62220 - Intelligent Systems

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	534 - Master's in IT Engineering
ECTS	6.0
Year	1
Semester	First semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as

- **Class attendance**. Lectures consisting of teacher's presentations and illustrative examples.
- **Expert talks**. Sessions run by guest experts.
- **Seminars**. They consist of written or oral contributions of students.

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- **Problem-based learning**. Oriented-educational approach to learning and instruction in which students address real problems in small groups under the supervision of a tutor.
- **Laboratory sessions**. Activities with specialized equipment (in the laboratory, computer room).
- **Tutorials**. Students can review and discuss with the teacher the course contents.
- **Assessment**. A set of written and oral tests, practical work, projects, assignments, etc.
- **Autonomous work**. Preparation of assignments and exercises, and study of the lecture contents (for examination, library research, complementary readings, problem-solving, etc.)

5.2.Learning tasks

The course includes 6 ECTS (150 hours: 50 hours classroom activities/100 hours autonomous activities) distributed as follows:

- Classroom activities (approximately 50 hours). Lectures, expert talks, seminars, problem-solving sessions, and laboratory sessions.
- Research assignments and projects (65 hours).
- Tutorials (5 hours).
- Autonomous work (25 hours).
- Assessment (5 hours). Evaluation tests.

5.3.Syllabus

The contents of the course will deepen the analysis, synthesis and evaluation of intelligent systems that incorporate some of these techniques:

- Search algorithms
- Knowledge representation
- Knowledge Engineering
- Probabilistic reasoning
- Planning and decision making
- Machine learning
- Multi Agent systems
- Other outstanding technical

The course will address the following topics:

Topic 1. Models for Intelligent Systems

- 1.1 Graphical models
- 1.2 Hidden Markov Models
- 1.3 State-space Models

- 1.4 Application to scene recognition and tracking of objects using vision

Topic 2. Decision making: planning and learning

- 2.1 Motion Planning
- 2.2 Markov Decision Processes (MDP)
- 2.3 Reinforcement learning: active and passive learning
- 2.4 Application to intelligent autonomous vehicles

Topic 3. Multi-Agent Systems

- 3.1 Theory of agents and multi - agent systems
- 3.2 Design Workshop SMA + JADE
- 3.3 Application exercises

5.4.Course planning and calendar

The educational organization of the sessions is planned as follows:

- Lectures
- Problem-solving and cases
- Laboratory sessions

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the Center website and the course website.

Projects will be submitted at the end of the semester. The dates will be announced on the course website.

5.5.Bibliography and recommended resources

- Bishop, Christopher M.. Pattern recognition and machine learning / Christopher M. Bishop [1st ed., 13th print.] New York : Springer, 2009
- Duda, Richard O.. Pattern classification / Richard O. Duda, Peter E. Hart, David G. Stork . - 2nd ed. New York [etc.] : John Wiley and Sons, cop. 2001
- Murphy, Kevin P.. Machine learning : a probabilistic perspective / Kevin P. Murphy. Cambridge [etc.] : The MIT Press, cop. 2012
- Russell, Stuart J.. Artificial intelligence : a modern approach / Stuart J. Russell and Peter Norvig ; contributing writers, Ernest Davis, Douglas D. Edwards, David Forsyth . - 3rd ed. Boston : Pearson, cop. 2010
- Sutton, Richard S. Reinforcement Learning: An Introduction / Richard S. Sutton and Andrew G. Barto(a Bradford Book). The MIT Press, 2005