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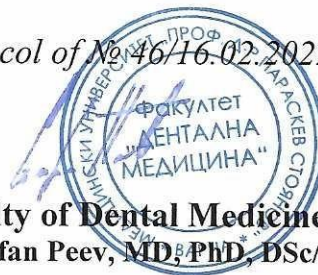
MEDICAL UNIVERSITY

“PROF. DR. PARASKEV STOYANOV” - VARNA

FACULTY OF DENTAL MEDICINE

Approved with a Protocol of № 46/16.02.2022г.

Approved:
DEAN of Faculty of Dental Medicine:
/ Prof. Stefan Peev, MD, PhD, DSc/



EDUCATIONAL PROGRAMME

OF

“ PHYSICS “

Specialty “DENTAL MEDICINE”

Educational-qualification degree “MASTER”

Professional qualification “ PHYSICIAN IN DENTAL MEDICINE”

	Semester	Horarium weekly	Total horarium
Lectures	1	2	30
Exercises	1	2	20
Total		4	60
Monitoring and evaluation forms	Current control		Exam- I semester
Credits (ECTS)			4
Extracurricular employment			60

Lecturers:

Varna, 2022

ANNOTATION:

This general course on Medical physics is oriented towards the basic physical phenomena and processes in living organisms and the operating principles of modern medical equipment. The lectures, labs and seminars are designed to develop the logical and analytical thinking of students.

The lectures introduce the students to the problems of acoustics, hearing, and the applications of ultrasound in medicine. Atmospheric pressure and air humidity are related to respiration and the mechanics of breathing. The fluid dynamics perspective is used to describe the circulation of blood and the work performed by the heart. The topics on electricity include the basics of the generation of biopotentials and their measurement. The study of optical phenomena is illustrated by the optical system of the human eye and the principles of operation of optical equipment, used in medical laboratories. Atomic physics problems are discussed in relation to the principles of computed tomography, magnetic resonance imaging, and lasers. The lectures also include topics on ionizing radiation and its use in medicine for diagnostics and therapy. The labs and seminars complement and illustrate the material covered on the lectures.

PLAN OF TOPICS OF LECTURES AND PRACTICAL CLASSES

Lectures I semester

№	Topic	Hours
1.	CIRCULAR MOTION. CENTRIFUGATION.	2
2.	ELEMENTS OF BIOMECHANICS. LEVERS – CLASSES AND EQUILIBRIUM.	2
3.	ACOUSTICS. SOUND AND ULTRASOUND.	2
4.	FLUIDS AND FLOWS. VISCOSITY.	1
	THE MOLECULAR STRUCTURE OF LIQUIDS. SURFACE TENSION.	1
5.	HAEMODYNAMICS. BLOOD CIRCULATION AND BLOOD PRESSURE.	1
	MECHANICAL PROPERTIES OF SOLIDS AND TISSUES. DEFORMATIONS.	1
6.	ATMOSPHERIC PRESSURE. RESPIRATION.	1
	ELECTRIC FIELD. ELECTROCARDIOGRAPHY.	1
7.	DIRECT ELECTRIC CURRENT. CONDUCTANCE OF ELECTROLYTES AND GASES.	1
	MAGNETIC FIELD. MAGNETIC PROPERTIES OF TISSUES.	1
8.	THE NATURE OF LIGHT. PHOTOMETRY. REFLECTION AND REFRACTION. THE ENDOSCOPE.	2
9.	OPTICAL LENSES. OPTICAL SYSTEM OF THE EYE.	2
10.	THE COMPOUND MICROSCOPE. MAGNIFICATION AND RESOLUTION.	2
11.	POLARISATION OF LIGHT. OPTICAL ACTIVITY.	1
	INFRARED AND ULTRAVIOLET LIGHT. MEDICAL USES.	1
12.	EMISSION, ABSORPTION AND SCATTERING OF LIGHT. APPLICATIONS IN MEDICINE AND BIOLOGY.	1
	THE ELECTRON MICROSCOPE. MAGNIFICATION AND RESOLUTION.	1
13.	NUCLEAR MAGNETIC RESONANCE. MAGNETIC RESONANCE IMAGING.	1
	X-RAYS AND THEIR INTERACTION WITH MATTER. X-RAY DIAGNOSTICS. X-RAY COMPUTED TOMOGRAPHY.	1
14.	RADIOACTIVE DECAY. APPLICATIONS IN MEDICINE.	2
15.	DOSIMETRY. RADIATION SAFETY.	2
	Total	30

Practical classes I semester

№	Topic	Hours
1.	MEASUREMENTS. UNITS AND ERRORS. (SEMINAR)	2
2.	AUDIOMETRY. DETERMINATION OF THE SPECTRAL DEPENDENCE OF THE HEARING THRESHOLD.	2
3.	MEASUREMENT OF THE DYNAMIC VISCOSITY OF LIQUIDS.	2
4.	BLOOD PRESSURE MEASUREMENT.	2
5.	DETERMINATION OF YOUNG'S MODULUS OF A BONE.	2
6.	ATMOSPHERIC PRESSURE AND AIR HUMIDITY.	2
7.	PERIODIC ELECTRICAL SIGNALS AND MEASUREMENT OF THEIR PARAMETERS BY A CATHODE-RAY OSCILLOSCOPE.	2
8.	AMPLIFICATION OF BIO-VOLTAGES. THE DIFFERENTIAL AMPLIFIER.	2
9.	TEST ON THE FIRST PART OF THE COURSE (MIDTERM TEST).	2
10.	OPTICAL LENSES. DETERMINATION OF THE OPTICAL POWER OF CONVERGING AND DIVERGING LENSES.	2
11.	LASERS. BASIC PROPERTIES OF LASER RADIATION.	2
12.	MICROSCOPY. USING THE MICROSCOPE FOR MEASUREMENTS.	2
13.	DETERMINATION OF THE REFRACTIVE INDEX OF LIQUIDS BY A REFRACTOMETER.	2
14.	PHOTOCOLORIMETRY.	2
15.	IONIZING RADIATION. DETERMINATION OF THE TOTAL LINEAR ATTENUATION COEFFICIENT OF γ -RAYS PROPAGATING THROUGH A SUBSTANCE.	2
Total		30

MONITORING AND EVALUATION FORMS:

Student performance is formally evaluated at lab and seminar sessions by brief tests on the current lab topic, and written student reports about the results obtained. A midterm test on the first part of the material from the lectures is compulsory and may be used as grounds for partial exemption from the written final examination.

Students who have completed the labs, seminars and midterm test are admitted to the final examination which consists of written and oral parts.

The final mark consists of: labs and seminars (30%), written part of final exam (60%), and oral part of final exam (10%).

SYLLABUS FOR PHYSICS
FIRST YEAR STUDENTS OF MEDICINE

1. CIRCULAR MOTION. CENTRIFUGATION.
2. ELEMENTS OF BIOMECHANICS. LEVERS – CLASSES AND EQUILIBRIUM.
3. ACOUSTICS. SOUND AND ULTRASOUND.
4. FLUIDS AND FLOWS. VISCOSITY.
5. THE MOLECULAR STRUCTURE OF LIQUIDS. SURFACE TENSION.
6. HAEMODYNAMICS. BLOOD CIRCULATION AND BLOOD PRESSURE.
7. MECHANICAL PROPERTIES OF SOLIDS AND TISSUES. DEFORMATIONS.
8. ATMOSPHERIC PRESSURE. RESPIRATION.
9. ELECTRIC FIELD. ELECTROCARDIOGRAPHY.
10. DIRECT ELECTRIC CURRENT. CONDUCTANCE OF ELECTROLYTES AND GASES.
11. MAGNETIC FIELD. MAGNETIC PROPERTIES OF TISSUES.
12. THE NATURE OF LIGHT. PHOTOMETRY. REFLECTION AND REFRACTION. THE ENDOSCOPE.
13. OPTICAL LENSES. OPTICAL SYSTEM OF THE EYE.
14. THE COMPOUND MICROSCOPE. MAGNIFICATION AND RESOLUTION.
15. POLARISATION OF LIGHT. OPTICAL ACTIVITY.
16. INFRARED AND ULTRAVIOLET LIGHT. MEDICAL USES.
17. EMISSION, ABSORPTION, AND SCATTERING OF LIGHT
18. THE ELECTRON MICROSCOPE
19. ELECTRON PARAMAGNETIC RESONANCE AND NUCLEAR MAGNETIC RESONANCE
20. X-RAYS AND THEIR INTERACTION WITH MATTER. X-RAY DIAGNOSTICS. X-RAY COMPUTED TOMOGRAPHY.
21. RADIOACTIVITY. APPLICATIONS IN MEDICINE.
22. DOSIMETRY. RADIATION PROTECTION.

REFERENCES:

1. Lecture Notes available online at <http://elearn.mu-varna.bg/>
2. Russell K. Hobbie, Bradley J Roth, Intermediate Physics for Medicine and Biology, 5th Edition, Springer, 2015.
3. P.Davidovits, Physics in Biology and Medicine, Harcourt Academic Press, 2008.
4. <https://en.khanacademy.org/science/physics/>
5. <https://en.khanacademy.org/science/biology/>
6. <https://en.khanacademy.org/science/health-and-medicine/>

Department's council protocol № 130 / 21.12.2021

PREPARED:


prof. Krastena Nikolova, PhD

HEAD OF DEPARTMENT – “PHYSICS AND BIOPHYSICS”


prof. Krastena Nikolova, PhD/

ПРЕПИС ИЗВЛЕЧЕНИЕ ОТ ПРОТОКОЛ №130

от заседание на катедрен съвет на катедра "Физика и биофизика",
провел се на 21.12.2021 година

Присъстващи: Проф. Кр. Николова, гл.ас. Д. Илиева, гл.ас. Ст. Минкова,
гл.ас. Й. Енева, ас. П. Радушева, ас. Н. Панова, ас. Я. Банева

Отсъстващи: ас. К.Николова – платен годишен отпуск

След проверка на кворума и установяване редовността на заседанието на катедрения съвет, проф. Кр. Николова откри същото и предложи следния **дневен ред**:

1. Приключване на зимен семестър на учебната 2021/2022 година.
2. Актуализиране на учебните програми за специалност "Дентална медицина" БЕО и АЕО във връзка с предстояща акредитация.
3. Разни.

Така предложеният дневен ред бе подложен на гласуване и единодушно приет.

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По точка втора от дневния ред Проф. Кр. Николова разясни, че във връзка с предстояща акредитация се изисква актуализация на учебните програми за специалност "Дентална медицина" БЕО и АЕО като поясни, че това засяга заглавната страница на програмите. Ръководителят на катедра „Физика и биофизика“ даде думата на присъстващите на заседанието на Катедрения съвет за изказвания, мнения и предложения.

Поради липса на други изказвания **направеното предложение бе подложено на гласуване и прието със следните резултати:**

гласували „За“ – 7 гласа
гласували „Против“ – няма
Въздържали се – няма

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Протоколирал: 
Гл. ас. Йорданка Енева, дф

Ръководител катедра: 
проф. Кр. Николова, дф

21.12.2021 г.
Гр. Варна