Intelligent systems design

Academic Year: (2019 / 2020) **Review date: 23-04-2019**

Department assigned to the subject: Department of Computer Science and Engineering

Coordinating teacher: FERNANDEZ ARREGUI, SUSANA

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 2

STUDENTS ARE EXPECTED TO HAVE COMPLETED

None

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

* Specific competences:
CE12. Ability to apply mathematical, statistical, and artificial intelligence methods to model, design, and develop applications, services, intelligent systems and knowledge-based systems.
CG1. Ability to project, compute and design products, processes and installations in all areas of Computer Science
CG8. Ability to apply acquired knowledge and solve problems in new environments or less known in wider and multidisciplinary contexts, being able to integrate those concepts.

* Learning results:
o Ability to design an intelligent system, selecting the most appropriate architecture. (RA1, RA2, RA3, RA5, RA6)
o Ability to integrate computational sensing and actuation capabilities in a computer system. (RA1, RA2, RA3, RA5, RA6)
o Ability to select the most adequate knowledge representation formalism to model an intelligent system. (RA1, RA2, RA3, RA5, RA6)
o Ability to develop computer systems that integrate reasoning, planning, search, control and learning techniques. (RA1, RA2, RA3, RA5, RA6)
o Know mathematical, statistical, and artificial intelligence methods that are used in the design and development of intelligent systems. (RA1, RA2, RA3, RA5, RA6)
o Ability to design and develop intelligent systems to make decisions to solve problems under uncertainty (RA1, RA2, RA3, RA5, RA6)

DESCRIPTION OF CONTENTS: PROGRAMME

1. Intelligent systems
1.1 Design of intelligent systems
1.2 Cognitive and execution architectures
1.3 Case studies
2. Interaction with the environment
2.1 Computational perception
2.2 Case studies
3. Knowledge representation
3.1 Knowledge representation paradigms
3.2 Modeling of intelligent systems
3.3 Case studies
4. Reasoning
4.1 Heuristic Search
4.2 Planning
4.3 Other reasoning mechanisms
4.4 Case studies
5. Machine learning
5.1 Supervised techniques
5.2 Unsupervised techniques
5.3 Case studies

LEARNING ACTIVITIES AND METHODOLOGY

* Theory classes

o Focus on acquiring the specific competences, by presenting the topics the students should acquire. Students will be given slides and they will have a list of basic reference books that will allow them to complete those subjects in which they are more interested. The focus will be on general aspects of the application of Artificial Intelligence techniques to the development of computational systems, including decision support systems.

* Case-based classes.
o Students will solve practical cases related to knowledge representation, design of intelligent systems based on reasoning, planning, search, control and learning.

* Homeworks.
o They will be preferably done in groups and they will be tailored towards the design and development of intelligent systems. We will consider systems that integrate several artificial intelligence techniques to solve real-world problems. Also, those techniques will be applied to decision making.

* Personal work of students.
o Focused towards the acquisition of the ability of auto-organization and planning of individual work and learning process

ASSESSMENT SYSTEM

The goal of the evaluation is to assess the degree of achievement of learning objectives. Thus, all the student work will be evaluated, both individually and in group, through the continuous evaluation of the activities performed: problems, exams, homeworks, final project and other academic activities. The student will be able to assess how much s/he knows and what is expected from her/him. The final grade will take into account all the activities. It will be composed of a 50% from the exam (10% of oral presentation of the final project and 40% of the written exam), 20% from homeworks and 30% from the final project. The grade in the extraordinary evaluation will be composed mainly by the exam.

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

BASIC BIBLIOGRAPHY

- E. Rich and K. Knight Artificial Intelligence, McGraw Hill, 1991

- S. Russell and P. Norvig Artificial Intelligence: A modern approach, Pearson Education, 2014