Universitat Autònoma de Barcelona

2022/2023

Cognitive Processes

Code: 106577
ECTS Credits: 6

Degree	Type	Year	Semester
2504392 Artificial Intelligence	FB	1	1

Contact

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Use of Languages

Principal working language: english (eng)
Some groups entirely in English: Yes
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Teachers

Yago Ramis Laloux
Anna Jordana Casas
Marta Borrueco Carmona

Prerequisites

No prerequisites are required.

Objectives and Contextualisation

This course aims to explore how the study of Cognitive Processes (CP) can inform and improve Artificial Intelligence (AI). The student will experience cognitive process such as perception and attention, learning and memory, language processing, thinking and reasoning, and emotion. The role of those processes in AI will be emphasized.

Competences

- Communicate effectively, both orally and in writing, adequately using the necessary communicative resources and adapting to the characteristics of the situation and the audience.
- Conceive, design, analyse and implement autonomous cyber-physical agents and systems capable of interacting with other agents and/or people in open environments, taking into account collective demands and needs.
- Identify, understand and analyse the fundamental characteristics of neural mechanisms and human psychological and cognitive processes and relate them to the processes of automatic intelligent systems.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Work independently, with responsibility and initiative, planning and managing time and available resources, and adapting to unforeseen situations.

Learning Outcomes

1. Apply concepts and identify psychosocial processes in the analysis of people's behaviour in technological contexts.
2. Apply knowledge of social interaction to the design of artificial intelligence devices.
3. Communicate effectively, both orally and in writing, adequately using the necessary communicative resources and adapting to the characteristics of the situation and the audience.
4. Identify and distinguish the main cognitive functions involved in human behaviour.
5. Identify cognitive biases and heuristics and their influence on decision-making.
6. Identify psychosocial concepts and processes that help to understand and explain social interaction between people.
7. Identify the cognitive bases of human verbal and non-verbal language and their relationship to thought.
8. Identify the main characteristics, types and functions of emotions and how they relate to cognitive functions.
9. Integrate and relate human cognitive and emotional functions to behaviour predictions.
10. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
11. Understand the different sensory modes of information capture and processing, as well as their biological foundations.
12. Work independently, with responsibility and initiative, planning and managing time and available resources, and adapting to unforeseen situations.

Content

1. Human cognition (1 week)

- Introduction to human cognition
- *Basic definitions, psychology, cognitive psychology, neuroscience*
- The main cognitive processes: *Attention, perception, memory, learning, thinking, reasoning, motivation, emotion, and language*

2. Perception and attention (2.5 weeks)

- Basic processing: *Top-Down and Bottom-Up processes, visual perception, perceptual organization*
- Object and face recognition *Pattern recognition, face recognition, imagery*
- Motion perception: *Perception of human motion, visually guided action*
- Attention and performance: Multi-modal perception, divided attention, automatic processing

3. Learning and memory (2 weeks)

- Basic learning processes: *Types of conditioning, associative learning, contingent learning*
- Short-term vs long-term memory
- *Declarative, episodic and semantic memory, levels of processing, implicit learning, forgetting*
- Working memory
- *Memory systems, executive functions in working memory*
- Memory in real life: *Autobiographical memory, testimony, prospective memory*

4. Language processing (2.5 weeks)

- Speech perception: *Prelexical processing, word recognition, theoretical models*
- Parsing and pragmatics: *Parsing and prediction, pragmatics, discourse comprehension*
- Language Production: *Speech planning, speech errors, writing*

5. Thinking and reasoning (2.5 weeks)

- Problem solving: *Expertise in problem solving, insightand experience, reasoning and analogical problem solving*

- Judgment and decision making: Theories of judgement, decision-making: risk, emotion and social factors
- Deductive Reasoning:*Hypothesis testing, deductive reasoning, informal or irrational reasoning*

6. Motivation, Cognition and Emotion (2 weeks)

- *Appraisal:* Motivation and emotion, coping processes, cognitive biases
- *Emotion regulation:* Deliberate and implicit regulation, reappraisal and distraction
- *Consciousness:* Conscious experience, unitary consciousness

Methodology

The teaching methodology is based on different training activities. Master classes, seminars, workshops, supervised and autonomous activities will be scheduled during the 12.5 weeks of the course.

Type: Directed (50 hours)

- Master classes:
- Seminars (PAUL)
- Assessment

Type: Supervised (20 hours)

- Tutoring (group and individual)

Type: Autonomous (55 hours)

- Study
- Teamwork
- Preparing public presentation

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.

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Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Master classes	26	1.04	1, 11, 6, 5, 8, 4, 7, 9
Seminars	24	0.96	1, 3, 6, 10
Type: Supervised			
Tutoring (group and individual)	20	0.8	10, 12
Type: Autonomous			
Individual Study	44	1.76	1, 2, 11, 6, 5, 8, 4, 7, 9
Team work	20	0.8	3, 10, 12

Assessment

The evaluation of this subject is continuous. Assessment has a clear formative function.
The competencies of this subject will be assessed through activities, presentations and reports, as well as exams.

The evidence of learning that the student must demonstrate is based on class theories and practices, and on work competencies in practices.

The evaluation system is organized into 3 pieces of evidence, each of which is assigned a specific weight relative to the final grade:

Evidence 1: Follow-up activities (30%) rapid tests and class exercises related to the content of the sessions.
Evidence 2: Examination 1 half semester (35%) Human cognition, attention and perception, learning and theory
Evidence 3: Exam 2 end of semester (35%) Language processing, Thought and reasoning, Motivation, Cognition and Emotion.
Passed subject:
The subject is passed when the student obtains a global mark higher than 5 and has at least 2 of the 3 evidences presented.
For not fulfilling these criteria (not having passed two of the 3 evidences) the maximum mark obtained is 4 points.

Re-test:

Evidence can be retrieved and the same grade can be obtained from 1 to 10 in case it could not be done at the time due to a documented justified reason.
When the evidence has been made and not passed, the highest grade that can be obtained in the recovery is passed (5).
The recovery consists of the test that allows to demonstrate the minimum knowledge necessary to pass the subject.
The subject is not assessable: When the student has presented less than (40%) of the evidence.

This subject does not offer a synthesis test for second or subsequent enrollments.

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Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exam 2	35%	2	0.08	5, 8, 4, 7, 9, 12
First Exam	35%	2	0.08	1, 2, 11, 6, 12
Follow up activities	30%	12	0.48	1, 2, 3, 11, 6, 5, 8, 4, 7, 9, 10

Bibliography

Eysenck, M.W. & Keane, M.T. (2020). *Cognitive Psychology. A Student's Handbook*. Routledge.

Eysenk, M.W. & Groome, D. (2015). *Cognitive Psychology: Revisiting the classic studies*.

Harley, T. A. (2014). *The Psychology of Language: From Data to Theory. 4th Edition*. Routledge

Kahneman, D. (2011). *Thinking fast and slow.* Penguin Books.

Software

No specific software needed