

Neuroanatomy

Academic Year: (2024 / 2025)

Review date: 18-02-2025

Department assigned to the subject: null

Coordinating teacher:

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 1

LEARNING OUTCOMES

K8: Knows the molecular and cellular basis of nerve impulse generation and transmission. Knows the different types of cells of the nervous system, and how their supracellular structures are established and organised. Knows the anatomical structure of the nervous system at both macroscopic and microscopic levels.

S1: Uses a variety of techniques to find, manage, integrate and critically evaluate available information for the development of professional activities in Neuroscience, especially in the digital sphere

S4: Uses their ability to analyse and synthesise, as well as to apply the principles of the scientific method in the work environment, in order to provide innovative responses to the needs and demands of society in their area.

S5: Appropriately uses the scientific and technical vocabulary of the different subfields within Neuroscience.

C1: Apply knowledge about the biological basis of Central Nervous System (CNS) disorders and their effects to the development of improved diagnostics and treatments.

C2: Apply knowledge about the organisation, structure and function of the Central Nervous System (CNS) to contribute to the evolution and improvement of technologies and systems for computing, data handling and analysis.

C5: Apply your neuroscience knowledge in a unifying and integrated fashion as part of a multidisciplinary team (pharmaceutical sector, health industry, diagnostic techniques, health information technologies, government agencies and regulatory bodies).

C6: Apply the results of your comprehensive training to your everyday professional activities, combining Neuroscience knowledge with a solid foundation of ethical responsibility and respect for fundamental rights, diversity and democratic values.

C7: Apply the scientific and technical principles you acquired during your undergraduate training, together with your own natural learning capabilities, to better adapt to novel opportunities arising from scientific and technological development.

DESCRIPTION OF CONTENTS: PROGRAMME

Comprehensive overview of neuroanatomy. The course is organised in three units:

I. Macroscopic organisation of the brain, the main types of cells that compose the brain (neurons and glia), how these cells interact with each other, anatomical and modern imaging technology to visualise brain anatomy.

1. General organisation of the nervous system, anatomical terms and planes.

2. Structure and function of neurons and glia.

3. Anatomical and physiological properties that allow neurons to communicate with each other.

4. Macroscopic anatomy of the brain and main internal and external structures, meninges, connective tissues, and fluids based on 3D (macroscopic tissue/models) and 2D (cross-sections) images.

5. Different types of modern neuroimaging tools, including CT, PET/SPECT and MRI (including T1, T2, T2-FLAIR, DTI and fMRI).

II. Anatomy of the spinal cord and brainstem, the main ascending and descending pathways, and the structure and function of the cranial nerves and nuclei.

6. Anatomy of the spinal cord and brainstem in 3D (macroscopic tissue/models) and 2D images (cross-

sectional).

7. Main ascending and descending pathways of the spinal cord.

8. Name and function of the cranial nerves and the location of their nuclei.

9. Neurobiology and the special sensory pathways.

III. Major parts of the upper motor system, the limbic and autonomic systems, and the higher order cognitive and sensory processing areas of the brain.

10. Anatomy and function of the three main parts of the upper motor systems (motor cortex, cerebellum, basal ganglia).

11. Structure and function of the limbic and autonomic systems.

12. Higher-order processing in the auditory, vestibular, visual, somatosensory and chemosensory systems.

13. Capacities for plastic change in higher brain areas, as well as stable organisational or functional properties that do not appear to be plastic

LEARNING ACTIVITIES AND METHODOLOGY

Classroom lectures.

Face-to-face classes: reduced (workshops, seminars, case studies).

Student individual work.

Laboratory session.

Final exam.

Seminars and lectures supported by computer and audiovisual aids.

Practical learning based on cases and problems, and exercise resolution.

Individual and group or cooperative work with the option of oral or written presentation.

Individual and group tutorials to resolve doubts and queries about the subject.

Internships and directed laboratory activities.

ASSESSMENT SYSTEM

% end-of-term-examination: 60

% of continuous assessment (assignments, laboratory, practicals...): 40

Final exam.

Continuous evaluation.