Speciality "General Medicine"

ACADEMIC DISCIPLINE "MEDICAL AND BIOLOGICAL PHYSICS"
NATURAL SCIENCE MODULE 1.4

Academic discipline outline	Mechanical properties of biological tissues. Methods for measuring blood pressure and blood flow velocity. Surface tension, Wetting, and capillarity. Bioelectric potentials. Electrography of tissues and organs. Physical principles of electrocardiography (ECG). Fundamentals of biosignal acquisition and recording. Electrical and magnetic phenomena in living organisms. Equivalent electrical circuit and impedance of biological tissues. Analysis of electrical pulse signal parameters. Effects of high-frequency electromagnetic fields on biological matter. Electric pulses and electrostimulation of tissues and organs. Registration and monitoring of biophysical parameters. Geometrical and physical optics. Microscopy. Optical system of the human eye. Biophysics of vision. Emission and absorption of electromagnetic radiation. Light absorption, scattering, and polarization. Luminescence and thermal radiation. Ionizing radiation: X-rays and radioactivity. Radiation detection: Geiger–Müller counter. Radiation dosimetry. Exposure, absorbed dose, equivalent dose, effective dose. Dose rate. Biological effects of ionizing radiation.
Resulting skills	To apply the basic biophysical foundations and knowledge of the general principles of functioning of medical equipment to solve the tasks of professional activity.
Learning outcomes	A student must: **know:** the characteristics of physical factors (therapeutic, climatic, and industrial) affecting the human body and the biophysical mechanisms underlying their effects; the purpose, basic design, and safety protocols associated with medical equipment; physical methods used to investigate substances and natural phenomena; methods for mathematical and statistical processing of biomedical data; **be able to:** investigate the physical and physicochemical properties of biological tissues and fluids; assess parameters of physical factors acting on the human body using appropriate measuring instruments; perform statistical analysis of measurement results;

	analyze experimental data and draw scientifically sound conclusions based on the physical characteristics of substances; **master:** practical skills in operating instruments and equipment for physical analysis of biological materials; techniques for determining key physical characteristics of biomedical objects; methodology for evaluating measurement uncertainty and error; competent use of therapeutic and diagnostic medical equipment in accordance with safety standards.
Semester(s)	1,2 semester
Prerequisite	School physics, biology, and chemistry.
Credit value	6 credits
Academic hours	180 academic hours, of which: 96 class hours
Forms of midterm attestation	Test Examination