

## 62220 - Intelligent Systems

### Syllabus Information

**Academic year:** 2024/25

**Subject:** 62220 - Intelligent Systems

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 534 - Master's Degree in Informatics Engineering

**ECTS:** 6.0

**Year:** 1

**Semester:** First semester

**Subject type:** Compulsory

**Module:**

### 1. General information

The subject aims to teach the student how to design intelligent systems capable of solving complex problems. These types of systems are based on a diverse set of tools that cover different topics such as knowledge representation, planning, learning, decision making, perception and inference from uncertainty. The subject is presented as a combination of theory and practice that allows the student to determine which techniques are most appropriate for a given problem as well as to implement and use the corresponding algorithms to develop the system.

### 2. Learning results

Upon completion of the subject, the student will be able to:

1. Critically analyse artificial intelligence algorithms and their application in different projects.
2. Choose, develop and evaluate artificial intelligence algorithms to solve multidisciplinary problems of an academic, industrial or administrative nature.
3. Present the technical and/or scientific results obtained from artificial intelligence algorithms in a concise manner.
4. Evaluate the opportunities to apply artificial intelligence methods to current and future societal problems with an emphasis on the intersection of artificial intelligence with other disciplines.

### 3. Syllabus

1. Models for intelligent systems
  - 1.1 Graphic models
  - 1.2 Hidden Markov Models
  - 1.3 State-space Models
  - 1.4 Application to scene recognition and object tracking with vision
2. Decision making: planning and learning
  - 2.1 Markov Decision Processes (MDP)
  - 2.2 Planning in MDPs
  - 2.3 Reinforcement learning
  - 2.4 Applications in robotics and video games
3. Multi-agent systems
  - 3.1 Theory of agents and multi-agent systems
  - 3.2 Design Workshop SMA+JADE
  - 3.2 Application exercises

#### 4. Academic activities

The planned teaching for the face-to-face sessions at the Río Ebro campus is as follows:

- Master classes
- Problem solving and cases
- Laboratory practices

The schedule for all classes and dates for the practical sessions will be announced well in advance through the centre's and the subject's websites.

The proposed projects will be delivered at the end of the semester, on the dates indicated.

#### 5. Assessment system

In order to pass the subject, the student must demonstrate they has acquired the foreseen learning results by the following assessment activities:

P1 [30%] - Written and laboratory test. Open face-to-face test on practical cases proposed by the teachers or on the project developed by the student. Face-to-face laboratory practices. Learning results: 1, 2, 3, 4 and 5.

P2 [60%] - Directed works. Assignments, exercises and reports from laboratory practices in which the knowledge and skills acquired in the subject will be put into practice. Learning results: 3, 4 and 5.

P3 [10%] - Oral presentations and debates. The oral presentations of the work, exercises and practices will be valued. Learning results: 1, 2, 3, 4 and 5.

In order to pass the subject, the student must pass the exam (written test in P1) with a grade of 5 out of 10 points (N1), and the laboratory practices (face-to-face in P1 and report of the practices in P2) with a grade of 5 out of 10 points (N2). If the students passes both tests, the final grade will be calculated according to the following formula:  $0.3*N1+0.6*N2+0.1*N3$ . In the event that the student does not pass N1 and N2, the final grade will be the highest of the two. In case the student does not pass N1 or N2, the grade will be that of the failed test.

The student who does not choose the evaluation procedure described above, does not pass these tests during the teaching period, or who would like to improve their grade, will be entitled to a comprehensive test, which will be scheduled within the exam period corresponding to the first or second call. The evaluation of this global test will be carried out with the same criteria as those applied in the teaching period.

#### 6. Sustainable Development Goals

8 - Decent Work and Economic Growth

9 - Industry, Innovation and Infrastructure