

Course guide

270736 - ISP - Intelligent System Project

Last modified: 21/07/2022

Unit in charge: Barcelona School of Informatics
Teaching unit: 723 - CS - Department of Computer Science.

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

Academic year: 2022 **ECTS Credits:** 3.0 **Languages:**

LECTURER

Coordinating lecturer: MIQUEL SANCHEZ MARRE

Others: Primer quadrimestre:
MIQUEL SANCHEZ MARRE - 10

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CEP4. Capability to design, write and report about computer science projects in the specific area of Artificial Intelligence.
CEP5. Capability to design new tools and new techniques of Artificial Intelligence in professional practice.
CEP8. Capability to respect the surrounding environment and design and develop sustainable intelligent systems.

Generical:

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.

Transversal:

CT2. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.

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.

Basic:

CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.
CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.

TEACHING METHODOLOGY

In general there will be different kind of teaching methods:

- Expositive Lectures
- Participative Lectures
- Project Supervising Classes
- Orientation classes for Autonomous work and cooperative teamwork

Concretely:

The first class will be focused on laboratory working teams, and basic information about the project will be given.

The following classes (3-4) will be devoted to providing information about the process of developing an Intelligent System and all its phases.

The remaining laboratory classes (7) will be devoted to oversee and guide the Intelligent System projects of different groups.

LEARNING OBJECTIVES OF THE SUBJECT

- 1.The students will be able to integrate and apply several knowledge acquired in previous Master courses for the solving of complex problems using Artificial Intelligence techniques
- 2.Students will be able to write and communicate their technical and research work on Intelligent Systems and achievements both to a general and specialized audience.
- 3.Students will acquire and learn the concepts and knowledge related to sustainability and their intrinsic relationship with Intelligent Systems.
- 4.Students will consolidate teamworking abilities.
- 5.Students will be able to design and construct an Intelligent System to solve a non trivial problem.

STUDY LOAD

Type	Hours	Percentage
Hours large group	27,0	36.00
Self study	48,0	64.00

Total learning time: 75 h

CONTENTS

Introduction

Description:

Description of the aims of the course. Description of the team works. Information about the IS project timeline. Deliverables of the IS project.

Problem Analysis

Description:

Problem Feature Analysis. Information/Data Analysis. Viability Analysis. Economical Analysis. Environmental and Sustainability Analysis.

Definition of the Intelligent System project issues

Description:

Definition of main goals of the IS project. Definition of sub-goals. Task Analysis.



Development of an Intelligent System Project

Description:

Data/Information Extraction. Data Mining & Knowledge Acquisition Process. Knowledge/Ontological Analysis. Planning and selection of Intelligent/Statistical/Mathematical Methods/Techniques. Construction of Models and implementation of Techniques. Module Integration. Validation of Models/Techniques. Comparison of Techniques. Proposed Solution.

Intelligent System Project Output

Description:

Executive Summary. Project System Documentation: User's Manual, System Manual. Project Schedule (Gantt's Chart). The Project Time Sheet.

Intelligent Methods and Models

Description:

Review of main Intelligent Methods available.

Software tools

Description:

Review of main software tools available.

ACTIVITIES

Introductory Lab Session

Description:

First Lab class will focus on laboratory working teams and on giving information about the IS project. (timeline, deliverables, etc.)

Specific objectives:

4

Related competencies :

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.

Full-or-part-time: 4h

Laboratory classes: 2h

Self study: 2h



Lab Sessions on the analysis of the problem and the design and implementation of an Intelligent System Project

Description:

The following classes will be dedicated to providing information about the process of developing an Intelligent System and all its phases

Specific objectives:

3, 5

Related competencies :

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.

CEP8. Capability to respect the surrounding environment and design and develop sustainable intelligent systems.

CEP5. Capability to design new tools and new techniques of Artificial Intelligence in professional practice.

CT2. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.

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

Full-or-part-time: 8h

Laboratory classes: 4h

Self study: 4h

Laboratory sessions on the review of intelligent methods and intelligent software tools available

Specific objectives:

1

Related competencies :

CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.

CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

Full-or-part-time: 4h

Laboratory classes: 2h

Self study: 2h

Laboratory sessions for tracking the project

Description:

The remaining laboratory classes (7) is devoted to oversee and guide the various Intelligent Systems projects of the different groups.

Specific objectives:

5

Related competencies :

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.

CEP5. Capability to design new tools and new techniques of Artificial Intelligence in professional practice.

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

Full-or-part-time: 16h

Laboratory classes: 16h



Midterm Deliverable

Description:

It is a document with the project analysis and project design

Specific objectives:

2

Related competencies :

CEP4. Capability to design, write and report about computer science projects in the specific area of ??Artificial Intelligence.
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.

Full-or-part-time: 11h

Guided activities: 1h

Self study: 10h

Final Presentation of the project

Description:

The project developed will be orally presented in class by each team, and they will have previously submitted all the required documentation, as well as the corresponding software code.

Specific objectives:

2, 5

Related competencies :

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.
CEP4. Capability to design, write and report about computer science projects in the specific area of ??Artificial Intelligence.
CEP5. Capability to design new tools and new techniques of Artificial Intelligence in professional practice.
CT7. ANALISIS Y SINTESIS: Capability to analyze and solve complex technical problems.
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.

Full-or-part-time: 32h

Guided activities: 2h

Self study: 30h



GRADING SYSTEM

The assessment of the achievement of the objectives of the course will be made by assessing the achievements of an Intelligent System project throughout the course, which will be done working in teams of 3 or 4 students.

The final grade (FGrade) is a weighted average between the teamwork (TGrade) assessment and the evaluation of the work of each individual student (IGrade) according to the formula:

$$FGrade = 0.5 * TGrade + 0.5 * IGrade$$

The individual grade for each student (IGrade) will be obtained as the mean between the observation and assessment of the ongoing work and participation of each student throughout the project according to the teacher (TeachA) and the self-assessment of each student participation and work in the team by her/his team members (SelfA). Thus,

$$IGrade = 0.5 * TeachA + 0.5 * SelfA$$

The teamwork grade (TGrade) will be a weighted average between four marks related to the definition of the project document (MS1Gr), the midterm delivery of system analysis and design (MS2Gr) the final document and software delivery (MS3Gr), and the final public presentation of the project (MS4Gr). It will be computed according to the formula:

$$TGrade = 0.15 * MS1Gr + 0.2 * MS2Gr + 0.45 * MS3Gr + 0.2 * MS4Gr$$

BIBLIOGRAPHY

Basic:

- Hopgood, A.A. Intelligent systems for engineers and scientists. 3rd ed. CRC Press, 2012. ISBN 9781439821206.
- Schalkoff, R.J. Intelligent systems: principles, paradigms, and pragmatics. Jones and Bartlett Publishers, 2011. ISBN 9780763780173.
- Negnevitsky, M. Artificial intelligence: a guide to intelligent systems. 3rd ed. Addison-Wesley/Pearson, 2011. ISBN 9781408225745.
- Sànchez-Marrè, Miquel. Intelligent Decision Support Systems [on line]. Springer, 2022 [Consultation: 18/01/2023]. Available on: <https://link-springer-com.recursos.biblioteca.upc.edu/book/10.1007/978-3-030-87790-3>. ISBN 9783030877897.

Complementary:

- Russell, S.; Norvig, P. Artificial intelligence: a modern approach. 4th ed., global ed. Harlow: Pearson Education Limited, 2022. ISBN 9781292401133.

RESOURCES

Hyperlink:

- <http://onlinelibrary.wiley.com/journal/10.1002/%28ISSN%291098-111X>- <http://tist.acm.org/index.php>- <http://www.computer.org/portal/web/computingnow/intelligentsystems>- <http://www.springer.com/computer/ai/journal/10489>