

Study program: Doctoral Academic Studies in Biomedical Sciences		
Name of the subject: BASICS OF CELL PHYSIOLOGY		
Teacher(s): Nada M. Naumović, Jelena Ž. Popadić Gaćeša, Dea I. Karaba Jakovljević, Miodrag P. Drapšin, Aleksandar V. Klašnja, Vedrana V. Karan		
Status of the subject: elective		
Number of ECTS points: 20		
Condition:		
Goal of the subject The goal of the subject is to acquire knowledge about the role of certain parts of the cell in the general organization of cell function, ways of their connecting with other cells, as well as the physiological principles of functioning of certain cell types and species. The general goal of the course is to emphasize the importance of knowing the fundamental ways of physiological functioning of cells as a starting point and condition for achieving homeostasis at the level of the whole organism, and thus for establishing, preserving and improving health.		
Outcome of the subject Knowledge of the fundamental principles of functioning of the cells of the human body will provide meaningful analytical examinations of the human body in certain conditions or when exposed to various influences, in order to establish, preserve and improve health, improve quality of life and prolong life.		
Content of the subject <i>Theoretical lectures</i> 1. Organization and structure of the cell. 2. Biological membranes; 3. Physiological role of proteins, lipids and carbohydrates in the cell; 4. Membrane channels (location, types and role). Types of ion channels, voltage regulated channels, chemically regulated ion channels, channels in relation to mechanical actions; 5. Gibbs-Donnan equilibrium; 6. Membrane potential, membrane irritability; 7. Mechanisms of transport; 8. Cellular receptors - types, characteristics, roles; 9. Second messengers, <i>cAMP</i> , <i>cGMP</i> . The role of free intracellular calcium and eicosanoids; 10. Structure and function of neurons; Types and significance of axon transport; 11. Development, differentiation, migration, mechanisms of aging and extinction of neurons - role in cellular homeostasis; 12. Intercellular communication. Synapses, types. Signaling molecules; 13. Types and ways of occurrence of postsynaptic potentials; 14. Mechanisms of action potential, characteristics and types; 15. Neuroglia; 16. Reproductive and reparative mechanisms; 17. Apoptosis; 18. Receptor cells of sensory systems; 19. Transduction mechanisms in mechanoreceptors, thermo receptors and pain receptors; 20. Acoustic transduction; 21. Visual transduction; 22. Olfactory and gustatory transduction; 23. Structural and physiological characteristics of muscle cells; 24. Specifics of the structure and function of endocrine cells; 25. Metabolic balance; 26. Nutrition in the service of homeostasis. 27. Stem cells; <i>Practical lectures</i> Theoretical thematic units will be viewed from the aspect of current research possibilities, in order to arouse curiosity and initiate research and expansion of existing knowledge and advancement in medical sciences. Within the practical classes, seminar papers will be formed, which should be the basis for future research.		
Recommended literature 1. Pappano AJ, Wier WG. Cardiovascular Physiology, 11 th edition, Elsevier, Philadelphia, 2019. 2. Paul A. Young PhD, Paul H. Young, Daniel L. Tolbert. Basic Clinical Neuroscience, Third Edition, Wolters Kluwer, 2015. 3. Mark F. Bear, Barry W. Connors, Michael A. Paradiso. Neuroscience: Exploring the Brain, Fourth Edition, Wolters Kluwer, 2015. 4. Laurie Lundy-Ekman. Neuroscience: Fundamentals for Rehabilitation, 4th Edition, Elsevier, 2015. 5. Guyton AC, Hall JE. Textbook of Medical physiology, Saunders, 2019. <i>Additional</i> 1. Despopulos A, Silbernagl S. Color atlas of Physiology, Thieme 2009. 2. Ganong's Review of Medical Physiology, Lang 2019.		
Number of active classes	Theory: 60	Practice: 45
Methods of delivering lectures: written exam, colloquium, seminar		
Evaluation of knowledge (maximum number of points 100) activity during lessons: 30 seminars: 40 written exam: 30		

