

Academic Year: ( 2023 / 2024 )

Review date: 26-04-2023

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: GENOVA FUSTER, GONZALO

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 1

## SKILLS AND LEARNING OUTCOMES

### LEARNING OUTCOMES:

- Produce creative papers and personal projects in the corresponding area of study.
- Gain familiarity with the different programmes of naturalistic study of the mind and their functioning.
- Identify formally correct and incorrect arguments by translating natural language utterances to formal language, and applying first-order logic to make demonstrations and deductions.
- Understand the concepts of numbering system, algorithm and computability, and appreciate their historical and practical importance.
- Programme simple algorithms and appreciate the logic of their functioning.
- Identify and evaluate the importance of the human factor in the development and use of symbolic systems.
- Make an informed judgement on the social and ethical challenges posed by artificial intelligence.
- Understand the notion of computability, and the concept of programme stored on a computer, as a set of instructions for executing an algorithm, and identify the difference between a machine with a fixed programme and a self-programmable machine.
- Integrate elements from different areas of knowledge to analyse a situation and suggest actions or solutions.
- Promote team spirit and the integration of others' points of view.

## OBJECTIVES

- To understand the classical concept of biologically based human intelligence.
- To understand the technological concept of artificial intelligence based on the processing of information in a computational machine.
- To understand the concept of computability introduced by Alan Turing, the basis of all computer science.
- To understand the concept of a program stored in a computer as a set of instructions to execute an algorithm.
- To understand the difference between a machine with a fixed program and a self-programming machine.
- To understand the concept of technological singularity, and the limits faced from the computational paradigm.
- To understand precisely the similarities and differences between natural intelligence and artificial intelligence.

## BASIC COMPETENCES

Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.

## SPECIFIC COMPETENCES

Explain human cognition and intelligence on the basis of the construction of symbolic languages and systems.

## TRANSVERSAL COMPETENCES

Display a capacity for organisation and planning and, at the same time, for adapting to new problems or situations. Work collaboratively in teams.

## DESCRIPTION OF CONTENTS: PROGRAMME

1. The classical conception of intelligence. Intelligence, rationality and self-consciousness. Theoretical reason, productive reason, practical reason.
2. The sciences of the artificial. Machines and artifacts. Structure and purpose of a machine.
3. Intelligence understood as the capacity to solve problems. What problems can be solved. Computability.
4. Computational machines as a substrate of artificial intelligence. Turing and Von Neumann.
5. The paradigm shift: explicit programming vs. machine learning. Problem solving. Emulation of human behavior.
6. The future and limits of artificial intelligence. The technological singularity. Machines ethics: freedom and responsibility.
7. The way back: natural intelligence understood in the light of artificial intelligence.

## LEARNING ACTIVITIES AND METHODOLOGY

### TRAINING ACTIVITIES

Theoretical classes  
Theoretical-practical classes  
Tutorials  
Group work  
Individual student work

### TEACHING METHODOLOGIES

Presentations in the professor's lecture room with computer and audiovisual support, in which the main concepts of the subject are developed and a bibliography is provided to complement the students' learning.  
Critical reading of texts recommended by the subject professor: Press articles, reports, manuals and/or academic articles, either for later discussion in class, or to expand and consolidate knowledge of the subject.  
Resolution of practical cases, problems, etc. raised by the professor, either individually or in a group.  
Presentation and discussion in class, under the moderation of the professor, of topics related to the content of the subject, as well as practical case studies.  
Developing pieces of work and reports, individually or in group.

## ASSESSMENT SYSTEM

### EVALUATION SYSTEM

Final exam: 30%.  
Continuous evaluation: 70%.  
- Participation in class: 20%.  
- Individual or group work carried out during the course: 50%

<b>% end-of-term-examination:</b>	30
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	70

## BASIC BIBLIOGRAPHY

- Dreyfus, H.L. What Computers Can't Do: The Limits of Artificial Intelligence, New York: Harper and Row, 1972
- Gelernter, D. The Tides of Mind: Uncovering the Spectrum of Consciousness. , New York: Liveright, 2016
- Tallis, R. Why the Mind Is Not a Computer: A Pocket Lexicon of Neuromythology, Exeter: Imprint Academic, 2004

## BASIC ELECTRONIC RESOURCES

- Reaktor, Universidad de Helsinki . Elementos de IA ¿ Curso online gratuito: <https://www.elementsofai.com/es/>