

**Animal Physiology: Neurophysiology and
Endocrinology**

Code: 100807
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	OB	3	1

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: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: Yes

Teachers

Mercè Giral Carbonell
Francisco Javier Carrasco Trancoso

Prerequisites

It is convenient that the student has reached basic knowledge and competences of Biochemistry, Cell Biology, Histology and Animal Physiology (systems).

Objectives and Contextualisation

The subject of Physiology: Neurophysiology and Endocrinology is programmed during the first semester of the second year of the Degree in Biology and develops the integrated knowledge of the endocrine system and the normal functioning of the nervous system. Particular emphasis is placed on the mammalian nervous system.

The acquisition of the basic competences of the subject will allow the student to face with a sufficient base the study of the physiopathology and the understanding of the mechanisms that affect the endocrine and nervous systems of animals and humans.

The general formative objectives of the subject are:

- Know the anatomical organization of the nervous system.
- Identify the different cell types that make up nervous tissue.
- Learn the basic concepts of the physiology of the nervous system in health.
- Identify the circuits and mechanisms responsible for the main neural, motor, sensory and cognitive functions.
- Train the student to apply the knowledge acquired in the deduction of the consequences of the pathological alterations of the endocrine and nervous system.

- Acquire the necessary practical skills to perform frequent functional techniques in the endocrine and nervous fields.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Apply statistical and computer resources to the interpretation of data.
- Be able to analyse and synthesise
- Be able to organise and plan.
- Carry out functional tests and determine, assess and interpret vital parameters.
- Control processes and provide services related to biology.
- Design and carry out biodiagnoses and identify and use bioindicators.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- 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.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
- Understand and interpret the physicochemical bases of the basic processes of living beings
- Understand the processes that determine the functioning of living beings in each of their levels of organisation.

Learning Outcomes

1. Analyse a situation and identify its points for improvement.
2. Analyse the sex- or gender-based inequalities and the gender biases present in one's own area of knowledge.
3. Apply statistical and computer resources to the interpretation of data.
4. Be able to analyse and synthesise.
5. Be able to organise and plan.
6. Carry out functional tests and determine, assess and interpret vital parameters in animals.
7. Critically analyse the principles, values and procedures that govern the exercise of the profession.
8. Gain further understanding of electric phenomena and of signal transmission to excitable cells.
9. Gain further understanding of the functional mechanisms of hydrosaline and acid-base balance in the animal organism.
10. Identify, enumerate, describe, interpret and explain the analysis protocols applied to studies of a physiological nature.
11. Identify, enumerate, describe, interpret, explain and apply the rules on laboratory practice covering studies of a physiological nature.
12. Identify, enumerate, describe, interpret, explain and summarise the different levels of organisation of animals.
13. Identify, enumerate, describe, interpret, explain and summarise the function and regulatory mechanisms of the animal reproductive system.

14. Identify, enumerate, describe, interpret, explain and summarise the functional organisation of animal organs and systems.
15. Identify, enumerate, describe, interpret, explain and summarise the functional mechanisms of animal nutrition and metabolism.
16. Identify, enumerate, describe, interpret, explain and summarise the fundamental principles of the concept of homeostasis.
17. Identify, enumerate, describe, interpret, explain and summarise the physiological bases of adaptation to the environment.
18. Identify, enumerate, describe, interpret, explain and summarise the physiological bases of pathological processes.
19. Identify, enumerate, describe, interpret, explain and summarise the structure and functioning of the endocrine system.
20. Identify, enumerate, describe, interpret, explain and summarise the structure and functioning of the nervous system.
21. Identify, enumerate, select, describe, interpret, explain and summarise the practical skills needed to apply diagnosis techniques and decide on the use of bioindicators.
22. Identify, enumerate, select, describe, interpret, explain and summarise the practical skills needed to apply the most common functional study techniques.
23. Propose new methods or well-founded alternative solutions.
24. Propose projects and actions that incorporate the gender perspective.
25. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
26. 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.
27. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
28. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
29. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
30. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
31. Work in teams.

Content

Nervous system

- Cellular Biology of neurons.
- Glial cells and their function.
- Synapse and neurotransmission. Basic concepts of neurochemistry.
- Concepts of neuronal integration and neural integration.
- General anatomy of the nervous system. Blood-brain barrier. Cerebrospinal fluid.
- Histological structure of the cerebral cortex. Functional organization of the cortex and relationship with the thalamus.
- Sensory systems. Concept, types and mechanisms of transduction.
- Somatosensory information. Types, receptors and processing by the SNC. Processing of pain
- Hearing Processing in the cochlea. Central processing
- Vision. Photoreceptors and processing in the retina. Central processing

- Taste and Smell. Taste processing on taste buds and central processing. Organs of smell and central processing.
- States of activation of the SNC. Electroencephalogram. The reticular system. Vigil and dream.
- Emotion and motivation. Concepts. The role of the limbic system and hypothalamus.
- Vegetative nervous system. Sympathetic and parasympathetic.
- Motor control. General concepts. Spinal organization. Sensory organs of the muscle. - - Motor control: supra-medullary organization. Role of the cerebral cortex, basal ganglia and cerebellum. Vestibular function and balance.
- Superior functions of the SN. Memory and learning

Endocrine system and reproduction

- Hormones. Action mechanisms. Regulation systems.
- The pituitary gland: Neurohypophysis. Neurohypophysis hormones. Adenohypophysis. Anterior pituitary hormones. Hypothalamic control of pituitary function
- Adrenal gland: Adrenocortical tissue. Glucocorticoids. Mineralocorticoids. Chromaffin tissue. Catecholamines.
- The thyroid gland. Synthesis and function of thyroid hormones.
- Pancreatic hormones. Insulin and Glucagon.
- The metabolism of calcium and phosphorus. Parathormone and calcitonin. Vitamin D.
- The testicular function. Control of male reproductive functions
- The ovarian function. The ovarian and endometrial cycle. Reproductive control in the female.
- Endocrinology of pregnancy part and lactation

Unless the requirements enforced by the health authorities demand a prioritization or reduction of these contents

Methodology

Theoretical classes:

Systematized exposition of the topics of the subject, giving relevance to the most important concepts. The student acquires the basic scientific knowledge of the subject by attending theory classes, which will complement the personal study of the topics discussed.

Seminars:

Discussion on basic concepts and situations of alterations of the endocrine and nervous systems relevant to the learning of the subject. The knowledge acquired in the theory classes and in the personal study is applied to the reinforcement of concepts, complex regulation functions and problem solving that arise in the seminars.

Practical classes:

Practical sessions for the simulation of changes in membrane potential, as well as observation and performance of neurohistological and behavioral techniques. Group work and active learning are promoted.

Tutorials:

They will be done in a personalized way in the teacher's office (schedule to be arranged). They aim to clarify concepts, facilitate the study by the student and solve doubts.

The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities

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.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Laboratory Practices	12	0.48	3, 6, 10, 11, 22, 21, 4
Seminars	7	0.28	8, 9, 12, 16, 15, 20, 14, 13, 17, 4
Theoretical classes	32	1.28	8, 9, 16, 15, 20, 14, 13, 17, 4
Type: Supervised			
Tutorials	5	0.2	8, 9, 12, 16, 15, 20, 14, 13, 17, 22, 21
Type: Autonomous			
Problem resolution and analysis of data	10	0.4	3, 8, 9, 6, 10, 11, 12, 16, 15, 20, 14, 13, 17, 22, 21, 4
Study	78	3.12	3, 8, 9, 6, 10, 11, 12, 16, 15, 20, 14, 13, 17, 22, 21, 4

Assessment

The competences of this subject will be evaluated by:

- Exams of objective multiple choice tests combined with short questions about the knowledge acquired (70% of the final grade)
- Evaluation of the preparation and discussion of the concepts and problems worked on in the seminars (15% of the final grade)
- Evaluation of the developed activity and of the comprehension of the practices through written exam, the same day of the exam of the second partial (15% of the final grade).

2/3 of the theory note corresponds to the part of the nervous system and 1/3 to the part of the endocrine system. A minimum grade of 4.5 is required for each of these exams to be mediated with the seminars and practices.

Attendance at Practical Sessions (or field trips) is mandatory. The student will obtain the grade of "Not Evaluable" when sum absence is superior to 20% of the programmed Sessions.

To participate in the recovery, students must have been previously evaluated in a set of activities the weight of which equals a minimum of two thirds of the total grade of the subject or module. Therefore, the students will obtain the "Not Evaluable" qualification when the evaluation activities carried out have a weight lower than 67% in the final grade.

Student's assessment may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Seminars	15%	1.5	0.06	30, 7, 2, 1, 3, 8, 9, 6, 10, 11, 12, 16, 15, 19, 20, 14, 13, 17, 18, 22, 21, 23, 24, 29, 28, 27, 25, 26, 4, 5, 31
Theoretical classes	70%	4	0.16	30, 7, 2, 1, 3, 8, 9, 6, 10, 11, 12, 16, 15, 19, 20, 14, 13, 17, 18, 22, 21, 23, 24, 29, 28, 27, 25, 4, 5, 31
practical exam	15%	0.5	0.02	30, 7, 2, 1, 3, 8, 9, 6, 10, 11, 12, 16, 15, 19, 20, 14, 13, 17, 18, 22, 21, 23, 24, 29, 28, 27, 25, 26, 4, 5, 31

Bibliography

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GUYTON AC, HALL JE. *Tratado de Fisiología Médica* (13 ed.), Elsevier, 2016.

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TRESGUERRES J.A.F. et al. *Tratado de endocrinología básica y clínica. Volumen I i II Ed.*Síntesis 2001

TRESGUERRES J.A.F. *Fisiología Humana*, Interamericana-McGraw Hill (4ª Ed.), 2014 (*)

(*) Electronic access

Software

We do not use any software