

Course syllabus

Course title	Intruduction to neuroanatomy
Instructor(s)	Aleksandra Bala, PhD, Marcin Leśniak, PhD, Ewa Malinowska PhD
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Affiliation	Faculty of Psychology, University of Warsaw
Course format	seminar
Number of hours	30 hours
Number of ECTS credits	3 ECTS credits = 90 hours work load: 30 hours – class attendance 20 hours – reading weekly literature 40 hours – prepering for exams
Brief course description	This course is designed to familiarize students with functional anatomy of the nervous system (NS). We will focus on the structure and function of the cental NS, although the organisation of the peripheral NS also will be discussed. The clinical significance of different cerebral regions and neural connections will be explored by studing symptoms and anatomical bases of multiple neurological disorders. Students will consolidate their knowledge by doing control exercises in class, reading additional texts and watching educational films.
Full course description	<p>This course is designed to familiarize students with functional anatomy of the nervous system (NS). We will focus on the structure and function of the cental NS, although the organisation of the peripheral NS also will be discussed. The clinical significance of different cerebral regions and neural connections will be explored by studing symptoms and anatomical bases of multiple neurological disorders. Students will consolidate their knowledge by doing control exercises in class, reading additional texts and watching educational films.</p> <p>The course starts with basics of functional neuroanatomy including: macro- and microscopic organization of the nervous system, principles of neural transmission, anatomy and functioning of major parts of the central NS: spinal cord, brainstem, cerebellum, diencephalon and cerebrum. The structure and function of meningeal coverings, ventricular system and cerebrospinal fluid circulation are also discussed.</p> <p>The course then continues with the organisation of main sensory (visual, auditory, balance, somatosensory, olfactory, gustatory) and motor systems. Based on an understanding of normal neural connections and brain</p>

function, the anatomical bases for several neurological conditions are also explored.

Learning outcomes	<p>By the end of the course students should:</p> <ul style="list-style-type: none">- identify the anatomical and functional divisions of the nervous system (K_W05)- recognize the major features of the external and internal morphology of the adult brain and spinal cord (K_W05)- understand the organization of functional systems, sensory and motor (K_W05, K_W07, K_U07)- understand the organization of the higher cortical processes (K_W05, K_W07, K_U07)- knows the basic methods of studying the structural and functional aspects nervous system (K_W07)- understand clinical deficits following lesions within the CNS (K_W05, K_W07, K_U07)- be able to interpret basic brain images (K_W05, K_W07, K_U07)- build their understanding of functional neuroanatomy on their own through reading scientific literature (K_K01, K_K02)
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Learning activities and teaching methods	Students will experience lectures, discussions, and practice exercises in class. The lecturer's presentations will be supported with short educational videos, e.g. http://www.neuroanatomy.ca/videos.html
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List of topics/classes and bibliography	<p>Recommended bibliography:</p> <ol style="list-style-type: none">1. Text: Nolte, J. (2008, 6th edition). <i>The human brain. An introduction to its functional anatomy</i>. Philadelphia: Mosby Elsevier.2. Atlas: Felten, D. L., Shetty, A. N. (2003, 2nd edition). <i>Netter's atlas of neuroscience</i>. Philadelphia: Saunders.
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List of topics:

1. Introduction and organization of the nervous system

Basic terminology (including planes of section and directions in CNS), evolution and uniqueness of human CNS, development and organization of human CNS.

2. Neurons and neuroglia

Origin of cells in the nervous system, classification of neurons and neuroglia, as well as their structure, and functions.

3. Synaptic transmission between neurons

Electrical activity of nervous cells, types of neuronal connections and specificity of signal transmission through chemical synapses, the role of neurotransmitters.

4. Sensory receptors and the peripheral nervous system

Peripheral nervous system, innervation of various parts of human body as well as specific receptors.

5. Spinal cord and the ascending and descending tracts

The anatomy of the spinal cord, ascending (somatosensory) and descending (motor) tracts and their functions.

6. Brainstem and the cranial nerves

The significance of the brainstem for entire CNS, the location of cranial nerves nuclei, the structure and function of ascending reticular formation, the role of the brainstem in oculomotor behaviour.

7. Basal ganglia

The classification of basal ganglia, functional cortico-basal circuits, controversies regarding the role of basal ganglia in cognition.

8. Cerebellum

The anatomy of the cerebellum, functional circuits, the role in motor control, motor learning, cognitive functioning and emotions.

9. Cerebrum

Introduction to gross anatomy and general organisation of the central nervous system, cerebral cortex of the two hemispheres, sulci and gyri, hippocampus and limbic system, thalamus and hypothalamus, ventricular system and cerebrospinal fluid, meningeal coverings of the brain and spinal cord (dura mater, arachnoid, pia mater), brain blood supply system.

10. Cerebral cortex

Layers of the neocortex, specialisation of the cortex for different functions: sensory areas, motor areas, association areas, corpus callosum as the connection between two hemispheres.

11. Limbic system

Hippocampus and amygdala as components of the two major limbic subsystems supporting a variety of functions including: attentional and emotional processes, motivation, social

information processing, memory, learning and olfaction, hypothalamus and its role in controlling drives.

12. Visual system

The primary visual pathway (retina and retinal neurons, optic nerve, optic chiasm, optic tract, lateral geniculate nucleus, optic radiation, visual cortex), the old visual pathway, functional organisation of the primary cortex, visual association cortex and how the visual fields are mapped.

13. Chemical senses

Chemical senses of taste and smell, gustatory , olfactory and trigeminal inputs, how taste and olfaction is mediated

14. Hearing and balance

The ear: auditory and vestibular receptors, the role of cochlea, vestibulocochlear nerve, auditory pathway, the importance of information regarding linear and angular acceleration of the head.

15. Motor system

Motor units and muscle fibers, motor control systems (pyramidal and extrapyramidal motor systems).

Assessment methods and criteria	3 written exams (100%): consisting of multiple choice and short answer questions. The final grade is the average of the grades of the partial tests.
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Attendance rules	Two unexcused absences are allowed. . The 3rd unexcused absence may result in lowering the grade. More than three unexcused absences is equivalent to the course failure.
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Prerequisites	-
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Academic honesty	Students must respect the principles of academic integrity. Cheating and plagiarism (including copying work from other students, internet or other sources) are serious violations that are punishable and instructors are required to report all cases to the administration.
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Remarks	-
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