

UNIVERSITY OF ZAGREB SCHOOL OF MEDICINE

Plan of the course

Fundamentals of Neuroscience

Academic year **2016/2017**

prof. dr. sc. Goran Šimić

I. COURSE AIMS

This course introduces students to all aspects of the nervous system structure and function, in health and in disease. It includes the anatomy, physiology, chemistry, pharmacology, and pathology of nerve cells, as well as the behavioural and psychological features that depend on the function of the nervous system and the clinical disciplines that deal with them, such as neurology, neurosurgery, and psychiatry. Traditionally neuroscience is seen as a branch of biological sciences. However, recently there has been a convergence of interest from many allied disciplines, including medicine, psychology, physics, computer science, statistics and many others. The scope of neuroscience has now broadened to include any systematic scientific experimental and theoretical investigation of the central and peripheral nervous system of biological organisms. The methodologies employed by neuroscientists have been enormously expanded, from biochemical and genetic analysis of dynamics of individual nerve cells and their molecular constituents to imaging representations of perceptual, motor and cognitive tasks in the brain. Neuroscience is at the frontier of investigation of the brain and mind. The study of the brain is becoming the cornerstone in understanding how we perceive and interact with the external world and, in particular, how human experience and human biology influence each other. Neuroscience is the most rapidly growing field of science.

II. COURSE STRUCTURE

Course hours:

Lectures: 65

Seminar: 45

Practicum: 20

Total hours: 130

The course Fundamentals of Neuroscience will last for five weeks (15th May 2017 – 16th June 2017). It will consist of lectures (65 hrs), seminars/tutorials (approximately 45 hrs), and practicals (dissections, computer simulations, examination of microscopical preparations, EEG recordings and readings, etc. - 20 hrs), totaling 130 hrs. The class will be divided in two seminar groups (Group 1 and Group 2) and four groups for practicals (A, B, C, and D).

III. PLAN OF THE COURSE AND COURSE SCHEDULE

BLOCKS OF THE COURSE

Number of blocks: 1

Block number	Start	End
1.	15.5.2017	16.6.2017

BLOCKS OF THE COURSE

Number of blocks: 1

Block number	Start	End
1.	15.5.2017	16.6.2017

BLOCKS OF THE COURSE SCHEME

Block 1

Date	Time	Group	Course hours type	Theme	Teaching staff
Monday 15.5.2017.	09:00-09:45; HIIM Seminarska H1	1,2	Lectures	Foundations: Past, Present and Future of Neuroscience	prof. dr. sc. Goran Šimić
	10:00-11:45; HIIM Seminarska H1	1,2	Lectures	The Brain and Behavior	prof. dr. sc. Goran Šimić
	12:00-13:45; HIIM Seminarska H1	1,2	Lectures	The Orgins of Neuroscience	prof. dr. sc. Miloš Judaš
	14:00-15:45; HIIM Seminarska H1	1,2	Lectures	The Neuron Doctrine	prof. dr. sc. Miloš Judaš
Tuesday 16.5.2017.	09:00-12:00; HIIM Seminarska H1	A	Seminar	Gross Organization of the Central Nervous System	doc. dr. sc. Željka Krsnik
	09:00-12:00; HIIM Seminarska H2	B	Seminar	Gross Organization of the Central Nervous System	prof. dr. sc. Goran Šimić
	09:00-12:00; HIIM Autopsije	C	Seminar	Gross Organization of the Central Nervous System	izv. prof. dr. sc. Mario Vukšić
	09:00-12:00; HIIM Autopsije A1	D	Seminar	Gross Organization of the Central Nervous System	doc. dr. sc. Goran Sedmak
	09:00-12:00; HIIM Zbirka Z1	E	Seminar	Gross Organization of the Central Nervous System	Mirjana Babić Leko
Wednesday 17.5.2017.	09:00-10:45; HIIM Seminarska H1	A	Practicum	The Cells of the Nervous System: Neurons	doc. dr. sc. Željka Krsnik
	09:00-10:45; HIIM Seminarska H2	B	Practicum	The Cells of the Nervous System: Neurons	prof. dr. sc. Goran Šimić
	09:00-10:45; HIIM Mikroskopiranje	C	Practicum	The Cells of the Nervous System: Neurons	izv. prof. dr. sc. Mario Vukšić
	09:00-10:45; HIIM Mikroskopiranje M1	D	Practicum	The Cells of the Nervous System: Neurons	doc. dr. sc. Goran Sedmak
	09:00-10:45; HIIM Razvojna neuropatologija L2	E	Practicum	The Cells of the Nervous System: Neurons	Mirjana Babić Leko
	11:00-12:45; HIIM Razvojna neuropatologija L2	E	Practicum	The Cells of the Nervous System: Glia	Mirjana Babić Leko
	11:00-12:45; HIIM Mikroskopiranje M1	D	Practicum	The Cells of the Nervous System: Glia	doc. dr. sc. Goran Sedmak
	11:00-12:45; HIIM Mikroskopiranje	C	Practicum	The Cells of the Nervous System: Glia	izv. prof. dr. sc. Mario Vukšić

Date	Time	Group	Course hours type	Theme	Teaching staff
	11:00-12:45; HIIM Seminarska H2	B	Practicum	The Cells of the Nervous System: Glia	prof. dr. sc. Goran Šimić
	11:00-12:45; HIIM Seminarska H1	A	Practicum	The Cells of the Nervous System: Glia	doc. dr. sc. Željka Krsnik
Thursday 18.5.2017.	09:00-10:45; HIIM Seminarska H1	1,2	Lectures	A Guide to the Cerebral Cortex: Cortical Types	prof. dr. sc. Goran Šimić
	11:00-12:45; HIIM Seminarska H1	1,2	Lectures	A Guide to the Cerebral Cortex: Cortical Areas	prof. dr. sc. Goran Šimić
	13:00-14:45; HIIM Seminarska H1	1,2	Lectures	Chemical Neurotransmission and Nerve-Muscle Synapse	prof. dr. sc. Hrvoje Banfić
Friday 19.5.2017.	09:00-10:45; HIIM Seminarska H1	1	Seminar	Understanding CNS Structure through Development	prof. dr. sc. Goran Šimić
	09:00-10:45; HIIM Seminarska H2	2	Seminar	Understanding CNS Structure through Development	prof. dr. sc. Zdravko Petanjek
	11:00-12:45; HIIM Seminarska H1	1	Seminar	Development of the Cerebral Cortex	doc. dr. sc. Goran Sedmak
	11:00-12:45; HIIM Seminarska H2	2	Seminar	Development of the Cerebral Cortex	doc. dr. sc. Željka Krsnik
Monday 22.5.2017.	09:00-10:45; HIIM Kompjutorske učionica C	A	Practicum	Ion Channels and Membrane Potential	izv. prof. dr. sc. Milan Radoš
	09:00-10:45; HIIM Seminarska H1	B	Practicum	Ion Channels and Membrane Potential	doc. dr. sc. Vladiana Crljen
	09:00-10:45; HIIM Seminarska H2	C	Practicum	Ion Channels and Membrane Potential	doc. dr. sc. Goran Sedmak
	09:00-10:45; HIIM Mikroskopiranje	D	Practicum	Ion Channels and Membrane Potential	prof. dr. sc. Goran Šimić
	09:00-10:45; HIIM Mikroskopiranje M1	E	Practicum	Ion Channels and Membrane Potential	izv. prof. dr. sc. Mario Vukšić
	11:00-12:45; HIIM Mikroskopiranje M1	E	Practicum	Action Potential	izv. prof. dr. sc. Mario Vukšić
	11:00-12:45; HIIM Mikroskopiranje	D	Practicum	Action Potential	prof. dr. sc. Goran Šimić
	11:00-12:45; HIIM Seminarska H2	C	Practicum	Action Potential	doc. dr. sc. Goran Sedmak
	11:00-12:45; HIIM Seminarska H1	B	Practicum	Action Potential	doc. dr. sc. Vladiana Crljen
	11:00-12:45; HIIM Kompjutorske učionica C	A	Practicum	Action Potential	izv. prof. dr. sc. Milan Radoš
	Tuesday 23.5.2017.	09:00-10:45; HIIM Seminarska H1	1,2	Lectures	Overview of Synaptic Transmission

Date	Time	Group	Course hours type	Theme	Teaching staff
	11:00-12:45; HIIM Seminarska H1	1,2	Lectures	Synaptic Integration and Transmitter Release	prof. dr. sc. Goran Šimić
	13:00-14:45; HIIM Seminarska H1	1,2	Lectures	G-protein-coupled receptors and effectors	doc. dr. sc. Vladiana Crljen
	15:00-16:45; HIIM Seminarska H1	1,2	Lectures	Synaptic Transmission and 2nd Messengers	prof. dr. sc. Hrvoje Banfić
Wednesday 24.5.2017.	09:00-12:00; HIIM Seminarska H1	A	Practicum	Chemical Neuroanatomy of Neurotransmitter Systems	prof. dr. sc. Goran Šimić
	09:00-12:00; HIIM Seminarska H2	B	Practicum	Chemical Neuroanatomy of Neurotransmitter Systems	izv. prof. dr. sc. Mario Vukšić
	09:00-12:00; HIIM Kompjutorske učionica C	C	Practicum	Chemical Neuroanatomy of Neurotransmitter Systems	doc. dr. sc. Goran Sedmak
	09:00-12:00; HIIM Zbirka Z1	D	Practicum	Chemical Neuroanatomy of Neurotransmitter Systems	doc. dr. sc. Željka Krsnik
	09:00-12:00; HIIM Razvojna neuropatologija L2	E	Practicum	Chemical Neuroanatomy of Neurotransmitter Systems	Mirjana Babić Leko
	13:00-14:45; HIIM Seminarska H1	1,2	Lectures	Chemical Senses: Smell	prof. dr. sc. Goran Šimić
	15:00-16:45; HIIM Seminarska H1	1,2	Lectures	Chemical Senses: Taste	prof. dr. sc. Goran Šimić
Thursday 25.5.2017.	09:00-10:45; HIIM Seminarska H1	1,2	Lectures	Visual Processing by the Retina	prof. dr. sc. Zdravko Petanjek
	11:00-12:45; HIIM Seminarska H1	1	Seminar	Constructing the Visual Image	Goran Ivkić, dr. med.
	11:00-12:45; HIIM Seminarska H2	2	Seminar	Constructing the Visual Image	Mirjana Babić Leko
	13:00-14:45; HIIM Seminarska H1	1	Seminar	High-Level Visual Processing	prof. dr. sc. Goran Šimić
	13:00-14:45; HIIM Seminarska H2	2	Seminar	High-Level Visual Processing	doc. dr. sc. Goran Sedmak
Friday 26.5.2017.	09:00-10:45; HIIM Seminarska H1	A	Practicum	Color Vision, Visual Processing and Action	prof. dr. sc. Goran Šimić
	09:00-10:45; HIIM Seminarska H2	B	Practicum	Color Vision, Visual Processing and Action	izv. prof. dr. sc. Mario Vukšić
	09:00-10:45; HIIM Kompjutorske učionica C	C	Practicum	Color Vision, Visual Processing and Action	doc. dr. sc. Goran Sedmak
	09:00-10:45; HIIM Zbirka Z1	D	Practicum	Color Vision, Visual Processing and Action	Mirjana Babić Leko
	09:00-10:45; HIIM Mikroskopiranje	E	Practicum	Color Vision, Visual Processing and Action	izv. prof. dr. sc. Milan Radoš
	11:00-12:45; HIIM Seminarska H1	1,2	Lectures	Inner Ear	doc. dr. sc. Vladiana Crljen

Date	Time	Group	Course hours type	Theme	Teaching staff
	13:00-14:45; HIIM Seminarska H1	1,2	Lectures	Auditory System and Hearing	doc. dr. sc. Vladiana Crljen
Monday 29.5.2017.	09:00-10:45; HIIM Seminarska H1	A	Practicum	The Somatosensory System	prof. dr. sc. Goran Šimić
	09:00-10:45; HIIM Kompjutorske učionica C	C	Practicum	The Somatosensory System	doc. dr. sc. Goran Sedmak
	09:00-10:45; HIIM Zbirka Z1	D	Practicum	The Somatosensory System	Goran Ivkić, dr. med.
	09:00-10:45; HIIM Mikroskopiranje M1	E	Practicum	The Somatosensory System	doc. dr. sc. Željka Krsnik
	09:00-10:45; HIIM Seminarska H2	B	Practicum	The Somatosensory System	Mirjana Babić Leko
	11:00-12:45; HIIM Seminarska H1	1,2	Lectures	Sensory Coding	doc. dr. sc. Goran Sedmak
	13:00-14:45; HIIM Seminarska H1	1	Seminar	Touch	doc. dr. sc. Vesna Lukinović-Škudar
	13:00-14:45; HIIM Seminarska H2	2	Seminar	Touch	prof. dr. sc. Goran Šimić
Tuesday 30.5.2017.	09:00-10:45; HIIM Seminarska H1	1,2	Lectures	Pain	prof. dr. sc. Goran Šimić
	11:00-12:45; HIIM Seminarska H1	1,2	Lectures	Spinal Control of Movement	izv. prof. dr. sc. Milan Radoš
	13:00-14:45; HIIM Seminarska H2	1,2	Lectures	Spinal Reflexes	doc. dr. sc. Vesna Lukinović-Škudar
Wednesday 31.5.2017.	09:00-10:45; HIIM Seminarska H1	1,2	Lectures	Motor Unit and its Diseases	prof. dr. sc. Goran Šimić
	11:00-12:45; HIIM Seminarska H1	1,2	Lectures	Brain Control of Movement	prof. dr. sc. Hrvoje Banfić
	13:00-14:45; HIIM Seminarska H2	2	Seminar	Posture and Control of Gaze	prof. dr. sc. Goran Šimić
	13:00-14:45; HIIM Seminarska H1	1	Seminar	Posture and Control of Gaze	izv. prof. dr. sc. Milan Radoš
Thursday 1.6.2017.	11:00-12:45; HIIM Seminarska H1	1,2	Lectures	The Cerebellum	izv. prof. dr. sc. Mario Vukšić
	13:00-14:45; HIIM Seminarska H1	A	Practicum	The Basal Ganglia	Goran Ivkić, dr. med.
	13:00-14:45; HIIM Seminarska H2	B	Practicum	The Basal Ganglia	doc. dr. sc. Goran Sedmak
	13:00-14:45; HIIM Kompjutorske učionica C	C	Practicum	The Basal Ganglia	prof. dr. sc. Goran Šimić
	13:00-14:45; HIIM Zbirka Z1	D	Practicum	The Basal Ganglia	izv. prof. dr. sc. Mario Vukšić

Date	Time	Group	Course hours type	Theme	Teaching staff
	13:00-14:45; HIIM Mikroskopiranje	E	Practicum	The Basal Ganglia	izv. prof. dr. sc. Milan Radoš
Monday 5.6.2017.	09:00-10:45; HIIM Seminarska H1	1,2	Lectures	Psychoactive Drugs	prof. dr. sc. Goran Šimić
	11:00-12:45; HIIM Seminarska H1	1	Seminar	Modulatory Functions of Brain Stem	Goran Ivkić, dr. med.
	11:00-12:45; HIIM Seminarska H2	2	Seminar	Modulatory Functions of Brain Stem	prof. dr. sc. Zdravko Petanjek
Tuesday 6.6.2017.	09:00-10:45; HIIM Seminarska H1	A	Practicum	Autonomic Nervous System and Hypothalamus	doc. dr. sc. Goran Sedmak
	09:00-10:45; HIIM Seminarska H2	B	Practicum	Autonomic Nervous System and Hypothalamus	Goran Ivkić, dr. med.
	09:00-10:45; HIIM Kompjutorske učionica C	C	Practicum	Autonomic Nervous System and Hypothalamus	prof. dr. sc. Goran Šimić
	09:00-10:45; HIIM Zbirka Z1	D	Practicum	Autonomic Nervous System and Hypothalamus	doc. dr. sc. Željka Krsnik
	09:00-10:45; HIIM Razvojna neuropatologija L2	E	Practicum	Autonomic Nervous System and Hypothalamus	Mirjana Babić Leko
	11:00-12:45; HIIM Seminarska H1	1	Seminar	Motivation and Addictive States	Elizabeta Radonić, dr. med.
	11:00-12:45; HIIM Seminarska H2	2	Seminar	Motivation and Addictive States	prof. dr. sc. Goran Šimić
	13:00-14:45; HIIM Seminarska H1	1,2	Lectures	Sex and Brain	doc. dr. sc. Goran Sedmak
Wednesday 7.6.2017.	09:00-10:45; HIIM Seminarska H1	1	Seminar	Emotions and Feelings	Elizabeta Radonić, dr. med.
	09:00-10:45; HIIM Seminarska H2	2	Seminar	Emotions and Feelings	prof. dr. sc. Goran Šimić
	11:00-12:45; HIIM Seminarska H1	1	Lectures	Brain Rhythms, Sleep and Dreaming	Goran Ivkić, dr. med.
	11:00-12:45; HIIM Seminarska H2	2	Lectures	Brain Rhythms, Sleep and Dreaming	prof. dr. sc. Goran Šimić
Thursday 8.6.2017.	09:00-10:45; HIIM Seminarska H1	1	Seminar	Seizures and Epilepsy	Goran Ivkić, dr. med.
	09:00-10:45; HIIM Seminarska H2	2	Seminar	Seizures and Epilepsy	izv. prof. dr. sc. Mario Vukšić
Friday 9.6.2017.	09:00-10:45; HIIM Seminarska H1	1,2	Lectures	Language and Aphasias	prof. dr. sc. Goran Šimić
	11:00-12:45; HIIM Seminarska H1	1,2	Lectures	The Resting Brain	prof. dr. sc. Goran Šimić
	13:00-14:45; HIIM Seminarska H1	1,2	Lectures	Attention and Consciousness	prof. dr. sc. Goran Šimić

Date	Time	Group	Course hours type	Theme	Teaching staff
Monday 12.6.2017.	09:00-10:45; HIIM Seminarska H1	1,2	Seminar	Aging of the Brain and Alzheimer's Disease	prof. dr. sc. Goran Šimić
	11:00-12:45; HIIM Seminarska H1	1,2	Seminar	Disorders of Thought and Volition: Schizophrenia	Elizabeta Radonić, dr. med.
	13:00-14:45; HIIM Seminarska H1	1,2	Seminar	Disorders of Moode and Anxiety	Elizabeta Radonić, dr. med.
Tuesday 13.6.2017.	09:00-10:45; HIIM Seminarska H1	1,2	Lectures	Autism and Other Neurodevelopmental Disorders	prof. dr. sc. Goran Šimić
	11:00-12:45; HIIM Seminarska H1	1,2	Seminar	Patterning the Nervous System	doc. dr. sc. Željka Krsnik
	13:00-14:45; HIIM Seminarska H1	1,2	Seminar	The Differentiation and Survival of Nerve Cells	izv. prof. dr. sc. Nataša Jovanov Milošević
Wednesday 14.6.2017.	09:00-10:45; HIIM Seminarska H1	1,2	Lectures	The Growth and Guidance of Axons	izv. prof. dr. sc. Nataša Jovanov Milošević
	11:00-12:45; HIIM Seminarska H1	1	Seminar	Experience and refinement of synaptic Connections	izv. prof. dr. sc. Mario Vukšić
	11:00-12:45; HIIM Seminarska H2	2	Seminar	Experience and refinement of synaptic Connections	prof. dr. sc. Goran Šimić
	13:00-14:45; HIIM Seminarska H1	1	Seminar	Memory Systems - Working Memory	Mirjana Babić Leko
	13:00-14:45; HIIM Seminarska H2	2	Seminar	Memory Systems - Working Memory	prof. dr. sc. Goran Šimić
Friday 16.6.2017.	09:00-10:45; HIIM Seminarska H1	1	Seminar	Learning and Forgetting	prof. dr. sc. Goran Šimić
	09:00-10:45; HIIM Seminarska H2	2	Seminar	Learning and Forgetting	izv. prof. dr. sc. Mario Vukšić
	11:00-12:45; HIIM Seminarska H1	1	Seminar	Memory Systems - Declarative and Procedural Memory	izv. prof. dr. sc. Mario Vukšić
	11:00-12:45; HIIM Seminarska H2	2	Seminar	Memory Systems - Declarative and Procedural Memory	prof. dr. sc. Goran Šimić
	13:00-14:45; HIIM Seminarska H1	1	Seminar	Molecular Mechanisms of Learning and Memory	prof. dr. sc. Goran Šimić
	13:00-14:45; HIIM Seminarska H2	2	Seminar	Molecular Mechanisms of Learning and Memory	Mirjana Babić Leko
	15:00-16:45; HIIM Seminarska H2	2	Seminar	Molecular and Genetic Mech. of Neurodegenerative Diseases	Mirjana Babić Leko
	15:00-16:45; HIIM Seminarska H1	1	Seminar	Molecular and Genetic Mech. of Neurodegenerative Diseases	prof. dr. sc. Goran Šimić
	17:00-18:30; HIIM Seminarska H1	1,2	Lectures	Overview of the Plasticity, Illness and Behavior	prof. dr. sc. Goran Šimić

All lectures, seminars and practicals will take place in Croatian Institute for Brain Research building (Šalata 12) – www.hiim.hr

Catalog of knowledge for the oral examination

1. Types of nervous cells
2. Types of glial cells
3. Neuronal cytoskeleton
4. Fast and slow axonal transport
5. Potassium, sodium and calcium ion channels
6. Resting membrane potential
7. Passive electrical properties of the neuron
8. Action potential
9. Neuromuscular synapse and its disorders
10. Excitatory synapses
11. Inhibitory synapses
12. Temporal and spatial synaptic integration
13. Ionotropic receptors
14. Metabotropic receptors
15. Transmitter synthesis and synaptic vesicles
16. Transmitter release and uptake
17. Acetylcholine
18. Biogenic amine transmitters
19. Amino acid transmitters
20. Neuroactive peptides
21. Anatomical organization of the spinal cord
22. Anatomical organization of the medulla
23. Anatomical organization of the midbrain
24. Anatomical organization of the cerebellum
25. Anatomical organization of the diencephalon
26. Anatomical organization of the cerebral hemispheres
27. Laminar organization of the cerebral cortex
28. Columnar organization of the cerebral cortex
29. Localization of cognitive functions within the cerebral cortex
30. Functional imaging of cognitive functions
31. Mechanoreceptors, proprioceptors and thermal receptors
32. Nociceptors and hyperalgesia
33. Dorsal column – medial lemniscal system
34. Anterolateral spinothalamic system
35. Gate-control theory, opioid peptides and the endogenous pain control
36. Thalamic syndrome and central pain
37. Photoreceptors and phototransduction cascade
38. Retinal visual processing
39. Visual field and lesions in the retino-geniculo-cortical visual pathways
40. Magnocellular and parvocellular central visual pathways
41. Functional modules of the visual cortex
42. Motion processing in the dorsal visual pathway
43. Visual attention
44. Object processing in the ventral visual pathway
45. Stereoscopic perception
46. Color vision
47. Conscious awareness and the binding problem in the visual cortex
48. Sensory transduction in the ear
49. Functional anatomy of the cochlea
50. Neural processing of auditory information
51. Sensorineural hearing loss
52. Encoding of odorant information
53. Olfactory pathways
54. Pheromones
55. Taste cells and qualities

56. Organization of the motor system
 57. The motor unit
 58. Neurogenic diseases of the motor unit
 59. Myopathic diseases of the motor unit
 60. Diseases of the peripheral nerves
 61. The stretch reflex
 62. Alterations in reflex responses and muscle tone
 63. Locomotion patterns within the spinal cord
 64. Voluntary movements
 65. Gaze control
 66. Anatomical organization of the vestibular apparatus
 67. Vestibular reflexes and central vestibular pathways
 68. Posture control
 69. Vestibulocerebellar circuits and disorders
 70. Spinocerebellar circuits and disorders
 71. Cerebrocerebellar circuits and disorders
 72. Direct and indirect pathways in the basal ganglia
 73. Movement disorders (Parkinson's disease, Huntington's disease)
 74. Roles of basal ganglia in the cognition and learning
 75. Brain stem reticular formation and cranial nerves
 76. Brain stem modulation of sensation, movement and consciousness
 77. Classification of the seizures and the epilepsies
 78. Disorders of sleep and wakefulness
 79. Hypothalamic control of the endocrine system
 80. The roles of amygdaloid complex in emotional states and feelings
 81. Depression, mania and anxiety disorders
 82. Addictive states and drug abuse
 83. Induction and patterning of the nervous system
 84. Generation and survival of nerve cells
 85. Guidance of axons to their targets
 86. Formation and regeneration of synapses
 87. Sensory experience and fine tuning of synaptic connections
 88. Single genes that have profound effects on behavior
 89. Sexual differentiation of the nervous system
 90. Hormone-induced modifications in the brain structure
 91. Aging of the brain and dementia
 92. Alzheimer's disease
 93. Language development and organization of the brain areas related to language
 94. Types of aphasias and other language-related disorders
 95. Schizophrenia
 96. Explicit and implicit memory
 97. Habituation, sensitisation and conditioning
 98. Long-term potentiation and long-term depression
 99. Blood-brain barrier, brain edema and hydrocephalus
100. Brain circulation and stroke

IV. EXAMINATIONS

The **written exam** consists of 50 multiple choice questions. There will be two summer examination terms and two examination terms in the fall. Scoring system: 40-50 points = excellent (5), 34-39 = very good (4), 29-33 = good (3), 26-28 = 2 (satisfactory), less than 26 = 1 (fail).

The **oral examination** will consist of 5 randomly chosen questions from the list above, for example:

1. Action potential
2. Anatomical organization of the midbrain

3. Anterolateral spinothalamic system
4. Addictive states and drug abuse
5. Alzheimer's disease

Regular terms	Date
	End of June 2017
Summer	Early July 2017
	Early Sept 2017
Autumn	Late Sept 2017

V./I. LIST OF LECTURERS AND TEACHING STAFF

1. prof. dr. sc. Hrvoje Banfić
2. prof. dr. sc. Goran Šimić
3. prof. dr. sc. Miloš Judaš
4. prof. dr. sc. Marijan Klarica
5. prof. dr. sc. Zdravko Petanjek
6. izv. prof. dr. sc. Mario Vukšić
7. izv. prof. dr. sc. Nataša Jovanov Milošević
8. doc. dr. sc. Vladiana Crljen
9. izv. prof. dr. sc. Milan Radoš
10. doc. dr. sc. Vesna Lukinović-Škudar
11. doc. dr. sc. Goran Sedmak
12. doc. dr. sc. Željka Krsnik
13. Mirjana Babić Leko
14. Goran Ivkić, dr. med.
15. doc. dr. sc. Sanja Darmopil

V./II EXTERNAL ASSOCIATES:

1. Elizabeta Radonić, dr. med.

V./III UNTENURED LECTURERS:

VI. LITERATURE

A. Obligatory

1. Bear MF et al. *Neuroscience: Exploring the Brain*, 4th edition. Lippincott Williams & Wilkins, 2016.

B. Additional

1. Kandel ER et al. (eds.) *Principles of Neural Science*, 5th edition, 2013.
2. Purves D. et al. (eds.) *Neuroscience*, 5th edition. Sinauer Associates, 2012.
3. Heines D. *Neuroanatomy: An atlas of Structures, Sections, and Systems*, 9th edition, Wolters Kluwer LWW, 2015.
4. Squire LR et al. (eds.) *Fundamental Neuroscience*, 4th edition, Academic Press, 2013.
5. Niuwenhuys R et al. *The Human Central Nervous System. A Synopsis and Atlas*. Fourth edition, Springer, 2007.