



## INTERNATIONAL SCHOOL OF MEDICINE

### SYLLABUS

<b>Program:</b>	<b>General medicine</b>
<b>Qualification of the graduate:</b>	<b>General practitioner / Medical doctor</b>
<b>Year:</b>	<b>2022-2023</b>
<b>Semester:</b>	<b>2</b>
<b>Course duration:</b>	<b>18 weeks</b>
<b>Instructor/Assistant/Professor</b>	Name: Amanbaeva Gulnara Muktarovna Candidate of physical and mathematical sciences Acting associate professor
<b>Department:</b>	«Гуманитарные науки»
<b>Day and Time for consultation:</b>	Every Saturday, at 3:00pm, administrative building of East campus, 5 <sup>th</sup> floor.
<b>Classroom:</b>	508
<b>e-mail:</b>	muhtar.gulnar@mail.ru
<b>Course Title:</b>	Medical and biological physics
<b>Must/Elective:</b>	
<b>Credit/Hours:</b>	<b>2</b>
<b>Course Description:</b>	This course is designed to familiarize the medical physics student with certain equipment and procedures in diagnostic radiology, with emphasis on nuclear medicine (both PET and SPECT), ultrasonic and x-ray (helical) computed tomographic (CT) imaging. Study of the basic anatomy of the human body as demonstrated from cadavers and correlating diagnostic radiographic imaging. Physiological processes of body systems will be examined with an emphasis on its relationship with imaging.
<b>Course Objectives:</b>	The main objective of the course of medical and biological physics is to provide biophysical, physical and technical knowledge to medical students; to install the skills needed for the direct formation of a thinker-doctor, practicing and improving his professionalism; both the development of intellectual and practical skills in the field of physical experiment, to assess the physical characteristics of a human; formation of independent thinking and creative approach to cognitive activity.
<b>Prerequisites:</b>	For successful studying of this course, student must know:  <u>Higher math</u> : Calculus systems, algebra, differential calculus, elementary statistics. <u>Physics</u> : Mechanics, basics of thermodynamics, electricity, elements of nuclear physics, optics. <u>Anatomy</u> .
<b>Post-requisites:</b>	Bio-chemistry, epidemiology, normal physiology.

<b>Learning Outcomes:</b> <b>(expected knowledge &amp; ability at the end)</b>	<ul style="list-style-type: none"> <li>➤ to use the laws of physics in the analysis of organisms' vital processes, a variety of physiological phenomena.</li> <li>➤ to recognize the physical principles lying in the basis of various methods of investigation of patients, to evaluate the significance of these findings for the body.</li> <li>➤ to distinguish the nature of the physical factors used for therapeutic purposes, to be able to measure (to dose the intensity of these factors in medical procedures, to understand the primary effect of these factors on the body.</li> </ul>
<b>Basic references:</b>	<ul style="list-style-type: none"> <li>• Amanbaeva G.M, Ismailova Ch.S, Baidjuranova A.M “Higher Mathematics” (2016)</li> <li>• Russell K. Hobbie Bradley J. Roth “Intermediate Physics for Medicine and Biology” (2006).</li> <li>• “Biophysics. Vasantha Pattabhi N. Gautham”. (2002) Kluwer Academic Publishers, Dordrecht, University of Madras, Guindy Campus, Chennai, India. 253p.</li> <li>•</li> </ul>
<b>Supplementary Textbook and Materials:</b>	<ul style="list-style-type: none"> <li>• “Physiology, Biophysics, and Biomedical Engineering” Andrew W. Wood.</li> <li>• “Practical MR Physics” Alexander C.Mamourian, (2010)</li> <li>• Radiation Protection and Dosimetry. Michael D. Stabin, (2010)</li> <li>• Fundamental Principles of Membrane Biophysics. David Njus, 2000, Wayne State University, 117p.</li> </ul>

### **COURSE POLICY AND EVALUATION CRITERIA:**

<b>Type of control (current, milestone, final)</b>	<b>Control form</b>	<b>Assessment of learning outcomes</b>
Attendance	For one missed lesson minus 2 points	20 points
Current control	Oral survey, written work	20 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 (test.edu.kg)	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»

Course Plan	Lecture / Practice	Medical and biological physics
1 week	Lecture	The mechanical properties of tissues. Biomechanics. Newton's Laws.
2 week	Practice	Biomechanics. Fundamentals of Materials. Solving problems.
3 week	Lecture	Basics of biorheology and hemodynamics.
4 week	Practice	Laboratory work # 1. Viscosity coefficient of fluid. Stokes' method
5 week	Lecture	Mechanical oscillations and waves
6 week	Practice	Laboratory work # 2. Measuring a coefficient of surface tension of a liquid by loop separation.
7 week	Lecture	Biological Membrane. Biological Thermodynamics.
8 week	Practice	Laboratory work No. 3. Determination of thermal conductivity of metals
<i>Modul 1</i>	Practice	Control of practical skills (final control of knowledge on a unit 1).
9 week	Lecture	The action of electric currents and electromagnetic fields on biological objects.
10 week	Practice	Laboratory work # 5. Bio-potentials. Physical fundamentals of electrocardiography.
11 week	Lecture	Medical electronics
12 week	Practice	Nuclear Magnetic resonance.
13 week	Lecture	Optics
14 week	Practice	Laboratory work # 7. Study of the light polarization. Malus Law.
15 week	Lecture	Elements of quantum physics.
16 week	Practice	Laboratory work # 6. Determination of the wavelength of gel-neon laser radiation using a diffraction grating
17 week	Lecture	Ionizing radiation. Dosimetry
18 week	Practice	Action of ionizing radiation on a human body(seminar)
<i>Modul 2</i>		Control of practical skills (final control of knowledge on a unit 2).