



Educational institution
"Royal Metropolitan University"
Quality management system
Syllabus of the discipline
«Med Biophysics» of the «DNHD» EI "RMU"

EI "ROYAL METROPOLITAN UNIVERSITY"
Department of Natural and Humanitarian Disciplines



SYLLABUS

Program:	General medicine
Qualification of the graduate:	General practitioner / Medical doctor
Year:	2025-2026
Semester:	1
Course duration:	18 weeks
Instructor/Assistant/Professor	Name: Ph.D. Saparaliev A <i>AS</i>
Department:	Humanities
Day and Time for consultation:	Wednesday at 13:00-14:00. room 209
Classroom:	209
e-mail:	<i>saparaliev1980@mail.ru</i>
Course Title:	Med biophysics
Must/Elective:	
Credit/Hours:	2



1. **Saparalieva A, e-mail:** *saparalieva1980@mail.ru*

2. Description of discipline:

The objectives of the discipline are the disclosure of its integrative links with other disciplines provide in the complex training of a specialist in this profile, with the formation of a dialectical worldview among students based on physical laws and teach them to recognize the physiological states of the human body through physical phenomena; providing in-depth knowledge of the features of the manifestation of physical laws in a biosystem; understanding of the design and operation of medical equipment.

Prerequisites to study this academic discipline, you need knowledge, skills and abilities formed by previous disciplines: a school course in mathematics, natural history, and physics.

Post-requisites because of studying this section of physics, namely biophysics, the foundations are laid for further study by students of the following clinical disciplines: Evidence-based medicine, health care, internal medicine, surgery, pediatrics, genetics, physiology, ophthalmology, physiotherapy, radiation therapy, hygiene disciplines.

The results of mastering the discipline after studying this discipline, which includes a course of lectures and practical exercises, students should:

Competencies of students, formed because of mastering the discipline, planned results of mastering the academic discipline.

GC-3 - capable and willing to collect, process, and interpret data necessary for forming judgments on relevant social, scientific, and ethical issues using modern information technologies.

IC-3 - capable and willing to communicate in written and oral form in the state and official languages, and capable of mastering one foreign language to solve professional problems.

SPC-1 - capable and willing to implement ethical, deontological, and bioethical principles in professional activities.

3. Name and complexity of the discipline

№	Name of discipline	course	semester	Week	Academic hours		Independent work	Total
					Lecture	Practice	IWS	
1	Med biophysics	1	1	18	18	18	24	60

4. Thematic plan for modules (indicating weeks and hours, dates)

1 semester

Course Plan	Lecture / Practice	Topic	Date	hours
1 week	Lecture	<i>Topic 1. Introduction to biological and medical physics. Physical foundations of diagnostic and treatment methods.</i>		2



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2 week	Lecture	<i>Topic 2. Biophysics of membrane processes</i>	2
3 week	Lecture	<i>Topic 3. Biomechanics of tissues and organs</i>	2
4 week	Lecture	<i>Topic 4. Bioacoustics.</i>	2
5 week	Lecture	<i>Topic 5. Electrical properties of tissues and organs</i>	2
6 week	Lecture	<i>Topic 6. Physical principles of electrocardiography, electroencephalography</i>	2
7 week	Lecture	<i>Topic 7. Biooptics</i>	2
8 week	Lecture	<i>Topic 8. Thermodynamics in biology and medicine</i>	2
9 week	Lecture	<i>Topic 9. Radiation biophysics</i>	2
Module 1 (Date)			
1 week	Practice	<i>Topic 1. Introduction to biological and medical physics. Physical foundations of diagnostic and treatment methods</i>	2
2 week	Practice	<i>Topic 2. Permeability and membrane transport. Electrical membrane potentials.</i>	2
3 week	Practice	<i>Topic 3. Biomechanics of tissues and organs</i>	2
4 week	Practice	<i>Topic 4. Biophysics of hearing. Use of sound in medicine</i>	2
5 week	Practice	<i>Topic 5. Effect of electromagnetic fields on the human body medical image</i>	2
Module 1 (Date)			
6 week	Practice	<i>Topic 6. Electrocardiography, electroencephalography</i>	2
7 week	Practice	<i>Topic 7. Optical methods in medicine</i>	2
8 week	Practice	<i>Topic 8. Thermodynamics in medical physics</i>	2
9 week	Practice	<i>Topic 9. Radioactivity. The effects of radiation on the human body</i>	2
Module 2 (Date)			

5. Schedule of consultations

semester	group	week	Time	room
1	GM	Wednesday	14:00-16:00	209



6. Schedule for receiving detentions

semester	group	week	Time	room
1	GM	Wednesday	14:00-16:00	209

7. List of basic and additional literature

1. Medical and biological physics: A. N. Remizov. — Moscow : GEOTAR-Media, 2022
2. Medical biophysics with practical course., Marcel Veterník, Ján Jakuš, Et Al. 2022.
3. Physics with Fundamentals of Biophysics. Yuriy Posudin. 2016
4. Biophysics: Searching for Principles. William Bialek. 2011
5. Physics in Biology and Medicine. Third Edition
6. Paul Davidovits, 2008.
7. Medical Physics. Course of Lectures: A Textbook / I. E. Esaulenko, E. V. Dorokhov, et al. Moscow: GEOTAR-Media, 2021. 272 p.
8. https://www.studentlibrary.ru/ru/book/OP_V04.html
9. medboocs\phy_Bookmatter ToMedicalPhysics.pdf
10. medboocs\phy_Bookmatter ToMedicalPhysics.pdf
11. medboocs\phy\2011_Biophysics:_MedicalPhysics.pdf
12. medboocs\phy\2008_Physics in Biology and Medicines.pdf

8. Course policy and evaluation criteria:

Mandatory class attendance.

Mandatory uniform (white medical gown and slippers; during lab sessions, a cap and non-sterile gloves are also required).

Active student participation in practical classes, including preliminary preparation and completion of homework.

High-quality and timely completion of assignments for Independent Work of a Student (IWS) and Independent Work of a Student with a Teacher (IWST).

Participation in all types of assessment: current, module (midterm), and final.

Maintenance of a workbook for recording lecture material, homework, and lab results

Additional Requirements

One late arrival or leaving class early for any reason is considered one missed class and must be made up.

The following are unacceptable: using mobile phones during classes, late submission of assignments, and failure to comply with rules of conduct and subordination.

Assessment System

The maximum score for each module is 100 points, including:

Independent Work of a Student (IWS) – 20 points

Current control (assessment) – 40 points

Module (midterm) control – 40 points

The results of all modules and the exam are combined to calculate the average course grade.

Students must make up missed classes and any “unsatisfactory” grades received during the course. Makeup assignments are accepted according to the faculty duty schedule in the department.

A module control (assessment) may be retaken only for a valid reason and must be completed no later than two weeks after the module date.

A student is allowed to take the final assessment (a differentiated pass/credit or an exam) if he



scores 60 or more points in the course.

A student who scores less than 60 points is not allowed to take the final assessment.

A student is exempt from taking the exam if their overall course score is between 96 and 100 (excellent). This provision does not apply to medical disciplines requiring a state final examination.

Exemption from the exam is granted by order of the rector based on a report from the dean's office. The dean's office prepares a semester summary report based on submissions from department heads.

Grading System

The credit system uses a multi-point grading scale with letter grades, allowing instructors more flexibility in assessing student performance. An academic credit is considered earned if the student receives one of the following grades:

A+, A, A-, B+, B, B-, C+, C, C-, D+, D, D-. Credit is not awarded for grades outside this scale.

Scoring Policy	Module 1	Module 2, etc.
Classroom work (activity in discussions, oral questioning, working with a glossary, etc.)	40 points	40 points
Independent work: abstract, report, essay	20 points	20 points
Modular control (midterm control)	40 points	40 points
Total for the discipline:	More than 60 points	
Credit passed	The discipline is passed.	


Final assessment in the form of a pass (a credit) is carried out based on the results of the student's independent work (SIW), current control (assessment) and midterm (modular) control for all modules.

Assessment Policy						
Form of interim assessment	Количество баллов					Mark
	Current control (max)	SIW (max)	Module (midterm) control (max)	Examination (max)	Total points (max)	
Examination	40	20	40	100	100	Excellent (Max)
Note: Method of calculating the sum of points	M1=CK1+SIW1+MC1; M2=CK2+SIW2+MC2;				S=(M1+M2+E)/3	

Final assessment in the form of an exam is conducted based on the student's independent work, current control (assessments) and module (midterm) control for all modules, as well as the exam itself.

The following grade-to-point scale is used to evaluate student performance:

Rating and Scoring Scale				
Maximum score	Intervals			
		«not satisfactory»	«satisfactory»	«good»

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20	0-11	12-15	16-17	18-20
40	0-23	24-30	31-35	36-40
60	0-35	36-45	46-53	54-60
100	0-59	60-75	76-89	90-100

Additional requirements:

- a. one lateness to classes and / or leaving before their end for any reason is considered as one missed lesson that is not subject to recovery;
- b. unacceptable: the use of cell phones during classes, deceit and plagiarism, late delivery of assignments, non-compliance with subordination and rules of conduct.

Help: For advice on the implementation of independent work (SIW), their delivery and protection, as well as for additional information on the material covered and all other questions you may have about the course, please contact the teacher during the hours allotted for consultations.