Neurobiology of Cognition and Behaviour

Code: 42911
ECTS Credits: 9

2025/2026

Degree	Type	Year
Neurosciences	OB	1

Contact

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Teachers

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Lidia Gimenez Llort
Marta Portero Tresserra
Sílvia Fuentes García
Beatriz Molinuevo Alonso

Teaching groups languages

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

Prerequisites

None special, except those established by the Master of Neurosciences.

Objectives and Contextualisation

The subject explores the brain, the central nervous system and its interaction with neuroendocrine and immune systems, always in relation to complex psychological processes, such as emotions, stress and the multiple aspects of cognitive functions. The neurobiology (and Neurogenetics) of the main psychopathologies (psychiatric pathologies) and brain aging are also studied, with emphasis on basic research in both laboratory and human animals, and in the translation of this research to the clinic.

Learning Outcomes

1. CA14 (Competence) Plan scientific projects on the neurobiology of cognition, identifying aspects related to ethical responsibility and respect for fundamental rights and duties, diversity, and democratic values.
2. CA14 (Competence) Plan scientific projects on the neurobiology of cognition, identifying aspects related to ethical responsibility and respect for fundamental rights and duties, diversity, and democratic values.
3. CA15 (Competence) Plan scientific projects on the neurobiology of cognition, identifying aspects related to ethical responsibility and respect for fundamental rights and duties, diversity, and democratic values.
4. CA16 (Competence) Incorporate the knowledge acquired in the field of neuroscience to continue your professional career independently or in a team.
5. KA12 (Knowledge) Identify the nervous, endocrine, and immune systems in the context of complex psychological processes such as emotions, stress, and cognition.
6. KA13 (Knowledge) Indicate the biological basis of both psychopathology and the ageing of the nervous system.
7. KA14 (Knowledge) Relate basic research to experimental models and their transfer to a clinical setting, both in experimental animals and in humans.
8. SA13 (Skill) Investigate the systems and models used in research on the degeneration, regeneration, and plasticity of the nervous system.
9. SA14 (Skill) Analyse cognitive processes under normal and psychopathological conditions.
10. SA15 (Skill) Examine the foundations of therapeutic treatments for pathologies of the nervous system.

Content

CONTENTS

BLOCK 1: SOME BASIC CONCEPTS AND PROCESSES

BLOCK 1A: LEARNING & MEMORY

1-LEARNING PROCESSES (I). Non-associative learning. Associative learning: Apetitive and Aversive Classical conditioning. Neurobiology of some forms of classical conditioning. (2 hours)

Alberto Fernández Teruel

2-LEARNING PROCESSES (II). Associative learning: Instrumental conditioning. Spatial and other forms of learning. Neurobiology of some forms of instrumental conditioning and spatial learning. (2 hours)

Alberto Fernández Teruel

3-MEMORY PROCESSES AND TEMPORAL DYNAMICS. Consolidation and reconsolidation. (2 hours)

Meritxell Torras

4-MEMORY SYSTEMS IN THE BRAIN (I). Explicit memory. Cognitive flexibility. (2 hours)

Anna Vale

5-MEMORY SYSTEMS IN THE BRAIN (II). Working memory. Emergence and maturational changes in implicit and explicit memory systems, and in working memory. (2 hours)

Gemma Guillazo

6-THE EMOTIONAL BRAIN. (2 hours)

Margarita Martí

7-SYNAPTIC PLASTICITY AND MEMORY. (2hours)

David Costa

8-THE ROLE OF SLEEP IN MEMORY CONSOLIDATION. (2 hours)

Isabel Portell

9-WORKSHOP: Practical evaluation of Block 1A (2 Subgroups). (2 hours)

Pilar Segura and Laura Aldavert

BLOCK1B: NEUROENDOCRINOLOGY & NEUROBIOLOGY OF STRESS

10-NEUROENDOCRINOLOGY & NEUROBIOLOGY OF STRESS (I). Hormone action mechanisms in the CNS. Neuroendocrine regulation of hypophysiary hormones. (2 hours)

Antonio Armario

11-NEUROENDOCRINOLOGY & NEUROBIOLOGY OF STRESS (II). Neurosteroids. (2 hours)

Marc Pallarés

12-NEUROENDOCRINOLOGY & NEUROBIOLOGY OF STRESS (III). Neurobiology of stress: Concepts, types and physiological markers. Processing stressing stimuli in CNS: Chronic stress and adaptation. Stress and pathological processes. (2 hours)

Antonio Armario

BLOCK 1C: NEUROBIOLOGY OF CONCIOUSNESS

13-NEUROBIOLOGY OF CONCIOUSNESS. Nature and basic concepts. Neural mechanisms of consciousness. (2 hours)

Ignacio Morgado

BLOCK 2: MENTAL HEALTH THROUGH THE LIFE CYCLE: FROM BASIC RESEARCH TO HUMAN SUFFERING

14-ANIMAL MODELS IN NEUROSCIENCE AND PSYCHIATRY RESEARCH. Overview on animal models of neuro-psychopathology. Validity criteria. Representative examples. (2 hours)

Rosa Mª Escorihuela

15-CHILD AND ADOLESCENT MENTAL HEALTH. Externalizing and internalizing behavior. Early life adversity. (3 hours)

Sílvia Fuentes, Beatriz Molinuevo

16-NEUROBIOLOGY OF AGGRESSIVE BEHAVIOR. Basic concepts. Classifications of aggressive behaviors. Animal models of aggression. Neurobiology of aggression. Development of aggressive behavior. Learning, maintenance, and control of aggressive behavior. Proximal causal factors of aggressive behavior Gene-environmental interactions. Causal models of the development of conduct problems. (3 hours)

Beatriz Molinuevo

17-ADDICTIVE BEHAVIOR (I). Addictive behavior. Stress and addiction. Individual differences in addictive behavior, and non-pharmacological addictions. Addictive drugs. Molecular basis of addiction. Motivation. (3 hours)

Roser Nadal

18-ADDICTIVE BEHAVIOR (II). Definition of addiction,toleranceand dependence. Role of animal models to study addiction. Neuroanatomy and neurochemistry of cerebral circuits of addictive behavior. (3 hours)

Jordi Ortiz

19-ANXIETY AND ITS DISORDERS. Definition of anxiety and fear. Essential neurobiology and neuropharmacology of anxiety and fear. Basic research with animal models. Main anxiety disorders. Pharmacological and non-pharmacological treatments. (2 hours)

Rosa Mª Escorihuela

20-NEUROBIOLOGY OF DEPRESSION AND AFFECTIVE DISORDERS. Definition of depression. Stress and depression. Essential neurobiology and neuropharmacology of depressive disorders. Basic research with animal models. Main depressive disorders. Pharmacological and non-pharmacological treatments. (3 hours)

Antonio Armario

21-NEUROBIOLOGY OF SCHIZOPHRENIA. Definition of schizophrenia. Essential neurobiology and neuropharmacology of schizophrenia. Basic research with animal models. Pharmacological and non-pharmacological treatments. (3 hours)

Alberto Fernández Teruel

22-THE AGING BRAIN (I). Health aging. Sensory, motor, cognitive, emotional and social function in the older people. Age-related cognitive and functional decline (under GDS, cultural and gender perspectives). (2 hours)

Lydia Giménez Llort

23- THE AGING BRAIN (II). Pathological aging: Clinical and translational research in neurodegenerative diseases (Dementia, Parkinson, Huntington Corea) and Accelarated aging. (2 hours)

Lydia Giménez Llort

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Clases magistrales	50	2	
Workshop	2	0.08	

Type: Autonomous		
Actividades autónomas	167	6.68

Master classes / expositions.

Discussion of some cases and / or scientific articles and experimental designs.

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
Practical evaluation (1st part)- Ejercicio práctico evaluativo (1a parte)	15	2	0.08	KA12, KA13, KA14, SA13, SA14, SA15
Theoretical exam- 1st part / Examen Teórico (1a parte)	35	2	0.08	CA14, CA15, CA16
Theoretical exam-2nd part / Examen teórico (2a parte)	50	2	0.08	KA12, KA13, KA14, SA13, SA14, SA15

To pass this module it will be necessary to get at least a 5.0 / 10.0 mark after averaging the mark of both blocks.

In order to be able to calculate this average it will be necessary to get a minimum of 4.0 both in BLOCK 1 (Theoretical exam 1st parte + Practical evaluation) and in BLOCK 2 (Theoretical exam 2nd parte).

The assessment tests will have different typologies (short questions, problem solving or multiple choice).

Students will have a second opportunity to take an examination of any part of the parts that they have failed, in a final recovery exam.

In order to take the recovery exam, students must have been previously assessed in a set of activities whose weight is equivalent to at least two-thirds of the total grade for the subject or module.

Students will receive a grade of "Not Evaluated" when the completed assessment activities account for less than a third of the final grade.

In this subject, the use of Artificial Intelligence (AI) technologies is not allowed in any of its phases. Any work that includes fragments generated with AI will be considered a lack of academic honesty and may lead to a partial or total penalty in the grade of the activity, or greater sanctions in serious cases.

Bibliography

GENERAL

Bear, M.F., Connors, B. i Paradiso, M. (2008) Neurociencia: la exploración del cerebro (3ª edició). Barcelona: Wolters Kluwer.

NR Carlson "Fisiologia de la Conducta", (8 Ed.) Barcelona: Ariel, 2005.

Kandel E. (2012) Principles of neural science. 5th ed. Ed. McGraw Hill.

MR Rosenzweig, AL Leiman y SM Breedlove, Psicobiologia, Barcelona: Ariel, 2005.

Squire LR, Bloom FE, Spitzer NC, Du Lac S, Ghosh A and Berg D (Eds)

"Fundamental Neuroscience" (3rd. Edit), New York Elsevier, 2008.

Stahl SM. Psicofarmacología esencial. Bases neurocietíficas y aplicaciones clínicas. Barcelona: Ariel. 2002.

Vallejo Ruiloba J, Leal Pérez C. Tratado de Psiquiatría (Volúmenes I y II). Barcelona: Ars Médica, 2010.

ESPECÍFICA

A Fernández-Teruel "Farmacología de la conducta: De los psicofármacos a las psicoterapias", Bellaterra: Servei de Publicacions de la UAB, 2008.

Ch. Koch "The quest for consciousness: a neurobiological approach", Colorado: Roberts and Co, 2004 (Ed.

española. Barcelona: Ariel).

GF Koob and ML LeMoal, "Neurobiology of addiction", New York: Academic Press, 2005

Morgado Bernal, I. (2007) Emociones e inteligencia social: las claves para una alianza entre los sentimientos y la razón. Barcelona: Ariel.

Morgado-Bernal, I: (2014) Aprender, recordar y olvidar: Claves cerebrales de la memoria y la educación. Barcelona: Ariel.

ET Rolls ET "Emotions explained", New York: Oxford University Press., 2005.

Sandi C, venero C, Cordero MI. Estrés, Memoria y trastornos asociados. Implicaciones para el daño cerebral y el envejecimiento. Barcelona: Ariel. 2001.

A Tobeña "Anatomia de la agresividad humana", Barcelona: Galaxia Gutenberg, 2001.

More specific bibliography on the different sessions / topics of this subject will be indicated by the respective professors and teachers at the time

Software

No specific programs are needed

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn

(SEMm) Seminars (master)	1	Spanish	second semester	morning-mixed
(SEMm) Seminars (master)	2	Spanish	second semester	morning-mixed
(TEm) Theory (master)	1	Spanish	second semester	morning-mixed