

Course guide

270704 - IMAS - Introduction to Multiagent Systems

Last modified: 21/07/2022

Unit in charge: Barcelona School of Informatics
Teaching unit: 1042 - URV - Universitat Rovira i Virgili.

Degree: MASTER'S DEGREE IN ARTIFICIAL INTELLIGENCE (Syllabus 2017). (Compulsory subject).

Academic year: 2022 **ECTS Credits:** 5.0 **Languages:**

LECTURER

Coordinating lecturer: ANTONIO MORENO RIBAS

Others: Primer quadrimestre:
ANTONIO MORENO RIBAS - 11, 12

PRIOR SKILLS

Knowledge of basic Artificial Intelligence concepts.
Good programming skills in Java.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CEA1. Capability to understand the basic principles of the Multiagent Systems operation main techniques , and to know how to use them in the environment of an intelligent service or system.
CEA8. Capability to research in new techniques, methodologies, architectures, services or systems in the area of ??Artificial Intelligence.
CEP3. Capacity for applying Artificial Intelligence techniques in technological and industrial environments to improve quality and productivity.
CEP4. Capability to design, write and report about computer science projects in the specific area of ??Artificial Intelligence.

Generical:

CG3. Capacity for modeling, calculation, simulation, development and implementation in technology and company engineering centers, particularly in research, development and innovation in all areas related to Artificial Intelligence.

Transversal:

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

CT7. ANALISIS Y SINTESIS: Capability to analyze and solve complex technical problems.

TEACHING METHODOLOGY

The teaching methodologies employed in this course are:

- Lectures.
- Participative sessions.
- Supervision of practice sessions in the lab.
- Supervision and orientation in team work.
- Orientation of autonomous work.
- Personalised tutoring.
- Doubts sessions.



LEARNING OBJECTIVES OF THE SUBJECT

- 1.Acquisition of the basic theoretical concepts in the field of intelligent agents and multi-agent systems.
- 2.Design and implementation of a multi-agent in a team to solve a complex problem.

STUDY LOAD

Type	Hours	Percentage
Hours large group	16,0	12.80
Hours medium group	16,0	12.80
Guided activities	5,0	4.00
Self study	80,0	64.00
Hours small group	8,0	6.40

Total learning time: 125 h

CONTENTS

Intelligent Agents

Description:

Introduction to intelligent agents. Definition.
Architectures: reactive, deliberative, hybrid.
Properties: reasoning, learning, autonomy, proactivity, etc.
Typology: interface agents, information agents, heterogeneous systems.

Multi-Agent Systems

Description:

Introduction to distributed intelligent systems. Communication. Standards. Coordination. Negotiation. Distributed planning.
Voting. Auctions. Coalition formation. Application of multi-agent systems to industrial problems.



ACTIVITIES

Practical exercise

Description:

Practical exercise (in teams) in which a multi-agent system must be developed.

Specific objectives:

2

Related competencies :

CG3. Capacity for modeling, calculation, simulation, development and implementation in technology and company engineering centers, particularly in research, development and innovation in all areas related to Artificial Intelligence.

CEP4. Capability to design, write and report about computer science projects in the specific area of ??Artificial Intelligence.

CEP3. Capacity for applying Artificial Intelligence techniques in technological and industrial environments to improve quality and productivity.

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CT7. ANALISIS Y SINTESIS: Capability to analyze and solve complex technical problems.

Full-or-part-time: 40h

Self study: 40h

Theoretical exam

Description:

Examen of the theoretical content of the course

Specific objectives:

1

Related competencies :

CEA8. Capability to research in new techniques, methodologies, architectures, services or systems in the area of ??Artificial Intelligence.

CEA1. Capability to understand the basic principles of the Multiagent Systems operation main techniques , and to know how to use them in the environment of an intelligent service or system.

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

Full-or-part-time: 39h 54m

Self study: 39h 54m



Lectures

Description:

Theoretical lectures covering the content of the course

Specific objectives:

1

Related competencies :

CEA8. Capability to research in new techniques, methodologies, architectures, services or systems in the area of Artificial Intelligence.

CEA1. Capability to understand the basic principles of the Multiagent Systems operation main techniques , and to know how to use them in the environment of an intelligent service or system.

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

Full-or-part-time: 30h

Theory classes: 30h

Lab sessions

Description:

Work sessions in the computer lab

Specific objectives:

2

Related competencies :

CG3. Capacity for modeling, calculation, simulation, development and implementation in technology and company engineering centers, particularly in research, development and innovation in all areas related to Artificial Intelligence.

CEP4. Capability to design, write and report about computer science projects in the specific area of Artificial Intelligence.

CEP3. Capacity for applying Artificial Intelligence techniques in technological and industrial environments to improve quality and productivity.

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CT7. ANALISIS Y SINTESIS: Capability to analyze and solve complex technical problems.

Full-or-part-time: 15h

Laboratory classes: 15h

GRADING SYSTEM

Final exam: 40%

Practical exercise, developed in teams: 60%. This exercise will include the analysis of the architectures and types of agents appropriate for the exercise (10%), an analysis of the most adequate coordination and negotiation mechanisms (20%) and a final oral and written presentation of the complete multi-agent system (30%). It is necessary to complete the practical exercise to pass the course.

BIBLIOGRAPHY

Basic:

- Wooldridge, M.J. An introduction to multiagent systems. 2nd ed. John Wiley & Sons, 2009. ISBN 9780470519462.

Complementary:



- Fasli, M. Agent technology for e-commerce. John Wiley & Sons, 2007. ISBN 9780470030301.
- Mas, A. Agentes software y sistemas multi-agente : conceptos, arquitecturas y aplicaciones. Prentice-Hall, 2005. ISBN 8420543675.

RESOURCES

Hyperlink:

- <https://campusvirtual.urv.cat>