UAB
Universitat Autònoma de Barcelona

Natural and Artificial Intelligence

Code: 106229
ECTS Credits: 6

2024/2025

Degree	Type	Year
2504235 Science, Technology and Humanities	OB	2

Contact

Name: Francesc Xavier Roque Rodriguez

Email: xavier.roque@uab.cat

Teachers

(External) Gonzalo Génova Fuster

Teaching groups languages

You can view this information at the end of this document.

Prerequisites

There are none.

Objectives and Contextualisation

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.

Competences

- Display a capacity for organisation and planning and, at the same time, for adapting to new problems or situations.
- Explain human cognition and intelligence on the basis of the construction of symbolic languages and systems.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.

- Work collaboratively in teams.

Learning Outcomes

1. Gain familiarity with the different programmes of naturalistic study of the mind and their functioning.
2. Identify and evaluate the importance of the human factor in the development and use of symbolic systems.
3. Identify formally correct and incorrect arguments by translating natural language utterances to formal language, and applying first-order logic to make demonstrations and deductions.
4. Integrate elements from different areas of knowledge to analyse a situation and suggest actions or solutions.
5. Make an informed judgement on the social and ethical challenges posed by artificial intelligence.
6. Produce creative papers and personal projects in the corresponding area of study.
7. Programme simple algorithms and appreciate the logic of their functioning.
8. Promote team spirit and the integration of others' points of view.
9. Understand the concepts of numbering system, algorithm and computability, and appreciate their historical and practical importance.
10. 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.

Content

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.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lectures	33	1.32	9, 10, 1, 3, 2, 5
Practical-theoretical lectures	16	0.64	6, 1, 8, 4, 7, 5
Type: Supervised			
Essay supervision	4.25	0.17	9, 10, 6, 1, 3, 2, 4, 7, 5
Type: Autonomous			
Group work	32.5	1.3	9, 10, 6, 1, 8, 3, 2, 4, 7, 5
Individual student work	62.25	2.49	9, 6, 1, 3, 2, 4, 7, 5

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

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Final essay	30%	0	0	9, 6, 1, 3, 2, 4, 7, 5
Group and individual essays	30%	0	0	9, 10, 6, 1, 8, 3, 2, 4, 7, 5
Partial examinations	40%	2	0.08	9, 10, 1, 3, 2, 7, 5

Final essay.
Group and individual essays.
Partial examinations.

There will be a reevaluation exam. To be reevaluated, the student must have been evaluated in a set of activities whose weight equals to a minimum of two thirds of the total grade of the subject (continuous evaluation) or have completed all the required assessment activities (single assessment). The student will be deemed NOT AVALUABLE if he/she has not participated in all the assessment activities

In the event of a student committing any irregularity that may lead to a significant variation in the grade awarded to an assessment activity, the student will be given a zero for this activity, regardless of any disciplinary process that may take place. In the event of several irregularities in assessment activities of the same subject, the student will be given a zero as the final grade for this subject.

Single assessment
Students who opt for the single assessment system will have to submit an essay (50%) and take an exam (50%), on the indicated date.

Bibliography

Basic References
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/

Software

No specific software is required.

Language list

Information on the teaching languages can be checked on the CONTENTS section of the guide.