

<i>Name of the Course</i>	<b>Basic Neuroscience</b>			<b>Code</b>	
<i>Study program Cycle</i>	Integrated undergraduate and graduate University study program			<b>Year of study</b>	2.
<i>ECTS:</i>	<b>8,5</b>	<i>Semester</i>	III.	Hours in semester (L+S+E)	103 (22+25+56)
<i>Status:</i>	Mandatory	<i>Entry competences:</i>	First year exams passed	<i>Usporedni uvjeti:</i>	
<i>Course attendance:</i>	Second year medical students			<i>Time schedule:</i>	According to the time schedule
<i>Course teacher:</i>	Prof. Zoran Đogaš, MD				
<i>Consultations:</i>					
<i>E-mail address and phone number:</i>	e-mail: <a href="mailto:zdogas@gmail.com">zdogas@gmail.com</a> +385 21 557 905				
<i>Assistant</i>	Prof. Maja Valić, MD; Assoc. Prof. Renata Pecotić, MD; Assist. Prof. Nikolina Pravdić, MD; Ivana Pavlinac Dodig, MD, PhD; Josip Lesko, MD; Linda Lušić, M. Psychol.				
<i>Consultation:</i>					
<i>E-mail address and phone number:</i>	e-mail: <a href="mailto:tnz@mefst.hr">tnz@mefst.hr</a> ; +387 36 335 600				
<i>Aims of the Course:</i>	General morphology - external and internal anatomy of the brain, cellular and molecular neuroscience; synaptic transmission; sensory systems; motor systems; general and associative brain functions and higher brain functions				
<i>Learning outcomes (general and specific competences):</i>	<p>Name, recognize and describe morphologic characteristics of the central nervous system, midbrain, brainstem, peripheral nervous system, spinal cord and describe their function.</p> <p>Describe basic electrophysiological characteristics of the neuron, explain mechanisms of the generation of transmembrane resting potentials, action potentials and postsynaptic potentials.</p> <p>Describe the principle of the information transmission between neurons, classify and explain characteristics and mechanisms of neurotransmitters' action, describe the structure of the receptors, and discuss their role in the information transmission.</p> <p>Describe, explain and outline principles of sensory system organization and apply adopted knowledge in solving examples of clinical cases.</p> <p>Describe, explain and outline principles of motor system organization and apply adopted knowledge in solving examples of clinical cases.</p> <p>Describe, explain and interpret neurophysiologic characteristics of the general brain function: learning and memory, emotions, sleep and</p>				

	wakefulness, neuronal control of breathing and hearth function. Use acquired theoretical knowledge in solving practical electrophysiological problem tasks on computer. Use acquired theoretical knowledge and demonstrate skills in recording of human bioelectrical potentials (EEG, EMG, and EOG).			
<b>Syllabus Content (brief summary):</b>	Neuroscience is one of the basic medical sciences studying morphology and function of a healthy nervous system, with an emphasis on the mechanisms responsible for achieving its role as a central organism control and management system. This course will introduce students to problems in this area and enable them to approach problems using scientific methods. The course is organized in six thematicall sessions. The aim of the Basic neuroscience course is to teach a student how to use the acquired knowledge on physics, chemistry, biochemistry, biology, anatomy, histology and physiology in acquiring knowledge on the normal function of the nervous system to the extent necessary for further successful studying.			
<b>Format of instructions (label using bold option)</b>	<b>Lectures</b>	<b>Exercises</b>	<b>Seminars</b>	Independent assignments
	Consultations	Mentor work	Practical training	Other
	Notes:			
<b>Students responsibilities</b>	Students are obligate to attend all types of classes (20% of justified absence is allowed); students are obligate to perform colloquium for all seminars and exercises that they were absent.			
<b>Grading and evaluating student work in class and at the final exam (label using bold option)</b>	<b>Class attendance</b>	<b>Class activities</b>	<b>Seminar work</b>	Practical work
	Oral exam	<b>Written test</b>	<b>Continuous knowledge assessment</b>	Essay
<i>Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course</i>				
<b>Students obligations</b>	<b>Hours (estimation)</b>	<b>Proportion in ECTS credits</b>	<b>Proportion in final grade</b>	
Class attendance and class activity	103	3,5	40%	
Seminar work	90	3	30%	
Colloquium (2) or Written test	60	2	30%	
Oral exam				

Additional explanation:	
According to the Rules of studying final grade is appointed as follows: A = 91-100% 5 (excellent) B = 79 to 90% 4 (very good) C = 67 to 78% 3 (good) D = 55 to 66% 2 (sufficient) F = 0 to 54% 1 (failed)	
<b>Required literature (available in the library and via other media)</b>	1. Purves D. and al.: Neuroznascience, 5th ed (Croatian editors: Heffer M, Puljak L, Kostić S), Medicinska Naklada 2016. 2. Judaš M, Kostović I. Temelji neuroznanosti. 1. izdanje. Zagreb. MD; 2005. (slobodan web pristup), selected chapters. 3. Đogaš Z. i sur. Vodič kroz vježbe iz temelja neuroznanosti. Mostar: Medicinski fakultet; 2004.
<b>Optional literature (at the time of submission of study programme proposal)</b>	1. Kandel ER, Schwartz JH, Jessel TM. Principles of the neural science. 4.ed., New York (NY): McGraw-Hill; 2000. 2. Shepherd, Gordon M. Neurobiology. 3.ed. New York (NY): Oxford University Press; 1994.
<b>Other (as the proposer wishes to add)</b>	Teaching quality analysis by students and teachers Exam passing rate analysis Committee for control of teaching reports External evaluation

#### Appendix: Time schedule

<i>Thematically session</i>	Subjects and literature
<b>I.</b>	<p><b>TITLE: BASICS OF BRAIN ANATOMY</b></p> <p><b>LECTURES:</b> Introductory lecture; Neuron is a basic structural-functional unit of the CNS; CNS research methods; Development of the CNS and processes of development reorganization and plasticity; Peripheral nervous system and the spinal cord; Diencephalon and telencephalon</p> <p><b>SEMINARS</b></p> <p>The structure of gray and white matter of the spinal cord The structure of gray and white matter of the brainstem and cerebellum The structure of gray and white matter of the diencephalon and telencephalon Neuroanatomy, summary</p> <p><b>EXERCISES</b></p> <p>Review of the CNS structures Appearance and distribution of gray and white matter of the spinal cord Appearance and distribution of gray and white matter of the brainstem Clinical-anatomic syndromes of the spinal cord</p>
	Short description: Students Name, recognize and describe morphologic characteristics of the central nervous system, midbrain, brainstem, peripheral nervous system, spinal cord and describe their function

	<p>Literature: Purves D et al.: Neuroscience, 5th ed (Croatian editors: Heffer M, Puljak L, Kostić S), Medicinska Naklada 2016.</p> <p>2. Judaš M, Kostović I. Temelji neuroznanosti. 1. izdanje. Zagreb. MD; 2005. (slobodan web pristup), selected chapters.</p>
<b>II.</b>	<p><b>TITLE: BASICS OF ELECTROPHYSIOLOGY OF THE NEURON</b></p> <p><b>LECTURES</b></p> <p>Neuron is a basic structural-functional unit of the CNS</p> <p>Biophysical basics of excitability</p> <p><b>SEMINARS</b></p> <p>Cell membrane, ion channels, passive and active properties of the neuron</p> <p>Electrophysiology of the neuron and types of the potentials</p> <p><b>EXERCISES</b></p> <p>Resting potential</p> <p>Action potential</p> <p>Synaptic potential</p>
	<p>Short description: Students will learn basic of electrophysiological characteristics of the neuron, explain mechanisms of the generation of transmembrane resting potentials, action potentials and postsynaptic potentials.</p>
	<p>Literature: required literature</p>
<b>III.</b>	<p><b>TITLE: INTERCELLULAR SIGNALING</b></p> <p><b>LECTURES</b></p> <p>Neurotransmitters in health and disease</p> <p>Serotonin</p> <p><b>SEMINARS</b></p> <p>Structure and function of the synapse and the cellular basis of behavior (neuron sequences, pathways, circles, networks, systems)</p> <p>Neurotransmitters, neuropeptides and their receptors</p> <p><b>EXERCISES</b></p> <p>Signalization</p>
	<p>Short description: Students will learn principle of the information transmission between neurons, classify and explain characteristics and mechanisms of neurotransmitters' action, describe the structure of the receptors, and discuss their role in the information transmission.</p>
	<p>Literature: required literature</p>
<b>IV.</b>	<p><b>TITLE: SENSORY SYSTEM</b></p> <p><b>LECTURES</b></p> <p>General organization of the sensory system</p> <p>Physiology of the eye and phototransduction</p> <p><b>SEMINARS</b></p> <p>Pain, heat and cold – anterolateral sensory system</p> <p>Touch, pressure, and kinesthesia - the dorsal column system</p> <p>Ear - organ of hearing and balance</p> <p>Auditory and vestibular system</p> <p>Organization of the retina, primary visual pathway and primary visual cortex</p> <p>Perception of colours, shapes, depth and movement; and the organization of the associative visual fields of the cerebral cortex</p> <p><b>EXERCISES</b></p> <p>Physiology of the senses</p>
	<p>Short description: Students will describe, explain and outline principles of sensory system organization and apply adopted knowledge in solving examples of clinical</p>

	cases.
	Literature: required literature
<b>V.</b>	<b>TITLE: MOTOR SYSTEM</b> <b>LECTURES</b> General organization of the motor system Role of the motor cortex in voluntary movements <b>SEMINARS</b> Spinal motor mechanisms and reflexes Role of the descending pathways from the brainstem in maintaining posture and muscle tone; spinal shock Motor functions of the cerebellum Motor functions of the basal ganglia The hypothalamus controls the endocrine and the autonomic nervous system <b>EXERCISES</b> Muscles and electromyography
	Short description: Students will describe, explain and outline principles of motor system organization and apply adopted knowledge in solving examples of clinical cases.
	Literature: required literature
<b>VI.</b>	<b>TITLE: GENERAL BRAIN FUNCTION</b> <b>LECTURES</b> Development of the CNS and processes of development reorganization and plasticity Stages of wakefulness and sleep; Sleep Medicine Physiology of intracranial pressure and cerebral circulation The structure of neurotransmitter systems and reticular formation <b>SEMINARS</b> General brain function: ascending activating system, EEG, alertness levels and levels of consciousness Neurobiology of biological rhythms and motivational states Neurobiology of emotion and sexuality Neurobiology of attention and association functions of the prefrontal and posterior parietal cortex Anatomy and psychology of learning and memory Cellular mechanisms of learning and memory <b>EXERCISES</b> Polisomnography Polisomnography report Reflexes and reaction time EEG and evoked potentials
	Short description: Students will describe, explain and interpret neurophysiologic characteristics of the general brain function: learning and memory, emotions, sleep and wakefulness, neuronal control of breathing and hearth function. Students will use acquired theoretical knowledge and demonstrate skills in recording of human bioelectrical potentials (EEG, EMG, and EOG).
	Literature: required literature