



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. Saparalieva A
Department:	Humanities
Day and Time for consultation:	Wednesday at 13:00-14:00. room 209
Classroom:	209
e-mail:	<i>saparalieva1980@mail.ru</i>
Course Title:	Med biophysics
Must/Elective:	
Credit/Hours:	2

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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 that 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
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1 week	Lecture	<i>Topic 1. Introduction to biological and medical physics. Physical foundations of diagnostic and treatment methods.</i>	2
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
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
<i>Module 1 (Date)</i>			
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
<i>Module 2 (Date)</i>			

5. Schedule of consultations

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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

A) Basic references:

1. Volkenstein M.V. "Biophysics". M. 2001
2. Vladimirov Yu.A., Roshchupkin D.I. "Biophysics". M. 2004
3. Liventsev M.N. "Physics course for medical universities". M. 2001
4. Remizov A.N. "Medical and biological physics". M., GEOTAR-Media, 2015
5. Laboratory workshop on medical and biological physics. Comp. Abdybalieva K. and others, Bishkek - 2018

B) Additional literature:

1. Blumendfeld L.A. "Problems of biological physics". M., 2007
2. Volkenstein M.V. "General Biophysics". M., 2008
3. Ilincheva V.D. "Bioacoustics". M., 2002
4. Merion J.B. "General Physics with Biological Examples". M., 2006
5. Rubin A.B. "Biophysics". M., 2007
6. Rubin A.B., Post'eva N.F. "Kinetics of Biological Processes". M., 2009

8. Course policy and evaluation criteria:

Type of control (current, milestone, final)	Control form	Assessment of learning outcomes
Current control	Oral survey, written work	40 points
IWS+IWW	Performing assignments, work with literature	20 points
Milestone control (modul submission)	Testing, control tasks	40 points
Final control (differential test)	Conversation, examination	100 points

Scale of correspondence between grades and scores on the final control (exam)	
Score	Grade
90-100	«excellent»
76-89	«good»
60-75	«satisfactory»
0-59	«unsatisfactory»

9. Policy of the academic discipline (corporate culture code, student code of ethics): - Mandatory attendance.



- Active participation of the student in practical classes, preliminary preparation and homework.
- High-quality and timely completion of tasks for the SIW.
- Participation in all types of control (current, milestone, final).

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.