MEDICAL AND BIOLOGICAL PHYSICS
For international Students
(English medium of instruction)

Contents

Lesson № 1

chapter topic	Mathematical modeling of biomedical processes and medical data processing
lesson topic	**Fundamentals of Mathematical Modeling of Biophysical Processes**
the purpose of the lesson is	to recognize some elements of differential calculus, to understand about their applications in medical and biological tasks

Questions

1. The problems to be solved during laboratory and practical classes in Medical and Biological Physics.
2. The problem of ensuring the operational safety of medical equipment and electrical circuits.
3. Derivative and differential functions, their geometric and physical meaning. Derivative of a function as a measure of the rate of a process.
4. Gradients. Partial derivatives and total differential of functions of several variables. The state of the body as a function of many variables.
5. Direct and indirect measurements. Estimation of the accuracy of the result obtained in the experiments (processing of the results of direct and indirect measurements).

Lesson № 2

chapter topic	Mathematical modeling of biomedical processes and medical data processing
lesson topic	**Differential of a function of one variable. Partial derivatives**
the purpose of the lesson is	to recognize some elements of differential calculus, to understand about their applications in medical and biological tasks

Questions

1. Derivatives of higher orders.
2. Differential of a function of one variable. Partial derivatives and total differential of functions of several variables. The state of the body as a function of many variables
3. Gradients.

Lesson № 3

chapter topic	Mathematical modeling of biomedical processes and medical data processing
lesson topic	**Fundamentals of integral calculus**
the purpose of the lesson is	to recognize physical characteristics of mechanical oscillations and oscillating systems, to study physical characteristics of mechanical waves, to understand the Doppler effect

Questions

1. Antiderivative function and indefinite integral.
2. The definite integral, its application for calculating the areas of figures and the work of a variable force.
3. Methods for finding indefinite and definite integrals. Newton-Leibniz rule
4. The concept of ordinary differential equations.
5. First order differential equations with separable variables. General and particular solutions of differential equations.

Lesson № 4

chapter topic	Fundamentals of biomechanics. Biomechanics of hearing. Acoustic research methods
lesson topic	**Mechanical oscillations. Fourier transform for processing diagnostic data. Mechanical waves**
the purpose of the lesson is	to recognize physical characteristics of mechanical oscillations and oscillating systems, to study physical characteristics of mechanical waves, to understand the Doppler effect

Questions

1. Mechanical oscillations. Harmonic oscillations. Energy of harmonic oscillations.
2. Addition of oscillations. Harmonic spectrum of complex oscillations. Fourier transform and its application for diagnostic data processing.
3. Mechanical wave.
4. Energy characteristics of the wave: wave energy flux, intensity (energy flux density).
5. Doppler effect

Lesson № 5

chapter topic	Fundamentals of biomechanics. Biomechanics of hearing. Acoustic research methods
lesson topic	**Biophysical foundations of the formation of auditory sensation. Audiometry**
the purpose of the lesson is	to study objective sound characteristics and sound perception ones, to understand the biophysics aspects of hearing
Laboratory work	**Determination of a personal level of threshold of hearing**

Questions

1. Classification of sounds. Physical characteristics of sound: frequency, intensity, spectral composition.
2. Reflection and absorption of sound waves. acoustic impedance.
3. Characteristics of auditory sensation and their relationship with the physical characteristics of sound.
4. Hearing chart. Weber-Fechner law. Intensity levels, sound volume levels and units of their measurement, the relationship between them.
5. Physical foundations of the sound perception apparatus (human ear).
6. Phonocardiography. Audiometry.

Lesson № 6

chapter topic	Fundamentals of biomechanics. Biomechanics of hearing. Acoustic research methods
lesson topic	**Ultrasound and infrasound. Ultrasonic methods of research and influence in medicine**
the purpose of the lesson is	to study ultrasound generation, to recognize ultrasound imaging techniques and application of ultrasound in medicine, to discuss infrasound influence on living organism
Laboratory work	**Studying of working principles of ultrasonic flow meter**

Questions

1. Emitters and receivers of ultrasound.
2. Biophysical foundations of the impact of ultrasound on cells and tissues of the body.
3. Therapeutic and surgical applications of ultrasound.
4. Principles of ultrasonic imaging of organs and tissues of the human body. Ultrasound diagnostics.
5. Application of the Doppler effect for non-invasive measurement of blood flow velocity.
6. Infrasound. Features of the action of infrasound on biological objects.

Lesson № 7

chapter topic	Fundamentals of biomechanics. Biomechanics of hearing. Acoustic research methods
lesson topic	**Mechanical properties of biological tissues. Determination of the elastic modulus of materials**
the purpose of the lesson is	to study the theoretical basics of the mechanical properties of solids, to recognize test methods for Young's modulus, to understand kinematics and dynamics of human motion
Laboratory work	**Determination of Young's modulus of a bone**

Questions

1. Mechanical deformations. Hooke's law, modulus of elasticity.
2. Diagram of the dependence of mechanical stress on relative deformation (stress diagram). Determination of the modulus of elasticity of materials.
3. Elastic, viscous and viscoelastic media, their mechanical characteristics.
4. Models of viscoelastic media.
5. Mechanical properties of biological tissues: bone tissue, muscles, tendons, vessel walls.

Lesson № 8

chapter topic	Biorheology. Physical basics of hemodynamics
lesson topic	**Physical foundations of hydrodynamics of ideal and viscous fluids. Biorheology and physical foundations of hemodynamics**
the purpose of the lesson is	to study the basic notions and laws of hydrodynamics, to recognize the physical properties of blood flow and cardio-vascular system

Questions

1. Basic concepts of hydrodynamics. The jet continuity equation. Bernoulli equation.
2. Application of the Bernoulli equation to study blood flow in large arteries and aorta (arterial occlusion, arterial murmur, aneurysm behavior)
3. Laminar and turbulent flow. Reynolds number.
4. The flow of a viscous fluid, the formulas of Newton and Poiseuille. hydraulic resistance.
5. The role of vascular elasticity, pulse wave.
6. Methods for determining pressure and blood flow velocity.

Lesson № 9

chapter topic	Fundamentals of biomechanics. Biomechanics of hearing. Acoustic research methods
lesson topic	**Viscometry**
the purpose of the lesson is	to study the physical properties of blood flow and cardio-vascular system, to recognize viscosity measurement techniques
Laboratory work	**Determination of liquid viscosity by capillary viscosimeter. Investigation of solution viscosity dependence on its concentration**

Questions

1. Rheological properties of blood, non-Newtonian nature of its viscosity.
2. Factors affecting blood viscosity in the human body.
3. Distribution of blood flow velocity and blood pressure in the systemic circulation.
4. Methods for determining viscosity: Stokes, Ostwald, rotational method.
5. Work and power of the heart.

Lesson № 10

chapter topic	Fundamentals of biomechanics. Biomechanics of hearing. Acoustic research methods
lesson topic	**Surface tension of liquids. Capillary action**
the purpose of the lesson is	to recognize some peculiarities of the molecular structure of liquids, to study surface phenomena and their manifestation in biological systems
Laboratory work	**Determination of liquid surface tension. Dependence of surface tension on temperatur**

Questions

1. Molecular structure of liquids. The physical essence of the surface tension phenomenon
2. Surface tension coefficient, units of surface tension coefficient
3. Phenomenon of wetting. Capillary actions and their role in biological systems
4. Additional pressure under curved surface of liquid. La Place's Law. Gas embolism in the vascular system
5. Pulmonary surfactant role in respiratory process

Lesson № 11

chapter topic	Transport phenomena and physical processes in biological membranes. Membrane potentials of the cell
lesson topic	**Structure and physical properties of biological membranes. Transport of substances across biological membranes**
the purpose of the lesson is	to recognize structural and functional organization of plasma membrane, to study the main kinds of membrane transport in biological cells
Laboratory work	**Diffusion of Ions through a Semipermeable Film**

Questions

1. Molecular organization and models of cell membranes.
2. Structure and physical properties of biological membranes.
3. Passive transport of substances through biological membranes, its types.
4. Mathematical description of passive transport.
5. Active transport of ions.

Lesson № 12

chapter topic	Transport phenomena and physical processes in biological membranes. Membrane potentials of the cell
lesson topic	**Formation of cell membrane potentials at rest and during excitation. Action potential propagation along axons**
the purpose of the lesson is	to study the bioelectrogenesis phenomena in cells

Questions

1. Resting membrane potentials and their ionic nature.
2. Nernst equation. The Goldmann-Hodgkin-Katz equation for the resting potential of a cell.
3. Action potential generation mechanism, its main phases. Refractory period.
4. Action potential propagation along unmyelinated axons.
5. Propagation of the action potential along myelinated axons.

Lesson № 13

chapter topic	Electrical and magnetic phenomena in the human body, electrical effects and research methods
lesson topic	**Physical basis of electrography of tissues and organs of the human body**
the purpose of the lesson is	to understand the physical origin of biopotentials of organs and tissues

Questions

1. Electric field and its characteristics.
2. electric dipole. The electric field of the dipole.
3. Dipole in an electric field. Dipole current generator.
4. The concept of a multipole. Myocardial fiber as a dipole.

Lesson № 14

chapter topic	Electrical and magnetic phenomena in the human body, electrical effects and research methods
lesson topic	**The Basics of Electrocardiography**
the purpose of the lesson is	to study technical principles of ECG recording, to perform ECG measurement
Laboratory work	**Electrocardiograph: Technical Principles. ECG recording. Time and Amplitude Analysis of ECG Waveform**

Questions

1. Dipole equivalent electrical generator of the heart.
2. Electrocardiography. Einthoven's theory.
3. Standard Einthoven leads, enhanced unipolar and chest leads.
4. Formation of electrocardiogram waves, their connection with physiological processes in the myocardium.

Lesson № 15

chapter topic	Electrical and magnetic phenomena in the human body, electrical effects and research methods
lesson topic	**Amplification of bioelectrical signals**
the purpose of the lesson is	to recognize working principle of amplifier and to study some main characteristics of amplifier
Laboratory work	**Amplitude characteristic and frequency response of amplifier**

Questions

1. General principles of electrical signal amplification. Requirements for bioelectric signal amplifiers.
2. Determination of the amplitude (dynamic range) characteristics of the amplifier.
3. Determination of the frequency (bandwidth) characteristics of the amplifier.
4. Amplitude and frequency characteristics of the main bioelectrograms: electrocardiography, electromyography, electroencephalography.
5. Differential amplifier, its application, features and method of connection to the patient.

Lesson № 16

chapter topic	Electrical and magnetic phenomena in the human body, electrical effects and research methods
lesson topic	**AC circuits**
the purpose of the lesson is	to study characteristics and laws of alternating current, to distinguish resistance, reactance and impedance and to explore capacitive and inductive reactances dependence on frequency
Laboratory work	**Capacitive and inductive reactances dependence on frequency**

Questions

1. Alternating current, its characteristics.
2. Ohmic resistance in an alternating current circuit.
3. Inductance in an alternating current circuit.
4. Capacitance in the AC circuit.
5. Circuit impedance.

Lesson № 17

chapter topic	Electrical and magnetic phenomena in the human body, electrical effects and research methods
lesson topic	**The use of direct and alternating current in medicine. Equivalent electrical circuit of living tissue. Physical basis of rheography**
the purpose of the lesson is	to study particular features of biological tissues electroconductivity for direct and alternating current, to recognize physical principles of rheography and quantification of tissue vitality on the basis of impedance dispersion
Laboratory work	**Resistance and impedance of biological tissue in DC and AC circuits respectively**

Questions

1. Direct and alternating current. Ohm's law in differential form.
2. Electrical conductivity of electrolytes for direct electric current.
3. Electrical conductivity of biological tissues. The primary action of direct current on body tissues. Galvanization and therapeutic electrophoresis.
4. Equivalent electrical circuit of living tissue Impedance of living tissue, its dependence on the frequency of alternating current. Assessment of tissue viability.
5. Physical basis of rheography as a diagnostic method.

Lesson № 18

chapter topic	Electrical and magnetic phenomena in the human body, electrical effects and research methods
lesson topic	**Biophysical bases of electrical stimulation of organs and tissues**
the purpose of the lesson is	to recognize electric pulse parameters and electric circuits of relaxation oscillators and to study physical principles of performance of low frequency physiotherapeutic apparatus
Laboratory work	**Studying of pulse parameters generated by multivibrator and changed by differentiator and integrator circuits**

Questions

1. Impulse currents and their characteristics.
2. Determination of the parameters of pulsed currents (pulse duration, frequency, duty cycle).
3. Electrical excitability of tissues. Electrical excitability curve, rheobase and chronaxy. Weiss-Lapic equation. Chronaxis. Dubois-Reymond law.
4. Equipment for electrical stimulation.
5. Electrical stimulation of the heart.

Lesson № 19

chapter topic	Knowledge control
lesson topic	**Credit for sections**
the purpose of the lesson is	to control knowledge on the topics: ✓ Mechanical Oscillation and Wave Processes ✓ Biophysics of cell membranes ✓ Electric and magnetic phenomena in living organisms

Lesson № 20

chapter topic	Electrical and magnetic phenomena in the human body, electrical effects and research methods
lesson topic	**Obtaining and registering biomedical information**
the purpose of the lesson is	to recognize the basic principles of biological measuring, to study the physical phenomena underlying the operation of sensors
Laboratory work	**Studying the resistance dependence on the temperature of a semiconductor thermistor; calculation of temperature coefficient of resistance. Studying the resistance dependence on the length of a resistive sensor**

Questions

1. A generalized scheme for the collection, transmission and registration of medical and biological information. Electrodes for taking bioelectric signal.
2. General characteristics and classification of biomedical information sensors (measuring transducers).
3. Contact potential difference. Thermocouple, thermoelectromotive force.
4. Temperature sensors. The dependence of the resistance of metals and semiconductors on temperature.
5. Piezoelectric effect and its application.
6. Registration of biophysical parameters (sensors in medicine: sensors of parameters of the respiratory system, sensors of parameters of the cardiovascular system).

Lesson № 21

chapter topic	Electrical and magnetic phenomena in the human body, electrical effects and research methods
lesson topic	**Impact on the human body of high-frequency currents and fields. Methods and equipment for high-frequency therapy**
the purpose of the lesson is	to study high-frequency electric and magnetic field effect on biological tissues and to recognize their usage in electrotherapy and electrosurgery
Laboratory work	**Influence on a substance by the high frequency alternating electric and magnetic field**

Questions

1. Physical fundamentals of high-frequency (HF) therapy and electrosurgery.
2. High-frequency therapy equipment: block diagram of the UHF-therapy apparatus. Generator of harmonic oscillations. therapeutic circuit.
3. Methods of HF-therapy: UHF-therapy.
4. Methods of HF-therapy: inductothermy.
5. RF therapy methods: microwave therapy, extremely high frequency therapy.
6. Methods of high-frequency therapy: diathermy, diathermocoagulation, diathermotomy, local darsonvalization.

Lesson № 22

chapter topic	Electromagnetic radiation, its use in medicine. Elements of the physics of atoms and molecules
lesson topic	**Refractometry. Determination of the concentration of solutions using a refractometer. Principles of fiber optics. Fundamentals of endoscopy**
the purpose of the lesson is	to study geometrical optics laws, to understand working principle of fiber optics medical instruments, to recognize the basics of refractometry and to perform refractive index measurements by Abbé refractometer
Laboratory work	**Investigation of Dependence of Refractive Index of Sugar Solution on its Concentration. Determination of Unknown Concentration of Sugar Solution**

Questions

1. Geometric optics. Laws of geometric optics.
2. The phenomenon of total internal reflection of light, the principles of fiber optics, the design of modern endoscopes.
3. The course of rays in a trihedral prism. Refractometer device.
4. Dependence of the refractive index of solutions on concentration. Determination of the concentration of solutions using a refractometer

Lesson № 23

chapter topic	Electromagnetic radiation, its use in medicine. Elements of the physics of atoms and molecules
lesson topic	**Optical Microscopy**
the purpose of the lesson is	to study the ray optics laws applications to lenses, understand main ideas of optical microscopy and microscope structure
Laboratory work	**Magnification and Resolution of Optical Microscope**

Questions

1. Lenses. Thin-lens equation. Lenses aberrations
2. Optical microscopy. Refraction in an optical microscope
3. Magnification and resolution of optical microscope. The Abbe diffraction limit
4. Specialized optical microscopy techniques

Lesson № 24

chapter topic	Electromagnetic radiation, its use in medicine. Elements of the physics of atoms and molecules
lesson topic	**Biophysical foundations of vision**
the purpose of the lesson is	to study optical and biophysical basics of image formation in human eye, to recognize correction of imperfect human vision

Questions

1. Optical system of the eye. Eye accommodation.
2. Disadvantages of the optical system of the eye and their correction. Visual acuity.
3. Biophysical foundations of visual photoreception.
4. Sensitivity of the eye to light and color. The mechanism of adaptation of the eye to different illumination

Lesson № 24

chapter topic	Electromagnetic radiation, its use in medicine. Elements of the physics of atoms and molecules
lesson topic	**Electromagnetic waves, their properties. Methods for obtaining polarized light. The use of polarization methods for the study of biological objects. optical activity**
the purpose of the lesson is	to study electromagnetic waves characteristics, to recognize phenomenon of polarization, its use in optical devices and in studying of biological objects
Laboratory work	**Measurement of Concentration of Optically Active Substances by Polarimeter**

Questions

1. General properties of electromagnetic waves. Scale of electromagnetic waves. Wave properties of light.
2. Natural and polarized light. Types of light polarization.
3. Methods for obtaining polarized light based on the phenomena of Brewster, birefringence, absorption dichroism. The device of polarization devices based on birefringence and absorption dichroism.
4. Malus' law. Passage of light through polarizers.
5. Optical activity. The construction of a polarimeter.

Lesson № 26

chapter topic	Electromagnetic radiation, its use in medicine. Elements of the physics of atoms and molecules
lesson topic	**Stimulated emission. Lasers. Properties of laser radiation. The use of lasers in medicine**
the purpose of the lesson is	to study physical principles of lasers, to recognize properties of laser radiation, its use in therapy and surgery
Laboratory work	**Determination of Wavelength with Diffraction Grating**

Questions

1. Stimulated emission and its properties. Amplification conditions.
2. The construction of a laser. Purpose of the active medium, pumping system and resonator in lasers. Scheme of work of a laser.
3. Properties of laser radiation.
4. The use of laser radiation in therapy and surgery

Lesson № 27

chapter topic	Electromagnetic radiation, its use in medicine. Elements of the physics of atoms and molecules
lesson topic	**Laws of absorption and scattering of light. Fundamentals of photocolorimetry and spectrophotometry**
the purpose of the lesson is	to study the laws of light absorption and light scattering, to recognize practical application of absorption and scattering of light for. spectrophotometry and nephelometry
Laboratory work	**Measurement of Concentration of Solutions With Photocolorimeter**

Questions

1. Light absorption. Laws of absorption of light by matter.
2. The absorption index of a substance, its dependence on the wavelength of light and the concentration of the solution. Transmittance and optical density, their dependence on wavelength and concentration.
3. The device of a photoelectrocolorimeter, determination of the concentration of solutions with its help. Determination of the absorption spectrum of a substance by a spectrophotometer.
4. Scattering of light, its types and regularities. Rayleigh's law. Nephelometry.

Lesson № 28

chapter topic	Electromagnetic radiation, its use in medicine. Elements of the physics of atoms and molecules
lesson topic	**Emission and absorption of energy by atoms and molecules. Fundamentals of spectral analysis. Luminescence**
the purpose of the lesson is	to understand fundamentals of atomic and molecular spectrum analysis, to study the phenomenon of luminescence and to recognize their medical application
Laboratory work	**Study of spectra of light radiation of different sources and absorption spectra of solutions**

Questions

1. Bohr's theory. Emission and absorption spectra. The spectrum of the hydrogen atom.
2. Structure of energy levels of atoms and molecules.
3. Fundamentals of atomic and molecular spectral analysis.
4. Luminescence, its types and characteristics. Stokes and Vavilov laws.
5. Luminescent analysis in medicine. Intrinsic luminescence of biological objects. Luminescent labels and probes.
6. Photobiological processes, action spectrum. Photodynamic therapy.

Lesson № 29

chapter topic	Electromagnetic radiation, its use in medicine. Elements of the physics of atoms and molecules
lesson topic	**Fundamentals of quantum mechanics and its applications. Fundamentals of electron and probe microscopy**
the purpose of the lesson is	to study main ideas quantum mechanics, consider Schrödinger equation and its applications; consider reasons of appearance tunnel effect; consider principles of electron and probe microscopy; consider definition of nanoparticle and using of nanoparticles in medicine

Questions

1. Wave function and its physical meaning. Schrödinger equation.
2. Wave properties of electrons. De Broglie wavelength.
3. Fundamentals of electron microscopy. Resolution limit of the electron microscope.
4. Physical principles of probe microscopy and its use in the study of biomedical objects.

Lesson № 30

chapter topic	Electromagnetic radiation, its use in medicine. Elements of the physics of atoms and molecules
lesson topic	**Thermal radiation of bodies. Energy characteristics of thermal radiation. Thermal imaging and thermography in medicine**
the purpose of the lesson is	to understand wave-particle duality, to study thermal radiation laws, to recognize medical application of thermography and thermal imaging.

Questions

1. Thermal radiation of bodies. The main characteristics of thermal radiation: energy luminosity, spectral density of energy luminosity, monochromatic absorption coefficient.
2. Absolutely black, gray and other bodies. The laws of thermal radiation (Kirchhoff, Stefan-Boltzmann, Wien). Planck formula.
3. Thermal radiation of the human body. Methods of heat exchange of the body with the environment.
4. The use of thermal imaging and thermography in medicine.

Lesson № 31

chapter topic	Electromagnetic radiation, its use in medicine. Elements of the physics of atoms and molecules
lesson topic	**Fundamentals of electron paramagnetic resonance. Nuclear magnetic resonance. Principles of magnetic resonance imaging**
the purpose of the lesson is	to study magnetic field and its properties, to recognize magnetic field influence on a charge and current, to study magnetic properties of substances, biological and medical use of EPR and NMR

Questions

1. Electron magnetic moments - orbital and spin. Orbital gyromagnetic ratio for an electron.
2. Electronic paramagnetic resonance. Paramagnetic properties of free radicals. Scheme of installation for observation of electron paramagnetic resonance. Identification of free radicals and determination of their concentration by the methods of electron paramagnetic resonance.
3. Magnetic properties of nuclei of chemical elements. Nuclear magnetic resonance (NMR). Chemical shift.
4. Principles of magnetic resonance imaging.

Lesson № 32

chapter topic	Ionizing radiation. Fundamentals of radiation dosimetry
lesson topic	**Bremsstrahlung and characteristic X-ray radiation. Properties of X-ray radiation and its use in medicine**
the purpose of the lesson is	to understand the basic nature of X-radiation, to study the law of attenuation of radiation in matter; to study different types of interaction of X-radiation with matter, to recognize the medical uses of X-radiation and X-ray protection techniques
Laboratory work	**Computer Simulation of Bremsstrahlung and Characteristic X-ray Spectrum**

Questions

1. The nature of bremsstrahlung and characteristic X-rays, their characteristics and properties.
2. X-ray tube device, bremsstrahlung spectrum and its adjustment.
3. Characteristic radiation. Moseley's law.
4. Law of attenuation of X-ray radiation by matter, layer of half attenuation. Linear and mass attenuation coefficients.
5. Types of interaction of X-rays with matter. Law of attenuation of X-ray radiation by matter, layer of half attenuation. Linear and mass attenuation coefficients, their dependence on radiation hardness and substance properties.
6. Physical principles of X-ray diagnostics. Fundamentals of x-ray computed tomography.
7. The use of x-rays in radiation therapy. Methods of protection against x-ray radiation.

Lesson № 33

chapter topic	Methods of nuclear physics in medicine
lesson topic	**Radioactivity. Artificial and natural radioactivity**
the purpose of the lesson is	to recognize the phenomenon of natural radioactive decay, to study the law of radioactive decay

Questions

1. Radioactive decay and its types. Energy spectra of α- and β particles, gamma radiation.
2. Basic law of radioactive decay. Half life time.
3. Activity of radionuclides, units of its measurement. Change of activity of a specimen over time.
4. Specific, mass and surface activities.
5. Obtaining radionuclides.

Lesson № 34

chapter topic	Methods of nuclear physics in medicine
lesson topic	**Interaction of ionizing radiation with matter**
the purpose of the lesson is	to recognize the phenomenon of natural radioactive decay to study the law of radioactive decay, to recognize radiation detectors, to understand working principle of nuclear medicine imaging systems

Questions

1. Characteristics of the interaction of ionizing radiation (IR) with matter: linear ionization density, linear energy losses, average linear range.
2. Features of interaction with matter of various particles.
3. Main biological effects under the action of AI. Physical basis of radiation therapy.
4. Principles of radionuclide diagnostic methods. Fundamentals of positron emission tomography.

Lesson № 35

chapter topic	Methods of nuclear physics in medicine
lesson topic	**Dosimetry of ionizing radiation. Methods for registering ionizing radiation**
the purpose of the lesson is	to study radiation doses characterized ionizing radiation and its influence on objects, to know doses interrelation
Laboratory work	**Determination of Substance Absorption Coefficient for Gamma Radiation**

Questions

1. Exposure, absorbed and equivalent doses of ionizing radiation. The relationship between them and their units of measurement Dose rates.
2. Effective equivalent dose, units of its measurement, radiation risk coefficient. Collective dose, units of its measurement.
3. Detectors of ionizing radiation. The device of dosimeters and radiometers.
4. Biological and effective half-lives of radionuclides from the body.
5. Natural radiation background.