

EI “ROYAL METROPOLITAN UNIVERSITY”
Department of Natural and Humanitarian Disciplines



SYLLABUS

Program:	General medicine
Qualification of the graduate:	General practitioner / Medical doctor
Year:	2023-2024
Semester:	2
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:	Medbiophysics
Must/Elective:	
Credit/Hours:	2

Bishkek 2023

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, physics.

Post-requisites as a result 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 as a result of mastering the discipline, planned results of mastering the academic discipline.

Competency codes	Content of competencies	List of planned learning outcomes by discipline
GC-1	able and ready to analyze socially significant problems and processes, use the methods of natural sciences, mathematics and the humanities in various types of professional and social activities;	Know: the basics of the culture of general and clinical thinking and the characteristics of mental operations; Be able to: understand the meaning, generalize, systematize, interpret and comment on the received socially significant information; solve combined and situational problems from the basic courses of natural sciences Own: mental operations of analysis and synthesis, comparison, abstraction, concretization, generalizations, classifications, based on the laws of natural sciences.
GC-4	able and ready to work in a team, tolerantly perceive social, ethnic, confessional and cultural differences;	Know: the basic concepts and fundamental laws of the natural sciences that ensure tolerance in the team; Be able to: apply mathematical methods, physical laws and computer technology to solve practical educational problems; Own: the skills of independent study of the foundations of tolerance in a team and in ethnically and confessionally different societies

		and the skills to conduct them in accordance with the law of mathematical and natural sciences.
IC-4	able and willing to use management techniques; organize the work of performers; find and make responsible management decisions in the conditions of different opinions and within the framework of their professional competence;	Know: a modern presentation of the basic concepts and fundamental laws of the natural sciences on which the operation of medical equipment is based. Be able to: apply mathematical methods, physical laws, medical and computer technology to solve practical problems of health care, receiving them from various sources. Own: work skills for collecting medical and medical physical information for compiling and solving situational medical problems solved by physical and mathematical methods with the help of medical equipment.
SLC-2	capable and ready for professional communication techniques; build interpersonal relationships, work in a group, constructively resolve conflict situations, tolerantly perceive social, ethnic, confessional and cultural differences;	Know: ways to communicate professionally and work in a group Be able to: communicate with patients and work in a group. Own: communication and teamwork skills
SLC-3	Able to use methods for assessing natural (including climate-geographically) and medical and social environmental factors in the development of diseases in children and adolescents, to carry out their correction.	Know: ways and means of self-knowledge, self-development and self-actualization; Be able to: manage and plan your time; Possess: strategic skills for personal and professional development and self-actualization skills.
SLC-5	Able to use methods for assessing natural (including climate-geographically) and medical and social environmental factors in the development of diseases in children and adolescents, to carry out their correction.	Know: the main physical phenomena and patterns underlying the processes occurring in the human body; Be able to: use physical, chemical and biological equipment; work with magnifying equipment (microscopes, optical and simple magnifiers). Own: basic information transformation technologies: text, spreadsheet editors, Internet search; - the concept of limitation in reliability; -

3. Name and complexity of the discipline

№	Name of discipline	course	semester	Week	Academic hours		Independent work	Total
					Lecture	Practice	IWS	

1	Physics	1	2	18	18	18	24	60
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4. Thematic plan for modules (indicating weeks and hours, dates)

1 semester

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

5. Schedule of consultations

semester	group	week	Time	room
2	GM -1-23	Wednesday	14:00-16:00	209

6. Schedule for receiving detentions

semester	group	week	Time	room
2	GM -1-23	Wednesday	14:00-16:00	209

7. List of basic and additional literature

A) Main literature:

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.