



IDENTIFYING DATA

Programming of Intelligent Systems

Subject	Programming of Intelligent Systems			
Code	V05G300V01943			
Study programme	(*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	Spanish			
Department				
Coordinator	Burguillo Rial, Juan Carlos			
Lecturers	Burguillo Rial, Juan Carlos Costa Montenegro, Enrique			
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Web				

General description This course will begin providing the notion of agent, to comprise what is, how build it and how can, the agents interact for modeling and solving complex problems. Later we will study the design, implementation and application of intelligent agents and multiagent systems in current communications technologies and relate them with other current paradigms such as: object oriented programming, mobile agents, the management distributed of networks, the adaptive user interfaces and the electronic commerce.

The students will learn to program multiagent systems in suitable platforms and mobile terminals (Android). Besides, they will perform a work in group, where they will extend the concepts studied in the subject to other topics of their own interest.

This subject will be taught and evaluated in Spanish by defect. Nevertheless, the teacher will ask the students about the possibility to provide the whole subject or part of it in English. In any case, all the documentation of the subject will be provided in English.

Competencies

Code	
A3	CG3: The knowledge of basic subjects and technologies that capacitates the student to learn new methods and technologies, as well as to give him great versatility to confront and update to new situations
A4	CG4: The ability to solve problems with initiative, to make creative decisions and to communicate and transmit knowledge and skills, understanding the ethical and professional responsibility of the Technical Telecommunication Engineer activity.
A9	CG9: The ability to work in multidisciplinary groups in a Multilanguage environment and to communicate, in writing and orally, knowledge, procedures, results and ideas related with Telecommunications and Electronics.
A95	(CE86/OP29) The ability to program computer applications and services based on artificial intelligence.

Learning aims

Expected results from this subject	Training and Learning Results
To understand the basic concepts of intelligent systems: search, reasoning and learning.	A3
To know the main concepts related with intelligent agents and multiagent systems.	A3 A95
To understand the basic concepts of software engineering in intelligent systems.	A3 A95
To achieve a suitable level of expertise in the use of IDEs for programming intelligent systems.	A3 A4 A95

To acquire skills in the design and development of intelligent services applied to electronic devices.	A3 A4 A95
To acquire skills for the application of intelligent systems in complex telematic services.	A3 A4 A9 A95

Contents

Topic	
Introduction to intelligent systems	a) Searching b) Reasoning c) Learning
Intelligent agents	a) Definition of intelligent agent b) Architectures for intelligent agents c) Learning and adaptability
Multiagent systems	a) Distributed Artificial Intelligence and multiagent systems b) Communication between agents: KQML, FIPA-ACL c) Coordination and protocols of interaction d) Learning in multiagent systems e) Self-organised multiagent-systems
Software engineering of oriented to agents	a) Programming and methodologies oriented to agents b) Agents vs. Objects c) Agents vs. Expert Systems d) The JADE development platform
Multiagent systems and Game Theory	a) Cooperation vs. Competition b) Negotiation c) Auctions d) electronic Commerce
Mobile agents	a) Concept of mobile agent b) Security problems c) Possible applications

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	3	6	9
Master Session	9	36	45
Laboratory practises	14	28	42
Proceedings	9	0	9
Forum Index	0	4	4
Tutored works	6	30	36
Multiple choice tests	1	4	5

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

Methodologies

	Description
Introductory activities	We start doing a generic introduction to the aims, and the global contents of the subject together with the results expected at the end of the course.
Master Session	We describe the different topics of the subject providing the necessary educational material.
Laboratory practises	Every student must do a practical task in the laboratory with the JADE development platform.
Proceedings	In the classes there will be open discussion, among groups of students, in order to focus on a topic of subject content, the analysis of a case, the outcome of a project, exercise or problem previously developed a keynote address.
Forum Index	The students must perform some activities within the TEMA platform at FAITIC in order to discuss topics related to the subject.
Tutored works	The students must perform a project in group, with the support of the professor, to extend and personalize the topics seen along the theoretical and practical classes. At the same time, we will try that the students perform such project demos using Android terminals.

Personalized attention

Methodologies	Description
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Tutored works	In the practical formative activities and tutoring, the professors of the subject will offer personal guidance to each student in the tasks to be performed, with the aim to orient the approach and the methodology. Also they will offer coordination information with other contents and subjects of the study program. It is recommended to consult the doubts with the teachers along the course in order to improve the understanding of the basic concepts, and for performing the tasks and activities to be evaluated.
Laboratory practises	In the practical formative activities and tutoring, the professors of the subject will offer personal guidance to each student in the tasks to be performed, with the aim to orient the approach and the methodology. Also they will offer coordination information with other contents and subjects of the study program. It is recommended to consult the doubts with the teachers along the course in order to improve the understanding of the basic concepts, and for performing the tasks and activities to be evaluated.
Proceedings	In the practical formative activities and tutoring, the professors of the subject will offer personal guidance to each student in the tasks to be performed, with the aim to orient the approach and the methodology. Also they will offer coordination information with other contents and subjects of the study program. It is recommended to consult the doubts with the teachers along the course in order to improve the understanding of the basic concepts, and for performing the tasks and activities to be evaluated.
Forum Index	In the practical formative activities and tutoring, the professors of the subject will offer personal guidance to each student in the tasks to be performed, with the aim to orient the approach and the methodology. Also they will offer coordination information with other contents and subjects of the study program. It is recommended to consult the doubts with the teachers along the course in order to improve the understanding of the basic concepts, and for performing the tasks and activities to be evaluated.

Assessment

	Description	Qualification
Laboratory practises	The students will perform a practical task in the laboratory with the JADE development platform where they will work with the concepts studied in the theoretical classes. These practices evaluate the competencies: A95, A3, A4.	30
Proceedings	Discussions done along classes related with expositions done or read previously. These discussions evaluate the competencies: A3, A4	5
Forum Index	Short answers and interaction done individually by students within the TEMA platform to discuss topics related with the subject. This forum evaluates the competencies: A3, A4	5
Tutored works	Evaluation of the works developed: understanding, maturity, importance and originality of the work and interaction between the group. These works evaluate the competencies: A3, A4, A9.	30
Multiple choice tests	Three successive tests (weeks 4, 7 and 10) to evaluate the contents given up to that time in the course. The tests will be individual and with time limit. These tests evaluate the competencies: A3	30

Other comments on the Evaluation

The elements that are part of the evaluation of the subject are the following:

- **Questionnaires:** along the course the student will fill 3 questionnaires that will contribute 10% to the final mark (each one).
- **Practical tasks:** each student will have to perform a practical task in the laboratory that will contribute 30% to the final mark.
- **Final work:** each student will have to do a work in group, about one among several possible topics, that will contribute 30% (5% proposal + 15% work done + 10% presentation) to the final mark.
- **Class participation:** students will discuss in class about expositions done by the professor, and this contributes in a 5% to the final mark.
- **Forum participation:** students must interact in the forum of the subject individually to achieve a 5% of the final mark.

Therefore, we have: questionnaires (3*x10 = 30%) + Practical task (30%) + Group Work (30%) + Class participation (5%) +

Forum (5%) = 100%.

Following the degree guidelines, the students that will follow this subject can choose between two evaluation: continuous evaluation and evaluation at the end of the semester.

Continuous evaluation: the student follows the continuous evaluation from the moment in that it fills two questionnaires. From that moment we assume that he/she has participated in the subject, independently of he/she assist to the final exam.

Evaluation at the end of the semester: the student will have to perform a final exam that substitutes the questionnaires done along the course, in addition to providing the practical task and the equivalent work to be done as part of the continuous evaluation.

Evaluation at the end of the second semester: the student will have to perform the part that has not passed previously.

The questionnaires and task proposed and performed in this course are only valid for the current course.

Sources of information

Michael Wooldridge,, **An Introduction to Multiagent Systems**, Addison-Wesley, 2a,

Stuart Russell, Peter Norvig, **Artificial Intelligence: A Modern Approach**,, Prentice Hall, 3a,

Jacques Ferber, **Multi-Agent Systems: an Introduction to Distributed Artificial Intelligence**, Addison-Wesley, 1a,

Alison Cawsey, **The Essence of Artificial Intelligence**, Prentice Hall Europe, 1a,

Recommendations

Subjects that it is recommended to have taken before

Programming II/V05G300V01302

Other comments

The only requirement for the students, in order to follow this subject, is to have a basic understanding of Java programming.
