



COURSE DATA

Data Subject	
Code	40143
Name	Systems neurobiology
Cycle	Master's degree
ECTS Credits	12.0
Academic year	2018 - 2019

Study (s)

Degree	Center	Acad. Period	year
2074 - M.D. in Basic and Applied Neurosciences	Faculty of Biological Sciences	1	First term
2180 - M.U. en Euromediterráneo en Neurocienc. y Biotecnol. 13-V.1	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
2180 - M.U. en Euromediterráneo en Neurocienc. y Biotecnol. 13-V.1	2 - Cognitive and functional neuroanatomy	Obligatory

Coordination

Name	Department
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 provide 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

English version is not available



EVALUATION

English version is not available

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. Neuroanatomía (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, Martínez-Pérez S, Martínez de la Torre M. 2008. Neuroanatomía. Ed. Panamericana, Buenos Aires y Madrid