

	UNIVERSITY OF EAST SARAJEVO Faculty of Medicine					
	Study program: medicine					
	Integrated academic studies	I study year				
Full subject title	CELL BIOLOGY AND HUMAN GENETICS					
Department	Department for preclinical subjects, Faculty of Medicine in Foča					
Subject code	Subject status	Semester	ECTS			
ME-01-1-003-1	compulsory	I	9			
Professor/ -s	Full professor. Milan Kulic, PhD, assistant professor. Nikolina Elez-Burnjakovic, PhD					
Associate/ -s	asistant., Sara Rakocevic, MA					
Number of lectures/ teaching workload (per week)		Individual student workload (in hours per semester)		Coefficient of student workload S₀¹		
L	E	SP	L	E	SP	S₀
3	6	0	3*15*1	6*15*1	0*15*1	1
total teaching workload (in hours, per semester) 3*15 + 6*15 + 0*15 = 135			total student workload (in hours, per semester) 3*15*1 + 6*15*1 + 0*15*1 = 135			
Total subject workload (teaching + student): 135 + 135 = 270 hours per semester						
Learning outcomes	<ol style="list-style-type: none"> Identifying the organization and function of the cell at the molecular level, which will facilitate the understanding of pathological processes as the cause of the disease that students meet on other subjects during the studies. Acquiring basic knowledge in human genetics and the application of acquired knowledge in other medical disciplines during the course of the study. 					
Preconditions	No preconditions					
Teaching methods	Lectures, exercises, seminar papers and consultations					
Subject content per week	<p>Lectures:</p> <ol style="list-style-type: none"> Evolution of a cell. Chemical composition of the cell (biologically important chemical elements, water and organic molecules). Organization of eukaryotic cells. Transport through cell membranes. Enzymes and living systems. Cellular breathing. Mitochondria – ATP synthesis Interaction between cells and their environment - basic molecules of the extracellular matrix. Molecular aspects of cell death - apoptosis. Hereditary material. Nucleic acids. DNA and RNA. The flow of information in a cell. Replication of DNA molecules. Transcription. Processing the primary transcript. Genetic code. Translation. Regulation of gene activity. Regulation of gene activities on the DNA level. Regulation of gene activities at the level of transcription and translation. Chromosomes, chemical composition and structure. Methods of analysis and coloring of chromosomes. Human genome. Cell cycle (control factors) and cell population. Gametogenesis. Genetic determination of sex. Development and reproduction of gonads. Differentiation of sex drain. Disorders of gender development. Genetic mutations. Mechanisms of mutation formation. Mutagenic agents. Recombination. Crossovers. DNA reparation mechanisms. Diseases caused by disorders of reparation mechanisms. Changes in the number of chromosomes. Aneuploidy and polyploidy. Frequency of chromosomal aberrations. Indications for karyotype analysis. Changes in the structure of chromosomes. Deletion. Duplication. Ring chromosome. Isochromosomes. Inversions and translocations. Inheritance in humans. Monogenic inheritance. Codominant inheritance. Multifactorial Inheritance. Mitochondrial inheritance. Genealogy. Genetic counseling and prevention of hereditary diseases. Genetics of cancer. Characteristics of the malignant cell. Genetic changes during carcinogenesis. Factors of the environment and carcinogenesis. Cancer as a multifactorial disease. Genetics of aging. Biological theories of aging. Systemic aging theories. Cell aging theories. Genetic basis of aging. Population genetics. Frequency of gene alleles. Panmixon, inbreeding and outbreeding. Genetic engineering. DNA cloning. Nucleic acid hybridization. DNA sequencing. Gene therapy. Molecular 					

¹Coefficient of student workload S₀ is calculated as it follows:

a) for the study programs not going through the licensing process: S₀ = (total workload in semester for all the subjects 900 hrs – total teaching workload L+E in semester for all the subjects 870 hrs)/ total teaching workload L+E in semester for all the subjects ____ hrs = _____. Consult form content and its explanation.

b) for the study programs going through the licencing process, it is necessary to use form content and its explanation.

	<p>markers in human genetics.</p> <p>Exercises:</p> <ol style="list-style-type: none"> 1. Introduction to microscopy (microscopy). Prokaryotic and eukaryotic cells (drawing, animations) 2. Cell membrane and membrane organelles (drawing, animations). Non-membrane organelles (drawing, animation) 3. Molecular genetics (drawing, tasks). Karyotype 4. Barr body (making of the preparation). Seminar papers 5. Mitosis (animation, observation of the preparation). Meiosis (animation, drawing) 6. Gametogenesis (observation of the preparation, drawing). 7. Numerical aberrations of full chromosomes (tasks). Numerical aberrations of autosomes (tasks) 8. Structural aberrations (tasks). Mendel's laws of inheritance (tasks). 9. Gene interaction (tasks). Sex-linked inheritance (tasks) 10. Genealogy (tasks). Population genetics (tasks) 11. Molecular Genetics Methods: DNA Laboratory (laboratory work). Isolation of DNA (laboratory work) 12. Checking the quality and quantity of DNA (laboratory work). PCR - polymerase chain reaction (laboratory work) 13. Sequencing. Seminar papers. Application of genetics in other areas 14. Application of genetics in other areas 15. Application of genetics in other areas. 			
Compulsory literature				
Author/s	Publication title, Publisher	Year	Pages (from-to)	
Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard	<i>Genetics in Medicine, Thompson and Thomson, ISBN: 9781416030805, 7th edition</i>	2007		
Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts, Peter Walter	<i>Molecular biology of the cell, Garland Science, Taylor & Francis Group, ISBN 978-0-8153-4432-2, 6th edition</i>	2015		
Geoffrey M Cooper	<i>The cell, Sunderland (MA): Sinauer Associates, ISBN-10: 0-87893-106-6</i>	2000		
Additional literature				
Author/s	Publication title, Publisher	Year	Pages (from-to)	
Csaba Szalai	Medical genetics and genomics, Semmelweis University, ISBN 978 963 279 187 6	2016		
Student responsibilities, types of student assessment and grading	Grading policy		Points	Percentage
	Pre-exam activities			
		lecture/exercise attendance	10	10%
		seminar paper	10	10%
		colloquium	30	30%
	Final exam			
		practical exam	10	10%
		final test	40	40%
	TOTAL	100	100 %	
Certification date	December 13 th 2018			