
	<b>UNIVERSITY OF BANJA LUKA</b> <b>FACULTY OF MEDICINE</b>				
	<b>UNDERGRADUATE STUDIES</b>				
	<b>Study Programme of</b>	<b>MEDICINE</b>			
<b>Course Unit Name</b>	<b>Cell Biology and Human Genetics</b>				
<b>Type of Course Unit</b>	<b>General Education</b>				
<b>Course Unit Code</b>	<b>Course Unit Status</b>	<b>Semester</b>	<b>Class Workload</b>	<b>Number of ECTS</b>	
	COMPULSORY	I and II	I: 2L+2P II: 2L+2P	8	
<b>Members of Staff</b>	Dr Vanja Vidović, assistant professor; Dr Irina Milovac, assistant professor				
<b>Eligibility Requirements</b>				<b>Form of Requirements</b>	
There are no requirements for registration, attendance and examination				As provided by the Rules of the First-Cycle Studies	
<b>Goals of the Course Unit</b>					
<p>Cell biology represents the foundation for all other course units which study morphology, anatomy, histology, physiology, biochemistry, genetics, evolution and ecology of the living organism. The goal of this course unit is to introduce students with the major structural and ultrastructural characteristics of acellular life forms (viruses, prions and viroids), prokaryotic cells (bacteria and cyanobacteria), eukaryotic cells (fungi, algae, animal and plant cells), and their interrelations and the relations which the cell establishes with its surroundings. The course unit provides basic knowledge on cell functions, as well as the functions of cell organelles.</p> <p>It is the goal of classes in human genetics for the students to acquire basic knowledge on the molecular foundation of heredity, the laws of inheritance and variability of traits in humans, with a special focus on induced changes in genetic material (mutations) in light of present-day knowledge in the field. Students are guided towards an interdisciplinary approach to observing healthy and diseased persons, so that they can apply their knowledge in all disciplines of medicine during their studies.</p>					
<b>Learning Outcomes (knowledge acquired):</b>					
<p>The students will acquire basic knowledge of prokaryotic and eukaryotic cells and the major molecules which can be found in living organisms, and of the connection between molecular structures and biological functions. Students will be able to describe and apply methods that will be used in cell research, and then to make assessments and plans for studying the cell and its structures using microscopic methods through creating cytohistological slides, proving the chemical composition of the cell using methods, and getting to know cell ultrastructure by analyzing cytochemical images from electronic microscopes.</p> <p>After completing the course unit of Human Genetics, the students will have acquired knowledge on the basics of molecular genetics and the molecular biological techniques applied in medicine, which will be helpful in overcoming other biomedical course units and enable them to apply these techniques in research.</p> <p>The students will have gotten to know the basic genetic terminology, inheritance rules, frequent genetic disorders, as well as analysis of family trees, enabling them to describe, assess and apply the acquired knowledge in human genetics to both clinical course units and their medical practice.</p>					
<b>Contents of the Course Unit:</b>					

Cells biology; Cell research methods; Cell evolution. Chemical composition of the cell: water, ions, elements, carbohydrates, lipids, nucleic acids and proteins. The structure of acellular life forms (viruses, prions and viroids). Organization of a prokaryotic cell (bacteria and cyanobacteria). Organization of a eukaryotic cell (animals and plants). Structure and role of membranes, membrane transport. Structure and role of the cytoskeleton, centrioles, cilia and flagella, the endoplasmic reticulum, the Golgi body. The structure and role of the lysosome, peroxisome, mitochondria. Glycolysis and cellular respiration, enzymes. The structure and role of the ribosome and cell nucleus. Chromosomes. Cell cycle. Cell death. Medical cytology.

Human genetics: Organization of the human genome. Genetical basics of reproduction, fertilization. Structure and role of DNA, RNA, chromatin. DNA replication. Flow of genetic information from DNA to polypeptides (transcription, genetic code, translation). DNA recombination mechanisms. Numerical and structural chromosomal aberrations and syndromes. Gene mutations. DNA molecule reparation. Gene expression regulation. Molecular basics of human diseases: Mendelian and non-Mendelian inheritance, genetic polymorphism, monogenetic and oligogenic human diseases. Genetic counselling and prevention of hereditary disorders. Basic methods of molecular genetics (recombinant DNA technology, chain polymerization method, hybridization tests, sequencing) and their application in medicine. Genetical basics of sex differentiation in humans (sex chromosomes, inactivation of the X chromosome, genetical basics of personality disorders). Oncogenetics: protooncogenes and tumor-suppressing genes. Genetical basics of the immune response: immunoglobulin genes, HLA, MHC. Personalized medicine, genetic markers. Genetic structure of human populations.

**Teaching Methods:**

The classes are given in the form of lectures, practicals, seminars, midterms, office hours, and independent student work.

**Literature:**

1. Cell Biology- Stephen Bolsover et al., 4th edition, Willey Blackwell
2. The genes- Benjamin Lewin, 7th edition-Oxford University press

**Examination Form:**

Pre-Exam Duties		Final Exam		Total Points
Attendance	4	Oral / Written	50	100
Midterm(s)	25	One per each semester		
Seminar paper / Practical	21	Mandatory prior to final		

**Note for the Course Unit:**

**Syllabus Designer: Prof. Dr Stojko Vidović**