

Cognitive Processes

Code: 106508

ECTS Credits: 6

Type: FB Year: 1 Semester: 1

Degree**1488 - Artificial Intelligence**

The contents of this guide are provisional and may be subject to minor changes. The final version of the guide will be available at the beginning of the semester.

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities

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

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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

- To conceive, design, analyse and implement autonomous cyber-physical agents and systems capable of interacting with other agents and/or people in open environments, considering the collective demands and needs.
- To identify, understand and analyse the fundamental characteristics of the human neural mechanisms, psychological and cognitive processes and relate them to the development of automatic intelligent systems.
- To communicate effectively, both in oral and written form, using in a proper way the communication resources and adapting the discourse to the context and the audience.

- To work autonomously, with responsibility and initiative, planning and managing the time and available resources, adapting to unforeseen situations.

Learning outcomes

- To identify concepts and psychosocial processes that allow the understanding and explanation of social interaction between people.
- To apply concepts and identify psychosocial processes in the analysis of the behaviour of the person in technological contexts.
- To apply the knowledge related to social interaction in the design of artificial intelligence devices.
- To know the different sensory modes of information acquisition and processing, as well as their biological foundations.
- To identify and distinguish the main cognitive functions involved in human behaviour.
- To identify biases and heuristics of thinking and their influence on decision making.
- To identify the main characteristics, types and functions of emotions, and their relationship with cognitive functions.
- To identify the cognitive bases of human verbal and non-verbal language and their relationship with thought.
- To integrate and relate the different human cognitive and emotional functions in the prediction of behaviour.

Content

1. **Human cognition** (1 week)
 - a. Introduction to human cognition
Basic definitions, psychology, cognitive psychology, neuroscience
 - b. The main cognitive processes
Attention, perception, memory, learning, thinking, reasoning, motivation, emotion, and language
2. **Perception and attention** (2 weeks)
 - a. Basic processing
Top-Down and Bottom-Up processes, visual perception, perceptual organization
 - b. Object and face recognition
Pattern recognition, face recognition, imagery
 - c. Motion perception
Perception of human motion, visually guided action
 - d. Attention and performance
Multi-modal perception, divided attention, automatic processing
3. **Learning and memory** (2 weeks)
 - a. Basic learning processes
Types of conditioning, associative learning, contingent learning
 - b. Short-term vs long-term memory
Declarative, episodic and semantic memory, levels of processing, implicit learning, forgetting
 - c. Working memory
Memory systems, executive functions in working memory
 - d. Memory in real life
Autobiographical memory, testimony, prospective memory
4. **Language processing** (2 weeks)
 - a. Speech perception
Prelexical processing, word recognition, theoretical models
 - b. Parsing and pragmatics
Parsing and prediction, pragmatics, discourse comprehension

- c. Language Production
Speech planning, speech errors, writing
- 5. **Thinking and reasoning** (2 weeks)
 - a. Problem solving
Expertise in problem solving, insight and experience, reasoning and analogical problem solving
 - b. Judgment and decision making
Theories of judgement, decision-making: risk, emotion and social factors
 - c. Deductive Reasoning
Hypothesis testing, deductive reasoning, informal or irrational reasoning
- 6. **Cognition and emotion** (2 weeks)
 - a. Appraisal
Motivation and emotion, coping processes, cognitive biases
 - b. Emotion regulation
Deliberate and implicit regulation, reappraisal and distraction
 - c. Consciousness
Conscious experience, unitary consciousness
- 7. **Assessment** (1.5 weeks)
 - a. Team presentation
 - b. Exam

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.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Master classes	26	1.04	E09.04, E09.05, E10.01, E10.02, E10.03, E10.04, E10.05, E10.06
Seminars	24	0.96	G03.04, G04.02, G04.04, E09.04, E09.05
Type: Supervised			
Tutoring (Group & Individual)	20	0.8	G03.04, G04.02, G04.04, E09.04, E09.05
Type: Autonomous			
Study	40	1.6	E09.04, E09.05, E10.01, E10.02, E10.03, E10.04, E10.05, E10.06
Team work	25	1	G03.04, G04.02, G04.04, E09.04, E09.05
Preparing public presentation	7	0.28	G03.04, G04.02, G04.04, E09.04, E09.05

Assessment

Assessment activities

Title	Weighting	Hours	ECTS	Learning outcomes
Follow up activities (Blocs 2-6; 4% each)	20%	2	0.08	E09.04, E09.05, E10.01, E10.02, E10.03, E10.04, E10.05, E10.06
Team Presentation & report	40%	4	0.16	G03.04, G04.02, G04.04, E09.04, E09.05
Exams (2)	40%	2	0.08	E09.04, E09.05, E10.01, E10.02, E10.03, E10.04, E10.05, E10.06

The evaluation of this subject is carried out continuously. The evaluation has a clear formative function. The competences of this subject will be evaluated by means of: follow up activities, group presentations and reports, as well as exams.

The learning evidences that the student must deliver will refer to the contents and competences worked in the theoretical and practical classes, and to the competences worked on in practice.

The evaluation system is organized in 3 evidences, each of which will be assigned a specific weight in the final grade:

Evidence 1: Follow up activities (20%) quick tests on the contents of the sessions.

Evidence 2: Team presentation and report (40%) based on a classical experiment of cognitive psychology

Evidence 3: Exams of the contents worked on Master classes and seminaries one by the middle of the semester and the other at the end.

Subject passed:

The subject is passed when the student obtains a grade equal to or greater than 5 and has at least two out of the 3 programmed learning evidences.

If you do not meet these requirements (not having passed at least two of the 3 evidences) the maximum grade that can be obtained is 4 points.

Recuperation:

The student may opt for resit if (a) throughout the continuous evaluation he has made evidences with a weight equal to or greater than two thirds of the total grade of the subject, and (b) at the end of the process of "Continuous assessment has a mark equal to or greater than 3.5 points and less than 5 points.

The teaching team of the subject will decide, depending on the unfulfilled evidence of each student, what or which one must recover.

The recuperation will consist of a test (or several tests in case of recovery of several evidences) to demonstrate that they have the minimum contents that need to approve the subject. The qualification obtained in the recuperation test will replace that of the written test recovered. The final grade of the subject will be recalculated from this note.

The maximum grade that can be obtained in the course, in case of overcoming the recovery, will be Approved (5).

Subject 'not evaluable': A student who has given learning evidences with a weight equal to or greater than 4 points (40%) can not record in acts as "non-evaluable".

This subject does not provide any synthesis test for students in second or more enrollments.

PLAGIARISM, COPIES, ETC: Without prejudice to other disciplinary measures deemed appropriate, and in accordance with current academic regulations, irregularities committed by a student that may lead to a variation of the grade will be graded with a zero (0). Evaluation activities that are graded in this manner and by this procedure will not be subject to recuperation. If it is necessary to pass any of these evaluation activities in order to pass the course, this course will be failed directly, without the opportunity to recuperate it in the same course. These irregularities include, among others :- the total or partial copy of a practice, report, or any other evaluation activity;- allow copying;- present a group work not done in its entirety by the members of the group;- present as their own materials produced by a third party, even if they are translations or adaptations, and present as their own materials produced by a third party, even if they are translations or adaptations, and in general work with elements that are not original and exclusive to the student;- have communication devices (such as mobile phones, smart watches, etc.) accessible during the individual theoretical-practical evaluation tests (examinations).In short: copy, let copy or plagiarize in any of the evaluation activities is equivalent to a FAIL with a grade lower than 3.5

Bibliography

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

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

Carroll, D.W. (2008). Psychology of Language. Belmont, CA: Thomson / Wadsworth

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

Software

No specific software needed