

1.	Subject	BIOPHYSICS			
2.	Code	OM 116			
3.	Study Program	General Medicine			
4.	Organizing Institution (Unit, Institute, Chair, Department)	UKIM-Faculty of Medicine Chair in Medical Physics			
5.	Educational degree (first or second cycle)	Integrated cycle			
6.	Study year /semester	First/First	7.	Number of credits	2
8.	Responsible teacher	Assistant Professor Dr Tomislav Stankovski			
9.	Preconditions:	/			
10.	Teaching goals of the study program (competencies):	<ul style="list-style-type: none"> • To learn the basic laws of Physics applied in Medicine; • To understand the processes of the living organisms that can be described by the Biophysics models; • To learn the basic laws of mechanics, acoustics, fluids and thermodynamics; • To learn about the electrical and magnetic forces, as well as their occurrence and application in living organisms; • To learn the basic characteristics of Non-ionizing and Ionizing radiation and their use in Medicine. 			

11.	<p>Contents of the study program:</p> <ul style="list-style-type: none"> • Biophysics basics and system theory • Biomechanics • Biophysics of fluids • Bioacoustics • Optics • X-ray and nuclear radiation • Thermodynamics • Electrical forces • Electromagnetism <p>Theoretical course:</p> <ul style="list-style-type: none"> • Biophysics basics. Divisions in Biophysics. System theory. System control. Important theories. • Basics of biomechanics. Levers of the locomotor system. Work and power of the man. Mechanical work of the heart. Elasticity. Bone fractures. • Fluids and their characteristics. Liquid viscosity. Hydrodynamics. Physical model of the blood vessels. Surface tension of liquids. Atmospheric pressure. Mechanics of breathing. • Bioacoustics. Oscillations and waves. Sounds waves. Ultrasound. Application of sound in Medicine. • Basic geometric laws in optics. Optical instruments. Eye as an optical instrument. Infrared light. NIRS method. Thermography. Ultraviolet light. Quantum optics. Lasers. 		
	<ul style="list-style-type: none"> • X-ray radiation. X-ray spectra. Application of X-ray in Medicine. Computer Tomography. Nuclear physics and nuclear reactions. Nuclear Medicine basics. SPECT and PET methods. Hybrid SPECT-CT methods. • Thermodynamic processes. Biological open systems. Physiological effect of heat on human body. • Electrical forces. Electrostimulation. Heart Bypass. Biopotentials and electrophysiology. • Basics of electromagnetism. Electromagnetic induction. Magnetic resonance. <p>Practical course:</p> <ul style="list-style-type: none"> • Basics of measuring physical quantities: measuring length. • Electrical forces and Ohm law of electrical circuit. • Concentration measurement with Abbe refractometer. • Concentration measurement with Polarimeter of light. 		
12.	Methods of studying: Theoretical lectures and lab experiments		
13.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Total no. of hours</td> <td>60 hours</td> </tr> </table>	Total no. of hours	60 hours
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14.	Distribution of the available time			
15.	Type of educational activity	15.1	Lectures-theoretical course	21 hours
		15.2	Practicals (laboratory, clinical), seminars, team work	9 hours
16.	Other types of activities	16.1	Project assignments	/ hours
		16.2	Individual tasks	/ hours
		16.3	Home studying	30 hours
17.	Assessment of knowledge: points			
	17.1	Tests	Continuous tests	min.-max. 2 36 - 60
		Final exam	Oral (written) exam	min.-max. 18 - 30
	17.2	Seminar work/project (presentation: written and oral)	Seminar works	min.-max. /
	17.3	Active participation	Theoretical course Practical course	min.-max. 0 - 1 6 - 9
18.	Knowledge assessment criteria: (points/grade)	up to 59 points		5 (five) F
		60 to 68 points		6 (six) E
		69 to 76 points		7 (seven) D
		77 to 84 points		8 (eight) C
		85 to 92 points		9 (nine) B
		93 to 100 points		10 (ten) A

19.	Criteria for obtaining a signature and taking the final exam	<p>Conditional criteria for assessment of knowledge:</p> <p>Only one absence is permitted for obtaining a signature. The two continuous tests are taken only during the lectures, after that one needs to go to the full exam. The written and the oral test are taken either during the lectures or on the full final exam. In either case, to pass the subject one needs to get at least the minimum required points.</p> <p>Based on the acquired points, the grade is formed according to the table of grades (given above).</p>
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20.	Language of the course	Macedonian
21.	Method for evaluation of the quality of education	Anonymous evaluation taken by the students, of the subject, teachers and collaborators involved in the educational activities

22.	Literature				
	Mandatory textbooks				
		Author	Title	Publisher	Year
22.1	1	T. Stankovski	Biophysics – internal materials	Faculty of Medicine	2015
	2	N. Andonovska	Biophysics	UKIM	2005
	3	D. Gersanovski	Biophysics – internal materials	Institute of Physics	2006
	Additional literature				
		Author	Title	Publisher	Year
22.2	1	W. Bialek	Biophysics: Searching for Principles	Princeton University Press	2012
	2	T. Stankovski	Tackling the inverse problem for nonautonomous systems:	Springer	2013

				Application to life sciences		
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