

**DESCRIPTION OF COURSE UNIT FOR DOCTORAL STUDIES
AT VILNIUS UNIVERSITY**

Scientific Area/eas, Field/ds of Science	Medical and Health Sciences (M000): Medicine (M001)			
Faculty, Institute, Department/Clinic	Faculty of Medicine Institute of Biomedical Sciences Department of Physiology, Biochemistry, Microbiology and Laboratory Medicine			
Course unit title (ECTS credits, hours)	Human Physiology 10 credits (265 hours)			
Study method	Lectures	Seminars	Consultations	Self-study
Number of ECTS credits	-	-	1	9
Method of the assessment (in 10 point system)	Presentation: Actuality: 2 points Structure of presentation: 2 points Generalization: 1 point Problematic questions: 3 points Visual aids: 2 points			
PURPOSE OF THE COURSE UNIT				
The main objective of this course is to teach PhD students about the functions of human organs and systems, including the processes of interaction between different physiological systems and the mechanisms of physiological regulations. PhD students will form a good theoretical basis for further practical and research studies.				
THE MAIN TOPICS OF COURSE UNIT				
<p><u>Physical Indicators of Blood.</u> Osmotic equilibrium. Major blood plasma composition and control of its level. The physiological characteristics and functions of blood cells. Hemostasis. Anticoagulants. Human blood groups. Blood transfusion. Overview of the immune system function.</p> <p><u>The Cardiovascular System.</u> Conductive system of the heart. Frank-Starling's law of the heart. Refractory period. Stroke volume, cardiac output and their changes during physical activity. Heart sounds. Electrical activity of the heart. Regulation of cardiac function. The structure and function of blood vessels. Blood pressure. Regulation of arterial blood pressure. Pulse. Microcirculation and the lymphatic system. Regional circulation.</p> <p><u>The Respiratory System.</u> Lung ventilation and volumes. Gas exchange in the lungs and tissues. Regulation of ventilation.</p> <p><u>Metabolism and Energy Balance.</u> Basal metabolic rate. Energy used during physical activities. Food intake control. Energy storage and control. Dietary guidelines. Essential dietary components (proteins, carbohydrates, fats, minerals, and vitamins), intake and functions. The impact of foodstuffs on tooth mineralization. Biological active ingredients of food. The impact of food composition on dental disease. Thermoregulation.</p> <p><u>The Gastrointestinal System.</u> General principles of gastrointestinal function. Saliva functions. Chewing and swallowing. Gastric secretion, motility, emptying, and its regulation. Importance of pancreatic juice. Regulation of the secretion of pancreatic juice. Functions of the liver. Composition and functions of bile. Control of biliary secretion. Regulation of intestinal secretion and motility. Digestion and absorption of nutrients and water. Functions of large intestine.</p> <p><u>The Urinary System.</u> Function of the kidneys and their regulation. Urine formation. Micturition. The general characteristics of urine.</p>				

The Endocrine System. The nature of hormones and mechanisms of hormones action. General concepts of endocrine regulation. Function of the anterior and posterior pituitary gland. Thyroid hormones. Parathyroid hormone and calcium metabolism. Pancreas hormones. Adrenal cortex and medulla hormones. Physiologic effects of gonad hormones in reproduction and formation of sex.

The Nervous System. Muscles. Excitable tissues. Passive and active ion transport across the cell membrane. Membrane and action potentials. The mechanism of the movement of an action potential through the axon and its conduction. Parabiosis. Synaptic transmission. Structure and function of the skeletal and smooth muscles. Sliding filament theory of contraction. Relaxation of muscle. Mechanics of body movement. Muscle fatigue. Autonomic nervous system.

Circuits of Neural System. Neural reflexes. Conditioned reflexes. The physiological functions of the spinal cord, medulla oblongata, pons, midbrain, cerebellum and diencephalon. Reticular formation. Cerebral cortex: sensory fields, motor areas, association areas. Basal nuclei. Limbic system. Instincts. Emotions. Motivations. Integrative functions of the nervous system. Behavior. Neurophysiology of language. Learning and memory. Neurophysiology of sleep. General principles of sensory systems.

RECOMMENDED LITERATURE SOURCES

1. Guyton A.C., Hall J.E. Textbook of Medical Physiology. Elsevier sounders, 14th edition, 2020
2. Bernadette Marriott, Diane Birt, Virginia Stalling, Allison Yates. Present Knowledge in Nutrition, 11th edition, ILSI publication, 2020, Washington, DC
3. Rekomenduojamos paros maistinių medžiagų ir energijos normos (Lietuvos Respublikos SAM 2016 06 23d. įsakymas Nr. V-836).
<https://www.e-tar.lt/portal/lt/legalAct/4bd890f0428011e6a8ae9e1795984391>
4. Silbernagl S, Despopoulos A. Color Atlas of Physiology. Thieme, Stuttgart, 7th edition, 2015
5. Koeppen B.M., Stanton B.A. Berne & Levy Physiology, 7th edition, 2017
6. Prenumeruojamos duomenų bazės: Prenumeruojama duomenų bazė:
<https://www.clinicalkey.com/#!/>
7. Prenumeruojama duomenų bazė: <http://accessmedicine.mhmedical.com/>
8. Silverthorn D.U. Human Physiology, an Integrated Approach, 7th edition, 2015
9. Nelson D.L., Cox M.M. Lehninger Principles of Biochemistry 8th edition. 2021, Worth Cummings
10. Theodore Tulchinsky, Elena Varavikova, Joel Matan Cohen. The New Public Health, 4th Edition. 2022
11. Walter F. Boron, Emile L. Boulpaep. Medical Physiology. Saunders; Elsevier, 3th edition . 2017

CONSULTING LECTURERS

1. Coordinating lecturer: Jonas Algis Abaravičius (Prof. Dr. HP).
2. Valerija Jablonskienė (Assoc. Prof. Dr.).
3. Vaiva Hendrixson (Prof. Dr.).
4. Dalia Paškevičienė (Assist. Dr.).

APPROVED:

By Council of Doctoral School of Medicine and Health Sciences at Vilnius University: 29th of September 2022

Chairperson of the Board: Prof. Janina Tutkuvienė