INTERNATIONAL SCHOOL OF MEDICINE

SYLLABUS

Program:	**General medicine**
Qualification of the graduate:	**General practitioner / Medical doctor**
Year:	**2021-2022**
Semester:	**2**
Course duration:	**18 weeks**
Instructor/Assistant/Professor	Name: Amanbaeva Gulnara Muktarovna Candidate of physical and mathematical sciences Acting associate professor
Department:	**«Гуманитарные науки»**
Day and Time for consultation:	Every Saturday, at 3:00pm, administrative building of East campus, 5th floor.
Classroom:	508
e-mail:	muhtar.gulnar@mail.ru
Course Title:	Medical and biological physics
Must/Elective:	
Credit/Hours:	**2**
Course Description:	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.
Course Objectives:	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.
Prerequisites:	For successful studying of this course, student must know: Higher math: Calculus systems, algebra, differential calculus, elementary statistics. Physics: Mechanics, basics of thermodynamics, electricity, elements of nuclear physics, optics. Anatomy.
Post-requisites:	Bio-chemistry, epidemiology, normal physiology.

Learning Outcomes: (expected knowledge & ability at the end)	➢ to use the laws of physics in the analysis of organisms' vital processes, a variety of physiological phenomena. ➢ 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. ➢ to distinguish the nature of the physical factors used for therapeutic purposes, to beable to measure (to dose the intensity of these factors in medical procedures, to understand the primary effect of these factors on the body.
Basic references:	• Amanbaeva G.M, Ismailova Ch.S, Baidjuranova A.M "Higher Mathematics" (2016) • Russell K. Hobbie Bradley J. Roth "Intermediate Physics for Medicine and Biology" (2006). • "Biophysics. Vasantha Pattabhi N. Gautham". (2002) Kluwer Academic Publishers, Dordrecht, University of Madras, Guindy Campus, Chennai, India. 253p. •
Supplementary Textbook and Materials:	• "Physiology, Biophysics, and Biomedical Engineering" Andrew W. Wood. • "Practical MR Physics" Alexander C.Mamourian, (2010) • Radiation Protection and Dosimetry. Michael D. Stabin, (2010) • Fundamental Principles of Membrane Biophysics. David Njus, 2000, Wayne State University, 117p.

COURSE POLICY AND EVALUATION CRITERIA:

Type of control (current, milestone, final)	Control form	Assessment of learning outcomes
Attendance	For one missed lesson minus 2 points	20 points
Current control	Oral surveey, written work	20 points
IWS+IWW	Perfoming 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'sLaws.**
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 oscilations 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**
Modul 1 (Date)	**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)**
Modul 2 (Date)		**Control of practical skills (final control of knowledge on a unit 2).**