Neurobiology of Cognition and Behaviour

Code: 42911
ECTS Credits: 9

Contact
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Use of Languages
Principal working language: spanish (spa)

Teachers
Laura Aldavert Vera
Antonio Armario García
Margalida Coll Andreu
David Costa Miserachs
Gemma Guillazo Blanch
Margarita Martí Nicolovius
Ignacio Morgado Bernal
Roser Nadal Alemany
Marcos Pallarés Anyo
Isabel Portell Cortés
María del Pilar Segura Torres
Rafael Torrubia Beltri
Rosa Maria Escorihuela Agulló
Anna Vale Martínez
Meritxell Torras García
Jordi Ortiz de Pablo
Lydia Giménez Llort
Beatriz Molinuevo Alonso

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.

**Competences**

- Conceive, design, develop and synthesise scientific projects in the field of neurosciences.
- Continue the learning process, to a large extent autonomously
- Explain the basis of treatments for pathologies of the nervous system.
- Identify and use the techniques for studying the neurobiological substrate of behaviour, neurodegenerative processes, neuroprotective strategies and strategies of plasticity of the nervous system.
- Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.

**Learning Outcomes**

1. Continue the learning process, to a large extent autonomously
2. Describe the evolutionary, neural and molecular mechanisms of emotions, learning and memory.
3. Describe the psychoneuroendocrine bases of psychopathology.
4. Develop a deep sense of responsibility and respect for those affected by diseases of the nervous system and their families.
5. Explain the cellular and molecular bases of addictive behaviours.
6. Recognise the degree and nature of the genetic and environmental contribution to both normal and pathological behaviour.
7. Seek out information in the scientific literature using appropriate channels, and use this information to formulate and contextualise a research topic.
8. Understand the effect of behaviour on the immune system.
9. Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.

**Content**

"NEUROBIOLOGY OF COGNITION AND BEHAVIOR"

**BLOCK 1**

**BLOCK 1A: LEARNING & MEMORY**


*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. Encoding, consolidation, reconsolidation, forgetting. (2 hours)

*Meritxell Torras*

4- MEMORY SYSTEMS IN THE BRAIN (I). Implicit and explicit memories. Working memory (2 hours)

*Anna Vale*

5- MEMORIESYSTEMS IN THE BRAIN (II). Implicit and explicit memories. Working memory. (2 hours)
Laura Aldavert
6- SYNAPTIC PLASTICITY AND MEMORY. (2 hours)

David Costa
7- MEMORY MODULATION: EMOTIONS AND MOTIVATION (2 hours)

Margarita Martí
8- MEMORY MODULATION: SLEEP AND AROUSAL. (2 hours)

Isabel Portell
9- WORKSHOP: practical evaluation of Block 1A (2 Subgroups). (2 hours)

Pilar Segura and Margalida Coll

BLOCK 1B: 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 Pallarès


Antonio Armario

BLOCK 1C: NEUROBIOLOGY OF CONSCIOUSNESS

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

Ignacio Morgado

BLOCK 2

BLOCK 2: MENTAL DISORDERS AND BRAIN AGING: 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. 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
16-NEUROBIOLOGY OF DEPRESSION AND AFFECTIVE DISORDERS (I). Definition of depression. Stress and depression. Essential neurobiology and neuropharmacology of depressive disorders. (2 hours)

Antonio Armario

17-NEUROBIOLOGY OF DEPRESSION AND AFFECTIVE DISORDERS (II). Basic research with animal models. Main depressive disorders. Pharmacological and non-pharmacological treatments. (2 hours)

Antonio Armario

18- NEUROBIOLOGY OF SCHIZOPHRENIA (I). Definition of schizophrenia. Essential neurobiology and neuropharmacology of schizophrenia. (2 hours)

Alberto Fernández Teruel

19- NEUROBIOLOGY OF SCHIZOPHRENIA (II) Basic research with animal models. Pharmacological and non-pharmacological treatments. (2 hours)

Alberto Fernández Teruel

20-ADDICTIVE BEHAVIOR (I). Motivation. Definition of addiction, tolerance and dependence. Role of animal models to study addiction. (2 hours)

Jordi Ortiz

21-ADDICTIVE BEHAVIOR (II) Neuroanatomy and neurochemistry of cerebral circuits of addictive behaviour. Addictive drugs. (2 hours)

Jordi Ortiz, Roser Nadal

22-ADDICTIVE BEHAVIOR (III) Stress and addiction. Individual differences in addictive behaviour. Non pharmacological addictions. (2 hours)

Roser Nadal


Beatriz Molinuevo


Rafael Torrubia

25- THE AGING BRAIN (I). Age-related cognitive decline and brain function impairment. Aging and brain-related diseases. (2 hours)

Lydia Giménez

26- THE AGING BRAIN (II). Dementia/Alzheimer's disease: neuropathological characteristics, neurobiology, basic research with animal models (transgenics, etc), treatments. Stress, psychosocial/behavioral factors and brain aging. (2 hours)

Lydia Giménez

Methodology

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

Activities

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Assessment

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 students will have a second opportunity to pass the module by undertaking final exam including the contents of the whole module.

Assessment Activities

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<th>Weighting</th>
<th>Hours</th>
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Bibliography

GENERAL


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


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


ESPECÍFICA


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