Module “Sensation and perception”. Examination program
(Updated 2010-09-27)

**Biology**
(Updated)
1. Morphological and functional projections of the retina to the primary visual cortex.
2. Types of receptive fields of the primary visual cortex.
3. Modular structure of the primary visual cortex.
4. Functional peculiarities of the higher visual cortices.
5. Conception of the sensory information-processing channel.

**Anatomy**
(Updated)
1. Pathway of the epicritic sensibility.
2. Pathway of the protopathic sensibility.
5. Coats of the eyeball.
6. Ocular refractive media and cavities of the eyeball.
7. Optic nerve, optic tract and centers.
8. Extrinsic muscles of the eyeball and their innervation.
10. Anatomy of the external and middle ear.
11. Anatomy of the inner ear.
15. External structure and morphofunctional characteristic of the telencephalon.
16. Limbic system subdivisions, location, connections with other brain parts and significance.
17. Arterial and venous brain blood supply.

**Histology**
(Updated)
1. Sensory receptors, definition and classification. Short description of receptor groups.
2. Histophysiology of sensory nerve endings.
3. Histophysiology of taste and smell receptors.
5. Histophysiology of vascular layer of the eyeball.
6. Histophysiology of the retina, course of light, relationship of the retinal cells.
7. Ultrastructure of the photosensitive cells, importance for vision. Structure of the optic nerve.
8. The eye fluid drainage and potential consequences of its disturbances.
11. Histophysiology of the organ of Corti, receptor cells, potential consequences of their function disturbances.
12. Cyto- and myelo- architectonics (arrangement of cells and fibers) in the cerebral cortex, structures involved in the reflex arch.
13. Cyto- and myelo- architectonics (arrangement of cells and fibers) in the cerebellar cortex. Structures involved in the reflex arch.
14. The organization module of the cerebral cortex. Structure of the cerebral functional areas.
15. Histophysiology of the brain barriers.
Physiology and pathophysiology

(Updated)

3. Thermoreceptors (kinds, spectra) and nociceptors (kinds, adaptation). Pain substances (mediators). Compare kinds of pain (superficial, deep, and visceral).
4. Two somatosensory pathways transmitting information up to the cortex. Effects of lesions (producing dissociation of sensations).
5. Central mechanisms of pain control (spinal gating, descending pathways).
6. Optical system of the eye. Optical defects and their correction. Accommodation and its control (draw the neuronal circuit).
8. Distribution of photoreceptors in the retina and the visual acuity. Dark adaptation.
12. Function of the outer and middle ear. Air and bone conduction of the sound signal. Tests for conduction disorder.
13. The traveling wave of the basilar membrane of the cochlea. Transduction of the sound signal in the hair cells of Corti organ. Functions of inner and outer hair cells.
16. Transduction of taste signals in the receptor cells and information transmission pathways.
17. Transduction of smell signals in the receptor cells and synaptic transmission in the olfactory bulb. Central projection pathways.
18. Three areas of association cortex and some of their functions. Differences in cerebral hemispheres. Language areas (hemisphere, lobe, gyrus, Brodmann area) and their connections. Aphasias.
20. Sleep phases, stages and cycles defined by EEG, EMG and EOG. Changes of functions of other organs and systems. The role of the reticular system.

Biochemistry

(Updated)

4. Serotonin, acetylcholine and amino acids as neurotransmitters; their synthesis and inactivation. Glutamate receptors.
5. Proteins implicated in pathogenesis of Alzheimer disease, mechanism of action.
6. Biosynthesis of nitric oxide (NO), role of NO in neurodegenerative disorders.
Pharmacology
(Modified)

1. Describe the mode of action of opioid receptors agonists, antagonists and mixed (agonists-antagonists) acting drugs, indicate representatives of each group; pharmacologic effects on CNS and peripheral organs; use of these medicines in medicine.
2. Describe the opioid analgesics used for pain relief (classify according action to the opioid receptors), cough suppress and diarrhoea. Denote the most common adverse effect of the indicated groups to different organ systems.
3. Indicate the main groups (according to chemical structure and duration of action), representatives (drug names) of local anaesthetics; common pharmacokinetic properties and differences; local and systemic adverse effects to organ systems.
4. Describe the classification of inhaled general anaesthetics, representatives of each group; mechanism of action and pharmacological effects.
5. Describe the classification of intravenous general anaesthetics; representatives of each group; mechanism of action and pharmacological effects.
6. Identify the classification of anxiolytic and hypnotic drugs (according mechanism of action), representatives of groups; describe the action of these medicines to the GABA receptors and pharmacologic effects to organ systems.
7. Indicate the clinical use of benzodiazepines, barbiturates and other (new) anxiolytics and hypnotics; acute and chronic adverse effects (describe the approach to avoid tolerance, dependence and withdrawal syndrome of anxiolytics and hypnotics).
8. Identify the pharmacological effects of benzodiazepines and barbiturates to central nervous system and peripheral organs; compare the dose–effect relationship between benzodiazepines and barbiturates (show it graphically).
9. Indicate the classification of antiepileptic drug according to the mechanism of action; according to action on the different types of epileptic seizures (name the representatives) and describe the pharmacodynamic properties of each group.
10. Indicate the adverse effects of antiepileptic drug groups (names the representatives); indicate specific adverse effects (teratogenic, hepatotoxic, skin and immune system disorder and other effects) and antiepileptic drugs can cause these effects.
11. Identify classification of antidepressant drugs, name the representatives and the mechanism of action of each group; explain acute and chronic effects on receptors of the selective serotonin reabsorption inhibitors.
12. Describe the pharmacodynamic and pharmacokinetic properties and clinical use of antidepressant groups (indicate the representatives).
13. Describe the adverse effects of antidepressant drug (AD) groups in relation with effects on different types of receptors (adrenergic, cholinergic, serotonergic and histaminergic etc.) and neurotransmitters; indicate the antidepressants that can interfere with food (what food?) and describe the mechanism of that interaction.
14. Describe the classification of the antipsychotic drugs (neuroleptics) according to chemical structure and type of action; name the main representatives (drugs); describe the pharmacological effects in relation with the drugs action on dopamine receptors localised in different structures of brain.
15. Describe the antipsychotic drugs groups and representatives action on brain receptors; pharmacodynamic properties of these groups and use in medicine.
16. Indicate the most common adverse effects in relation with the action on different brain structures (e.g. Parkinsonism, other movement disorders, endocrine and metabolic effects, autonomic and anticholinergic effects etc.) and effects on peripheral organs.
17. Classify the psychostimulants and indicate the main representatives of the groups, describe mechanism of action and pharmacological effects.
General surgery
(Unchanged)
1. Superficial and infiltrative anesthesia, indications for surgery, contraindications, technique and
   anesthetics.
2. Intravenous regional anesthesia, indications, technique, anesthetics and complications.
3. Peripheral and central nerve blocks.

Pathological anatomy
(Updated)
1. Etiology, mechanisms of development, morphology and complications of the brain infarction.
2. Classification of the tumors of nervous system and its coverings.
3. Morphological peculiarities and complications of the neuroectodermal tumors of central nervous system.
4. Morphological peculiarities and complications of the meningeal and vascular tumors of central nervous
   system. Metastatic neoplasms, their primary localization and complications.