

**First name and surname****Date****UČO****Signature**

---

1. Types of axoplasmatic transports according to direction and speed, their functions in the intact neuron and during axon regeneration, examples of transported molecules.
2. Smell - stimuli, receptor cells, transduction mechanism of smell stimuli in bipolar cells.
3. Structural-functional compartments of the cerebellum (horizontal and longitudinal divisions). Connections of the spinal cerebellum (median and paramedian zones) and their functional involvements. Cerebellum and learning. Effects of cerebellar lesions - examples.

**First name and surname****Date****UČO****Signature**

---

1. Draw and describe motor cortical pathways that influence the motoneurons in spinal cord, describe their functions. Describe their crossing of midline and somatotopic arrangement.
2. Temperature sense - stimuli, receptors and their characteristics. Temperature regulation.
3. Eye movements - basic types and their function, eliciting stimuli. Describe CNS structures involved in control of saccadic eye movements. Electrooculography.

**First name and surname****Date****UČO****Signature**

---

1. Draw and describe scheme of ascending pathways for the nociceptive information in spinal system.
2. Transduction of light signal in photoreceptors.
3. The basal ganglia, their afferent, efferent, and basic internal connections. Four basic functional loops of the basal ganglia. Role of the basal ganglia in motor control. Examples of the basal ganglia impairments in humans.

**First name and surname****Date****UČO****Signature**

---

1. Structural basis for the blood-brain (hematoencephalic) barrier, its transport mechanisms and significance.
2. Postsynaptic potentials – mechanisms of generation. Length and time constant of the neuronal membrane and its relation to temporal and spatial summation of membrane potentials.
3. Structural-functional compartments of the cerebellum (horizontal and longitudinal divisions). Connections of the vestibular cerebellum, the pontocerebellum and their functional involvements. Cerebellum and learning. Effects of cerebellar lesions - examples.

**First name and surname****Date****UČO****Signature**

---

1. Structures free of total blood-brain (hematoencephalic) barrier, describe their localization and functional effects.
2. Functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) - principles of measurement, examples of clinical and experimental use.
3. Reflexes in motor control. Myotatic and Golgi tendon organ reflexes and their functional involvements. Draw and describe scheme of these reflex arches. Supraspinal influences on reflexes. Task specific reflex reversal. Evaluation of reflexes in clinical practice, examples. H reflex.

**First name and surname****Date****UČO****Signature**

---

1. Describe pathways for projection of the visual information to subcortical structures, and their functional significance.
2. Resting potential of the neuron. Equilibrium potential for sodium, potassium and chloride.
3. Learning and memory – nondeclarative and declarative memory, corresponding CNS structures in humans. The role of hippocampal formation. Cellular mechanisms of habituation and sensitization. Neurophysiological mechanisms of memory storage – long term potentiation and depression. Memory impairments.

**First name and surname****Date**

UČO

**Signature**

---

1. Draw and describe the organization of spinal motoneurons in ventral horn. General categorization of motor pathways.
2. Receptor (generator) potential - electrophysiological characteristics and mechanisms of generation. Coding of sensory information – intensity, duration and modality. Adaptation of sensory receptors.
3. Central system of emotion and stress - major structures and pathways of limbic forebrain including amygdala. Information inputs to the limbic forebrain, information processing. Projections of the limbic forebrain to effector systems. Components of a defensive response. Assessment of capabilities to cope with threat in relation to corresponding behaviour. Linkage of psychosocial stress to organ pathology.

**First name and surname****Date****UČO****Signature**

---

1. Draw and describe motor pathways from the brainstem that influence the spinal motoneurons, describe their functions.
2. Control of feeding behaviour – motivational state and its determinants, central structures, corresponding behaviour).
3. Nociception and pain, stimuli, receptors, physiological significance. Classification of pain, nerve fibres. Pain perception. Referred pain. Draw and describe scheme of ascending pathways for the nociceptive information in trigeminal system. Describe structures for endogenous analgesic system and its functional significance.

**First name and surname****Date****UČO****Signature**

---

1. Describe types of the neuronal synapses and their characteristics by localization and transmitters. Structural and functional differences between chemical and electrical synapses.
2. Taste - stimuli, receptor cells, transduction mechanisms. Taste buds and their innervation.
3. Language and speech - modern concept of organization. CNS structures engaged in spoken and written language. Target muscle groups and corresponding motor pathways. Function of hemispheres in different aspects of language. Aphasias.

**First name and surname****Date****UČO****Signature**

---

1. Draw and describe neurons and their connections and function in the enteric nervous system.
2. Auditory signal – physical characteristic, mechanisms of transduction in the hair cells of Corti organ.
3. Control of locomotion. Spinal pattern generators, basic stepping pattern and its modulation by afferent information. Describe function of main CNS structures involved in locomotion. Describe and draw a scheme of proprioceptive pathways from the lower extremity.

**First name and surname****Date****UČO****Signature**

---

1. Somatosensory pathways from the skin of body and extremities, scheme and its description.
2. Neuromuscular junction – basic structural components and their functions. Mechanisms of signal transmission, end plate potential.
3. Central system of emotion and stress - major structures and pathways of limbic forebrain including amygdala. Information inputs to the limbic forebrain, information processing. Projections of the limbic forebrain to effector systems. Components of a defensive response. Assessment of capabilities to cope with threat in relation to corresponding behaviour. Linkage of psychosocial stress to organ pathology.

**First name and surname****Date****UČO****Signature**

---

1. Draw and describe a scheme of somatosensory pathways from the skin of facial part of the head (trigeminal system).
2. Reflexes in motor control - monosynaptic, polysynaptic reflexes. Reflex arc. Muscle tone. Alfa and gama motoneurons, their function.
3. Sense of balance – description of stimuli and receptor cells. Detection of head position due to gravity. Detection of angular and linear acceleration. Draw and describe a simple scheme illustrating position, localization and connections of neurons that convey vestibular information to brainstem. Nystagmus.

**First name and surname****Date****UČO****Signature**

---

1. Draw and describe structural arrangement and innervation of muscle spindle and Golgi tendon organ, describe their function.
2. Cerebral blood flow and its regulation. Factors affecting cerebral blood flow. Brain metabolism and oxygen requirements. Regional blood flow changes - autoregulation.
3. Optical system of the eye. Common defects of the image-forming mechanism. Adaptation to different light intensities. Accommodation. Photopic and scotopic vision. Draw and describe simple scheme of pathways for mydriatic and miotic pupillary reflexes and accommodation.

**First name and surname****Date**

UČO

**Signature**

---

1. Draw and describe proprioceptive pathways from the upper and the lower extremities.
2. Specialization of the hemispheres. Gnostic functions – examples, impairments.
3. Vision – detection of motion, and its functional significance. Describe information processing in the retina. Characteristic property of receptive fields of neurons in corresponding visual pathway. Draw and describe scheme of position, localization and connections of neurons for pathways that convey this visual information to the cortex. Describe arrangement of primary visual cortex and mention other visual cortices involved in motion analysis.

**First name and surname****Date****UČO****Signature**

---

1. Molecular mechanisms for axon navigation to the target tissue during development and regeneration of the nervous system.
2. Short-term modulation at synapses - presynaptic inhibition and facilitation, potentiation and posttetanic potentiation.
3. Encoding of auditory stimuli – frequency and intensity. Structure and functions of the inner and outer cochlear hair cells, mechanisms of stimulation. Function of basilar membrane. Draw and describe scheme of position, localization and connections of neurons for pathways that convey auditory information to the cortex.

**First name and surname****Date****UČO****Signature**

---

1. Draw and describe a simple scheme illustrating position, localization and connections of neurons that convey olfactory information to the structures of the CNS.
2. Sleep-waking periodicity. Sleep cycles (EEG and vegetative correlates). Examples of sleep disorders.
3. Eye movements - basic types and their function, eliciting stimuli. Describe CNS structures involved in control of the vestibulo-ocular reflexes and the slow eye movements.

**First name and surname****Date****UČO****Signature**

---

1. Draw and describe scheme of ascending pathways for the nociceptive information in trigeminal system.
2. Action potential – description, ionic fluxes, places of generation. Refractory period. Conduction velocity of the action potential, its determinants.
3. Visceral sensation - stimuli, receptors, their distribution. Draw and describe a simple scheme illustrating position, localization and connections of neurons that convey viscerosensory information to subcortical and cortical structures. Three examples of visceral information use in body function control.

**First name and surname****Date**

UČO

**Signature**

---

1. Taste pathway. Describe taste buds, their localization and innervation. Draw and describe a simple scheme illustrating position, localization and connections of neurons that convey taste information to the upper structures of the CNS.
2. Localization of sound in space.
3. Skin sensation from the facial part of the head (trigeminal system): 1) crude sensation and temperature sense, 2) discriminative and vibration sensation. Stimuli, receptors and their distribution. Draw and describe a simple scheme illustrating position, localization and connections of neurons that convey crude and discriminative skin sensation from the ventral part of the head to cortex, describe their somatotopic arrangement including cortex.

**First name and surname****Date****UČO****Signature**

---

1. Visual pathways. Draw and describe a simple scheme illustrating position, localization and connections of neurons that convey visual information to cortex.
2. Control of fluid intake (motivational state and its determinants, central structures, corresponding behaviour).
3. Voluntary movement of upper extremities. Essential afferent information. Draw and describe a simple scheme of motor pathways that control voluntary movements of upper extremity. Scheme and description of corresponding proprioceptive pathways. Praxis and apraxias. Electromyography.

**First name and surname****Date****UČO****Signature**

---

1. Auditory pathways. Draw and describe a simple scheme illustrating position, localization and connections of neurons that convey auditory information to cortex.
2. Electroencephalogram – description of electrical activity, basic rhythms, clinical meaning. Evoked potentials. Event-related potentials.
3. Control of posture – functions of postural system. Describe corresponding muscle groups, essential afferent information, reflexes and CNS structures. Proprioceptive pathways from the lower extremity, scheme and its description.

**First name and surname****Date****UČO****Signature**

---

1. Vestibular pathways. Draw and describe a simple scheme illustrating position, localization and connections of neurons that convey vestibular information to brainstem, describe their functions.
2. Chemical synapses - mechanisms of neurotransmitter release and its inactivation.
3. Vision – analysis of shape and colour. Information processing in the retina. Receptive fields of retinal ganglion neurons and neurons in corresponding visual pathway. Mechanisms of colour vision. Draw and describe scheme of position, localization and connections of neurons for pathways that convey this visual information to the cortex. Describe arrangement of primary visual cortex, mention other visual cortices for shape and colour analysis.

**First name and surname****Date**

UČO

**Signature**

---

1. Trophic interactions among the neurons and target tissue, neurotrophic factors and their characteristic features.
2. Membrane receptors of chemical synapses – describe their types and function. Excitatory and inhibitory neurotransmitters – mechanisms of action, examples.
3. Skin sensation from the body: 1) crude sensation and temperature sense, 2) discriminative and vibration sensation. Stimuli, receptors and their distribution. Draw and describe a simple scheme illustrating position, localization and connections of neurons that convey 1) crude and 2) discriminative skin sensation from the body to cortex, describe their somatotopic arrangement including cortex. Dermatomes.

**First name and surname****Date****UČO****Signature**

---

1. Draw and describe motor cortical pathways that influence the motoneurons in spinal cord, describe their functions. Describe their crossing of midline and somatotopic arrangement.
2. Monocular and binocular cues in perception of depth.
3. Parasympathetic compartment of the autonomic nervous system. Central structures and pathways. Localization of preganglionic and postganglionic neurons, neurotransmitters (synthesis and inactivation) and their receptors at parasympathetic junctions. Responses of effector organs to parasympathetic stimulation. Examples of reflexes with parasympathetic component.

**First name and surname****Date****UČO****Signature**

---

1. The CNS liquid compartments and their barriers. Formation and absorption of cerebrospinal fluid. Function of cerebrospinal fluid.
2. Visual acuity – definition, testing. Visual field – definition, perimetry, visual field deficits.
3. Sympathetic compartment of the autonomic nervous system. Central structures and pathways. Localization of preganglionic and postganglionic neurons, neurotransmitters (synthesis and inactivation) and their receptors at sympathetic junctions. Responses of effector organs to sympathetic stimulation. Examples of reflexes with sympathetic component.

**First name and surname****Date****UČO****Signature**

---

1. Glial cells and their role in the ontogenetic development of the CNS and the PNS.
2. Capturing sound - functions of the external ear, tympanic membrane and middle ear ossicles. Traveling wave in the cochlea.
3. Nociception and pain, stimuli, receptors, physiological significance. Classification of pain, nerve fibres. Pain perception. Referred pain. Draw and describe scheme of ascending pathways for the nociceptive information in trigeminal system. Describe structures for endogenous analgesic system and its functional significance.