Attachment No. 3		Course program for the first cycle of studies				
1.	Course title	Biophysics				
2.	Code	DMMBP1				
3.	Study program	Dentistry - integrated first and second cycle of studies				
4.	Organizer of the study program (unit, i.e., institute, department, division)	University "Ss. Cyril and Methodius" in Skopje, Faculty of Natural Sciences and Mathematics - Skopje, Department of Medical Physics				
5.	Degree (first, second, third cycle)	Integrated first and second cycle studies				
6.	Academic year/semester	Year	1	Semester	1	
7	Course workload expressed in ECTS credits	2				
8.	Teacher	Prof. Dr. Tomislav Stankovski				
9.	Language in which the curriculum is conducted	English				
10.	Necessary prerequisites for taking and passing the course	None				
11.	Course objectives (competences) and learning outcomes:	Objectives of the subject program: - To learn the basic physical laws that apply to dentistry and medicine; - To understand the processes in living organisms that can be described by biophysical models; - To learn the basic laws of movement, acoustics, pressure, and heat, as well as the application of ultrasound; - To understand the importance of electrical and magnetic phenomena and processes, as well as the application of low-frequency and high-frequency electric currents in dentistry; - To learn the characteristics of non-ionizing and ionizing radiation and their application in medicine.				
12.	Detailed course content by chapter and units, with the learning outcomes for each chapter	- Basics of Biophysics……1 class Learning outcomes: Students are introduced to the division of biophysics, systems theory, management, and significant theories. - Basics of biomechanics.....2 classes Learning outcomes: Students are introduced to the lever, human locomotor system, human work and power, ergometry, mechanical work of the heart, elasticity, mechanical properties of biological tissues, bone elasticity, and bone fracture. - Fluids and their properties.....2 classes Learning outcomes: Students become familiar with fluid viscosity, viscosimetry, hydrodynamics of ideal fluids, physical model of the blood system, surface tension, Laplace pressure, gas embolism, atmospheric pressure, breathing mechanics. - Bioacoustics.....1 class Learning outcomes: Students become familiar with sound waves, physical and subjective characteristics, ultrasound effect of ultrasound on biological systems, application of sound in medicine. - Basic laws in optics.....2 classes Learning outcomes: Students become familiar with optical lenses, optical instruments: magnifying glass, microscope, eye as an optical instrument, physical optics, and infrared light. NIRS – near-infrared spectroscopy, thermography, ultraviolet radiation, fundamentals of quantum optics, photo-effect, luminescence, and lasers. - X-ray radiation..... 2 classes Learning outcomes: Students become familiar with X-ray spectra, absorption of				

		X-ray radiation in the material, application of X-ray radiation in medicine, nuclear physics, and nuclear reactions. Nuclear medicine, SPECT and PET methods, hybrid SPECT/CT methods. - Thermodynamic processes.....2 classes Learning outcomes: Students become familiar with thermometry and calorimetry, heat transfer processes, physiological effect of heat, air humidity as a biophysical factor - Electrical occurrences.....2 classes Learning outcomes: Students become familiar with the operation and power of electric current, contact potential difference, thermoelements, aeroions, aeroionotherapy. Electrical current through liquids, electrolysis, electrokinetic processes, physiological effect of current, electrostimulation, active electrodiagnostic, biopotentials, physical bases, action potential and electrophysiology. - Electromagnetism.....1 class Learning outcomes: Students become familiar with electromagnetic induction, leakage of current through the human organism, magnetic resonance imaging. Total: .....15 classes Practical teaching (seminars and exercises – 15 classes): - Electrical phenomena and Ohm's Law for electrical circuits.3 classes - Electromagnetism. Magnetic resonance imaging.....3 classes - Mechanics and elasticity.....3 classes - Bioacoustics and the nature of sound.....3 classes - Geometric optics and optical lenses.....3 classes Total: .....15 classes		
13	Interrelation of subjects			
14.	Detailed description of the teaching and working methods for the subject	Interactive teaching, laboratory or auditorium exercises, interactive simulation demonstrations, thematic unit development seminars.		
15.	Total Available Time	60 classes		
16.	Forms of teaching activities	16.1.	Lectures- theoretical teaching. classes	15
		16.2.	Exercises (laboratory, auditorium), seminars, teamwork	15
		16.3.	Practice: classes	
17.	Other forms of activities	17.1.	Project assignments: classes	
		17.2.	Independent assignments: classes	
		17.3.	Home study - assignments	30
18	Signature requirements	Attendance and activity during exercises are included with 20% in the grade (after passing the exam). Attendance at lectures (1%) enters into the final grade.		
19	Method of grading			
	19.1.	Tests: points		Continuous assessment min.-max. 60 - 100
	19.2.	Seminar work/project, written and oral presentation: points		/
	19.3.	Final exam: points		min.-max. 60 - 100
20	Evaluation criteria (points/grade)		up to 59 points	5 (five) (F)
			from 60 to 68 points	6 (six) (E)
			from 69 to 76 points	7 (seven) (D)
			from 77 to 84 points	8 (eight) (C)
			from 85 to 92 points	9 (nine) (B)
			from 93 to 100points	10 (ten) (A)
21.	Method of monitoring the quality of teaching	Self-evaluation by students, assistant control during the practical teaching and assessment of the achieved student success, as well as the pass rate of students who have passed the subject		
22.	Literature			
	22.1.	Required literature		

		Ord. number	Author	Title	Publisher	Year
		1.	T.Stankovski	Biophysics	Internal Script	Faculty of Medicine
		2.	N.Andonovska	Biophysics	Book	UKIM, Skopje
		3.	D.Gershanovski	Biophysics	Script	Institute of Physics
	22.2.	Additional literature				
		Ord. number	Author	Title	Publisher	Year
		1.	W. Bialek	Biophysics: Searching for Principles	Princeton University Press	2012
		2.	T.Stankovski	Tackling the inverse problem for non-autonomous systems: Application to life sciences	Springer	2013