Structure and Function of the Nervous System

Code: 101919
ECTS Credits: 6

2025/2026

Degree	Type	Year
Biomedical Sciences	OB	2

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Teaching groups languages

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

Prerequisites

It is convenient that the student has reached basic knowledge and skills about the structure and organization of the human body and its cellular systems.

It is important that the student has achieved the basic knowledge and skills of the subjects of Histology and General Physiology.

Objectives and Contextualisation

The subject Structure and Function of the Nervous System is programmed during the second semester of the second year of the Degree in Biomedical Sciences and develops the integrated knowledge of the anatomy, histology and normal functioning of the nervous system. Particular emphasis is placed on the human 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 of injuries, diseases and degenerative processes that affect the human nervous system during the following courses.

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 and their organizational differences in different regions of the nervous system.

• 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 pathological alterations of the nervous system.

• Acquire the practical skills necessary to perform microscopic, macroscopic and functional techniques frequent in the biomedical field (laboratory II).

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Describe biomedical problems in terms of causes, mechanisms and treatments.
- Display knowledge of the bases and elements applicable to the development and validation of diagnostic and therapeutic techniques.
- Display knowledge of the basic life processes on several levels of organisation: molecular, cellular, tissues, organs, individual and populations.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Read and critically analyse original and review papers on biomedical issues and assess and choose the appropriate methodological descriptions for biomedical laboratory research work.
- 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.
- Work as part of a group with members of other professions, understanding their viewpoint and establishing a constructive collaboration.

Learning Outcomes

1. Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
2. Analyse and identify the functional alterations, at the level of the nervous system, nerve cells and neurotransmitters, that are caused by various types of pathologies.
3. Analyse the functional mechanisms that allow the organism to adapt to the principal variations in the environment.
4. Describe the functioning of the nervous system.

5. Display the necessary practical skills to perform the most common functional neuroscience study techniques in the biomedical field.
6. Identify the macroscopic and microscopic structure of the nervous system.
7. Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
8. Perform basic techniques for assessing neurophysiological functioning and disorders.
9. 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.
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. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
12. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
13. 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.
14. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
15. Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
16. Understand the basic mechanisms of cell and tissue physiology.
17. Work as part of a group with members of other professions, understanding their viewpoint and establishing a constructive collaboration.

Content

Anatomy of the nervous system

1- Introduction to neuroanatomy.

2- Brain hemispheres

3- basal nuclei.

4- Limbic system.

5- Diencephalon

6- Brain stem

7- Cerebellum

8- Spinal cord

9- Autonomic nervous system

10- Cranial nerves

11- Vascularization of the nervous system

12- Nervous System covers

13- Ventricular system and cerebrospinal fluid

Histology of the nervous system

1- Cell bases of the nervous system development

2- Structural differences in the organization of the central and peripheral nervous system

3- Structural differences in the different areas of the central nervous system.

4- Response of the nervous system to injury

Physiology of the nervous system

1- Foundations of neurophysiology

2- Corticothalamic integration

3- Sensory systems

4- Somatosensory sensitivity

5- Special senses

6- Brain electrical activity, arousal mechanisms, wakefulness, and sleep

7- Neurobiology of motivation and emotion

8- Motor control

9- Learning and memory

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
seminars	10	0.4	12, 11, 9, 10, 17
Theoretical classes	36	1.44	4, 6
Type: Supervised			
Tutorials	5	0.2	1, 15, 14, 7, 13, 11, 9
Type: Autonomous			
Problem resolution and analysis of data	30	1.2	2
Study	60	2.4	2, 4, 6

Theoretical classes:

Systematized exposition of the main 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:

Acquisition of complementary knowledge in the theoretical part and presentation and work on cases or situations of nervous system alterations relevant to the learning of the subject. The knowledge acquired in the theory classes and in the personal study is applied to the resolution of cases that arise in the seminars. The students work in small groups.

Use of AI

In this course, the use of Artificial Intelligence (AI) technologies is permitted as an integral part of the work development, as long as the final result reflects a significant contribution from the student in terms of analysis and personal reflection. The student must clearly identify which parts were generated using such technology, specify the tools used, and include a critical reflection on how these tools influenced both the process and the final outcome of the activity. Lack of transparency in the use of AI will be considered academic dishonesty and may result in a penalty in the activity's grade or more serious sanctions in severe cases.

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.

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
Anatomy test	24.75%	2	0.08	2, 5, 6, 13, 11, 9, 10
content of seminars, problems and evaluation of papers	25%	3	0.12	1, 15, 14, 3, 2, 16, 5, 4, 6, 7, 13, 12, 9, 10, 8, 17
Histology test	12.75%	1	0.04	2, 5, 6, 13, 11, 9, 10
Physiology exam	37.5%	3	0.12	3, 2, 16, 5, 4, 13, 11, 9, 10

The competences in this subject will be evaluated by:

- Multiple-choice tests or short questions on the knowledge acquired (75% of the final grade)

- Evaluation of the content, preparation and presentations of the topics covered in the seminars and of the problems and cases and of the work carried out (25% of the final grade)

Partial exams will be carried out for each of the three modules that include the structure and function of the nervous system. The percent contribution to the final grade will be as follows: Anatomy (33%), Histology (17%) and Physiology (50%).

It is necessary to obtain a minimum grade of 5 in each part in the partial tests and 4.5 to average in the final test, where each part will be evaluated independently. If one module has grade below 4.5, the overall student's mark will be 4.8 points maximum, even though the weighted grade of the different parts is greater than or equal to 5.0. The mark of each part refers to that obtained in the partial exams or in the final exam.

The final grade of the subject will have a numerical expression, with a decimal on the scale of 0-10 and with the qualitative equivalence in accordance with the criteria of the UAB, of "fail" (0-4.9), "pass" (5.0-6.9), "good" (7.0 -8.9) and "excellent" (9.0-10.0). The following indications of the UAB will be rounded off to the nearest whole number when it is one-tenth of a value that entails a qualitative change of qualification. "High honours" will be among students who have achieved an excellent qualification. The number of "High honors awarded" may not exceed 5% as established by the academic regulations of the UAB.

To participate in the second-chance exam , 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 a "Not Assessed" qualification when the evaluation activities carried out have a weight lower than 67% in the final grade.

<u>Single assessment</u>

The students who opt for the single assessment will have to attend those seminars that are considered mandatory in the different modules. The evaluation of theoretical content and seminars will represent the 100% of the grade in the course and will take place on a single date that will coincide with the final continuous assessment test."

Bibliography

ANATOMY

- CROSSMAN AR, NEARY D. *Neuroanatomia* (3ª ed.). Ed. Elsevier-Masson, 2010.

- SCHÜNKE. *Prometheus. Vol 3. Cabeza y Neuroanatomia* (2 ed.). Panamericana, 2010.

- NOLTE J, ANGEVINE JB. *El encéfalo humano en fotografias y esquemas.* Ed. Elsevier, 2009.

HISTOLOGY

- ROSS. *Histologia. Texto y atlas color con biologia celular y molecular.* Panamericana, 2009.

- WELSCH. *Sobotta Histologia* (2ª ed.). Panamericana, 2008.

- OVALLE. *Netter's Essential Histology*. Saunders, 2008.

- GARTNER, L. *Texto Atlas de Histologia*. Mc Graw-Hill, 2008.

PHYSIOLOGY

- BARRETT KE. et al., *Ganong's Review of Medical Physiology* (26th Ed.), McGraw Hill, 2019

- CARDINALI DP, Neurociencia aplicada. Sus fundamentos. Panamericana, 2007*

- GUYTON AC, HALL JE. *Tratado de Fisiología Médica* (14ª ed.). Elsevier-Saunders, 2021.

- KANDEL ER et al. Principles of Neural Science (5th ed.). McGraw Hill Medical, 2013*

- PURVES. *Neuroscience* (6ª ed.). OXFORD UNIVERSITY PRESS, 2018

* Highly recommended

Software

No specific software is required for this subject

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
(SEM) Seminars	521	Catalan	second semester	morning-mixed
(SEM) Seminars	522	Catalan	second semester	morning-mixed
(TE) Theory	52	Catalan	second semester	afternoon