

Study program: Integrated academic studies of Dentistry
Type and level of the study program: integrated academic studies
Course title: Physiology (DII-PHYSL)
Teacher: Barak F. Oto, Drapšin P. Miodrag, Karaba Jakovljević I. Dea, Karan V. Vedrana, Klačnja V. Aleksandar, Naumović M. Nada, Popadić Gaćeša Ž. Jelena
Course status: compulsory
ECTS Credits: 20
Condition: -
Course aim The main objectives of education in physiology are to introduce students to the basic functioning of organs and organ systems and their forms of organization in complex functional systems.
Expected outcome of the course: Introduction with basic mechanisms of functioning of different systems of organs and aspects of organisation of regulatory mechanisms of complex homeostatic parameters in the functional systems. Introduction with complex neural and humoral regulatory mechanisms of different functional systems. Students need to learn basic principles and rules of laboratory usage and to get acquainted with principal laboratory procedures. Also, students will be trained to perform daily laboratory routines by themselves. Students will learn to use animal models and animal tissue for demonstration of physiological processes. Students will be trained in detail for sampling and preparation of body liquids (blood, urine) as well as with the methods of basic laboratory analysis used in daily practice (sedimentation, hematocrit, red blood and white blood cell count, white blood cell formula, time of bleeding and coagulation, general and chemical characteristics of urine). Student will learn basic electrophysiological methods (ECG, EEG, EMNG, EP), and will be trained to perform the recordings and explain the basic parameters of the recordings. Student will learn to perform blood pressure measurement and heart auscultation. Also student will learn to determine the respiratory volumes and capacities.
Course description <i>Theoretical education</i> INTRODUCTION IN PHYSIOLOGY: Functional organization of the human body and control of "internal environment". The cells of the body as living units and their functions. Homeostatic mechanisms of major functional systems. BREATHING: Properties of gases. Ventilation. Volume and lung capacity. Physiological characteristics of the pulmonary circulation. Transport of gases to the cells. The main and auxiliary respiratory muscles. Intrapleural pressure. Regulation of breathing. Types of breathing. Breathing in terms of decreased and increased atmospheric pressure. BLOOD: General characteristics of blood. Blood plasma. Erythrocytes. Leukocytes. Immunity and immune bodies. Platelets. Blood coagulation and hemostasis. Blood groups. Transfusion and transplantation. BLOODSTREAM AND LYMPH: Functional division of the circulatory system. Morpho-functional characteristics of heart muscle. Hemodynamic of the heart. The system of the heart. Registration and analysis of the electrocardiogram. Mechanical heart rate and its efficiency. Regulation of cardiac muscle. Circulation. Exchange at the capillaries. Peripheral circulation. Pulse: definition, types and characteristics. Blood flow in veins. Lymph. Neurohumoral mechanisms of regulation of vascular tone. DIGESTION, RESORPTION: Definition of digestion. Basic functions of the digestive tract. Digestion in the oral cavity. Saliva, regulation of secretion. Vomiting. Speech. Digestion in the stomach. Digestion in the small intestine. The role of the pancreas in digestion. Bile. Digestion in the colon. Act defecation. TURNOVER MATTER AND ENERGY: the role of building and energy nutrients. Minerals and vitamins. Methods of studying the energy market. Respiratory quotient. Basal metabolism. Energy operations in the load. Assembling nutritive daily meals. THERMOREGULATION: Mechanisms of maintenance of continuous protection of internal body temperature. Physical and chemical thermoregulation. Physiological basis of hypo and hyperthermia. EXCRETION: renal physiology. Ultrastructure of the nephron. Legality of the process of filtration, secretion and reabsorption in the kidneys. The amount of the composition and properties of urine. Participation of the kidneys in maintaining homeostasis. Regulation of the kidney. Mechanisms of excretion of urine. EXCITABLE TISSUES: Membrane potential. Action potential. Laws irritation. Accommodation. Polar's Law of stimulation. Electro tonus. Polarization current. ANALYZERS: Analyzer. Receptors. Analyzer vision. Lenses and ophthalmoscopy and auxiliary apparatus of the eye. Analyzer for the hearing. Vestibular system. Muscle - joint reception. Tactile and thermal reception. Visceroreception. Reception of smell and taste. Reception pain. MUSCLES: Nervous - muscle synapse. Mediators and the basic mechanisms synaptic transfer. Distribution of muscle. Morpho-physiological characteristics of muscles. Muscle contraction. Motor units. Tonus and thermo genesis. Work, power and muscle fatigue. Smooth muscles. VEGETATIVE NERVOUS SYSTEM: sympathetic and parasympathetic centers: structure, classification, vegetative ganglia and their function, the specific mediators, Division of vegetative reflexes and the importance of dual innervations bodies. ENDOCRINOLOGY General characteristics of hormones and test methods of endocrine glands, thyroid gland. Parathyroid gland. Pancreas. Adrenal gland. Female and male sex gland. . Pituitary: hormones, function and regulation of secretion. Hypothalamic-pituitary complex. Other bodies with endocrine significance: thymus, epiphysis, spleen and kidney, tissue hormones. PHYSIOLOGY OF THE CENTRAL NERVOUS SYSTEM: neurons. Division of synapse in the CNS. Neuromediators. Nerve center. Inhibition in the CNS. Spinal cord. Medulla oblongata and Pons. Reflex function. Functional significance of the transfer of roads in the extended cord. Mid-brain. Brainstem reticular formation. Cerebellum. Hypothalamus. Limbic brain structures. Crust of a large brain. Basal ganglia. Reflexes. Sleep. Types of nervous system. Learning and memory. Consciousness. <i>Practical education: Laboratory work, other forms of education, research related activities</i> 1. Excitable tissue (rheobasis, chronaction, useful time, anelectrotone, catelectrotone, polarization current, Pflüger lows). 2. Muscles (basic and complex muscle contraction, summation, influence of intensity of stimuli on the size of muscle contraction, maximal muscle contraction with different loads, ergography, influence of temperature and fatigue on muscle contraction). 3. Breathing (model

of the ribs, Donders model, spirometry, spirometry, pneumography, forced spirometry, air content). 4. Digestion (digestion in the mouth, digestion in the stomach). 5. Heart and the circulation (heart regulation, ECG, measurement of the blood pressure, auscultation, polycardiography, capillaries). 6. Blood (plasma buffers, sedimentation, hematocrit, hemolysis, red blood and white blood cell count, white blood cell formula, time of coagulation and bleeding). 7. Excretion (general characteristics of the urine, chemical chr. of urine, urine sediment). 8. Senses (examination of the eyes, ears and hearing, balance, surface and deep sensibility). 9. CNS (spinal reflexes of the decapitated frog, spinal shock, testing of the reflex arc, examination of the reflexes of clinical significance, EEG, neuronal activity, EMNG, EP, reaction)

Literature

Compulsory

1. Guyton AC. Textbook of Medical Physiology. Elsevier, 2016.

Additional

1. Despopulos A, Silbernagl S.. Color Atlas of Physiology. Thieme, 2009.

2. Bruce KM. Berne & Levy Physiology. Mosby, Elsevier, 2010.

3. Costanzo LS. Physiology. Elsevier, 2014.

Number of active classes				Other: -
Lectures: 90	Practice: 60	Other types of teaching: -	Research related activities: -	

Teaching methods: lectures; laboratory work.

Student activity assessment (maximally 100 points)

Pre-exam activities	points	Final exam	points
Lectures	15	Written	70
Practices	15	Oral	
Colloquium		
Essay			