COURSE DATA

Data Subject	
Code	40143
Name	Systems neurobiology
Cycle	Master's degree
ECTS Credits	12.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
2074 - M.D. in Basic and Applied Neurosciences	Faculty of Biological Sciences	1	First term

Subject-matter

Degree	Subject-matter	Character
2074 - M.D. in Basic and Applied Neurosciences	1 - Neurobiology of systems	Obligatory

Coordination

Name	Department
LANUZA NAVARRO, ENRIQUE	357 - Cellular Biology, Functional Biology and Physical Anthropol.
TERUEL MARTI, VICENT MANUEL	17 - Human Anatomy and Embryology

SUMMARY

Systems Neurobiology topic is located on the first semester of the Master in Basic and Applied Neurosciences of the University of Valencia. It is developed in parallel to Cellular and Molecular Neurobiology and Behavioral Neurobiology. Systems Neurobiology is an integrative topic (moving between cellular / molecular levels and behavior). It is necessary a close coordination with the other two subjects the semester with regard to content and activities.

The overall objectives of the Systems Neurobiology course are to provide students basic knowledge about the organization of the nervous system in functional systems, to recognize the anatomic location of the centers in the brain and the structural organization of ourselves and understanding how the activity of centers of each of the functional systems contributes to processing information for sensory perception, decision making , execution of motor patterns and more complex mental processes such as cognition , emotion or memory.

This course contains high load of practical sessions that are aimed to introduce students into the basics of experimental methods used in the study of the anatomo - functional relationships of the nervous System. Additionally, practical part of the course intends for students to acquire skills in experimental design and the use of the most common techniques in this field. The knowledge of basic methods will proviode knowledge to interpret the results of the experiments (and thus be able to understand the results of functional neuroanatomy and articles neurophysiology) and understand its implications in the context of current knowledge. Finally, the subject aims to help develop the ability to communicate to either lay or specialized audiences this type of experimental work.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

OUTCOMES

2074 - M.D. in Basic and Applied Neurosciences

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Ser capaz de aplicar las técnicas de búsqueda, identificación, selección y recogida de información científica especializada, así como de los métodos que se han de tener en cuenta a la hora de examinar críticamente cualquier clase de fuentes y documentos científicos.

- Saber comunicar el conocimiento sobre neurociencia y sus implicaciones a públicos especializados y no especializados de un modo claro y sin ambigüedades, usando la lengua propia y el inglés.
- Comprender y conocer las bases neuroanatómicas, neurohistológicas, neuroquímicas y electrofisiológicas del sistema nervioso central y periférico
- Conocer la neurobiología de la percepción sensorial, la función motora y neuroendocrina, el aprendizaje, la memoria y la conducta así como las bases neurales de los trastornos psicológicos asociados y las estrategias terapéuticas

- Ser capaz de realizar una correlación ajustada de estructura-función asignando los elementos estructurales asociados a las principales vías nerviosas, entender sus relaciones, la biofísica y la neuroquímica de la interacción entre centros y el papel en la función global del sistema
- Saber aplicar el método científico a los estudios en neurociencias y poseer el espíritu crítico requerido para distinguir la información científica rigurosa de la pseudociencia
- Saber trabajar en equipos multidisciplinares y diseñar estrategias experimentales multidisciplinares en el ámbito de las neurociencias para la resolución de problemas biológicos complejos
- Saber trabajar de manera responsable y rigurosa en el laboratorio, considerando los aspectos de seguridad, manipulación y eliminación de residuos así como del correcto uso de los animales de experimentación y los principios éticos para la investigación en humanos.
- Conocer los principios éticos y legales de la investigación científica en neurociencias
- Comprender las aproximaciones experimentales y sus limitaciones, así como interpretar resultados científicos en neurociencias y saber elaborar y redactar informes que los describan
- Adquirir destrezas en el manejo de las metodologías empleadas en las neurociencias y en el registro anotado de actividades, así como en el manejo de programas informáticos para la obtención y análisis de los datos y la exposición de los resultados
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Ser capaz de elaborar y estructurar una presentación en los distintos formatos de comunicación científica.

LEARNING OUTCOMES

Skills that the student must show at the end of the learning process:

1. To demonstrate an understanding of the structural and functional organization of the nervous system and its relationship with other systems.

2. To be able to get series of histological sections of brain and perform staining techniques, conventional histochemistry and immunocytochemistry.

3. To be able to define the major divisions of the brain in histological sections and assign a particular brain region or any of the core functional systems

4. To acquire capacity in discriminating subdivisions in one region of the nervous system based on the distribution of certain markers

5. To organize effectively information in public presentations on functional systems

6. To demonstrate the ability to formulate and solve theoretical and related practical issues in Systems Neurobiology .

As for Social Skills, this topic aims to provide the student :

a. willing on how to work in groups coordinated maximizing individual skills

b. being able to participate in contributing ideas and debates arguing reasonably

c. being able to draw criticism of the work of others, showing a constructive attitude

d. being able to accept criticism and change their views flexibly to strong arguments

e. using English as the language in neuroscience

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	36,00	100
Laboratory practices	18,00	100
Tutorials	16,00	100
Seminars	4,00	100
Other activities	3,00	100
Study and independent work	150,00	0
Readings supplementary material	60,00	0
Preparing lectures	8,00	0
Preparation of practical classes and problem	5,00	0
TOTAL	**300,00**	

TEACHING METHODOLOGY

A. Theoretical classes

It will be developed in 3 weekly sessions of 1.5 hours, during the approximately 10 weeks of the semester, in the classroom in the presence of all students. They will consist of lectures and may include discussion forums for self-assessment of student work.

B. Laboratory Practical Classes

They are completed in the laboratory in 6 sessions of 3 hours, in groups of 16 students that will be developed according to the calendar published at the beginning of the academic year. During these sessions, different types of activities are carried out that pursue the following objectives: a) Understand the macroscopic anatomy of the nervous system to be able to place functional systems in their anatomical context; b) to learn the basic techniques of study of the nervous system at histological level and its foundations; c) To be able to study, in original experimental material elaborated during the practical sessions by the student and / or the teachers, in the cerebral circuits of some of the functional systems and

/ or the organization of some of its centers; d) Understand how human brain activity is investigated and how some of its dysfunctions are assessed.

C. Seminars or Classroom Practices

These activities are developed in a complete group, in the classroom or computer room. It consists of raising problems or practical assumptions that students will have to solve in working groups. At the end of the class, discussions of the problems and the possible solutions will be carried out, emphasizing the theoretical foundations of the answer and the methodology used to address the problems.

D. Group tutorials at the beginning of the course

It is developed in groups of 16 students, in 10 sessions of 2 hours at the beginning of the course (The first two weeks) and aims to update the knowledge of the student on fundamental curricular aspects for the understanding of the basic concepts of the neurosciences.

After these tutorials, the student will have to pass some assessment tests. Passing this assessment (at least 50% of the maximum mark) will be an indispensable requirement to be able to be examined in the subject, in addition to being used for the calculation of the final mark of the subject.

EVALUATION

The evaluation of knowledge learning andskills acquired by students will take into account all facets of it. It will therefore be very important the student-teacher relationship and the knowledge by the student of the degree of learning achieved by the student, which will be facilitated by personalized tutorials.

In addition, in order to be able to give a numerical qualification of the degree of knowledge and skills acquired by the student, different tests will be carried out who will try to measure these from the different teaching activities developed. like this:

A. Evaluation of the group tutorials at the beginning of the course (15%): Only will be able to carry out the final theoretical and practical tests of the subject one

once passed the evaluation of the tutorials at the beginning of the course. The note of the tutorials constitute 15% of the grade of the subject.

B. Assessment of theoretical knowledge (50%): One will be done evaluation of the concepts worked on in the theoretical sessions using the conducting tests with test-type questions and / or questions. Part of these tests will be held throughout the course, and part in the form of a final test. the weight end of the tasks performed throughout the course will be 10% and that of the test final 40%.

C. Assessment of practical knowledge and skills (10%): Required attendance at 80% of practical classes (laboratory and classroom). Is will make an assessment by conducting tests with questions and / or test-type questions about experimental approach to neurobiological problems or the interpretation of the results of experiments such as those posed in the practical lessons.

D. Practice report (25%): Students will prepare a report of the practical sessions in groups of 2-3 people that will be evaluated taking into account the

concretion, clarity and bibliographic material used.

FINAL NOTE: the sum of all parts (tutorials 15%, theory exam 40%, activities carried out throughout the course 10%, practice exam 10%,

practice report 25%). It will be essential to obtain at least 4 points of 10 in the theory test to perform the total calculation.

Second call: if the student has not passed the subject in the first call, the notes of the approved parties (tutorials, practics, activities carried out during the course and internship report)

REFERENCES

Basic

- El uso de alguno de los libros listados a continuación es necesario para el trabajo en la asignatura, por lo que se recomienda al estudiante la adquisición de alguno de ellos.
  Breedlove SM, Watson NV, Rosenzweig MR. 2010. Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience, Sixth Edition. Edicion española de Ariel, de 2005
  Carlson NR. 2009. Fisiología de la conducta. 8a edición. Madrid: Pearson Educación. Edición inglesa, Physiology of Behavior, por la misma editorial (de Allyn and Bacon)
  Kalat JD. 2009. Biological Psychology. Wadsworth Cengage Learning.
  Kandel ER, Schwartz JH, Jessell TH. 2001. Principios de neurociencia. McGraw-Hill Interamericana de España, 1400 páginas. Edición inglesa por la misma editorial en 2000
  Purves D, Augustine, Fitzpatrick, Hall, LaMantia, McNamara, White. 2007. Neurociencia. 3a Edicion. Editorial Médica Panamericana. Cuarta Edición inglesa en 2008, de Sinauer.
  Squire LR, Berg D, Bloom FE, du Lac S, Ghosh A, Spitzer NC. 2008. Fundamental Neuroscience, 3rd Edition. Academic Press.

Additional

- Cardinali DP. 2007. Neurociencia Aplicada: Sus fundamentos. Ed. Panamericana, Buenos Aires y Madrid
  Martin JH. 1998. Neuroanatomia (segunda edición). Prentice-Hall. Madrid
  Paxinos G (Ed). The Rat Nervous System (Third Edition). Academic Press. ISBN: 978-0-12-547638-6
  Paxinos G, Franklin KBJ. 2001. The Mouse Brain in Stereotaxic Coordinates. Academic Press, San Diego.
  Paxinos G, Watson C. 2007. The Rat Brain in Stereotaxic Coordinates, 6th Edition. Academic Press, San Diego. Book w/ CD-ROM, Reference
  Puelles L, Martinez-Pérez S, Martinez de la Torre M. 2008. Neuroanatomia. Ed. Panamericana, Buenos Aires y Madrid