Appendix to the working program

Federal State Budgetary Educational Institution of Higher Education
"Privolzhsky Research Medical University"
Ministry of Health of the Russian Federation

BANK OF ASSESSMENT TOOLS FOR DISCIPLINE

«PHYSICS »

Training program (specialty): **33.05.01 PHARMACY**

Department: **MEDICAL BIOPHYSICS**

Mode of study: **FULL-TIME**

Nizhniy Novgorod
2021

1. Bank of assessment tools for the current monitoring of academic performance, mid-term assessment of students in the discipline / practice

This Bank of Assessment Tools (BAT) for the discipline " Physics" is an integral appendix to the working program of the discipline " Physics". All the details of the approval submitted in the WPD for this discipline apply to this BAT.

(Banks of assessment tools allow us to evaluate the achievement of the planned results stated in the educational program.

Assessment tools are a bank of control tasks, as well as a description of forms and procedures designed to determine the quality of mastering study material by students.)

2. List of assessment tools

The following assessment tools are used to determine the quality of mastering the academic material by students in the discipline "Physics":

No.	Assessment tool	Brief description of the assessment tool	Presentation of the assessment tool in the BAT
1.	Test №1 Test №2	A system of standardized tasks that allows you to automate the procedure of measuring the level of knowledge and skills of a student.	Bank of test tasks
2.	Situational tasks	A method of control that allows you to assess the criticality of thinking and the degree of the material comprehension, the ability to apply theoretical knowledge in practice.	List of tasks
3.	Individual survey	A control tool that allows you to assess the degree of comprehension of the material	List of questions
4.	Control work	A tool of checking the ability to apply acquired knowledge for solving problems of a certain type by topic or section	Set of control tasks in variants
5.	Colloquium	A tool of controlling the mastering of study materials of a topic, section or sections of a discipline, organized as a class in the form of an interview between a teacher and students.	Questions on topics/sections of the discipline

3. A list of competencies indicating the stages of their formation in the process of mastering the educational program and the types of evaluation tools

Code and formulation of competence*	Stage of competence formation	Controlled sections of the discipline	Assessment tools
UC-1 Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy. GPC -1 Able to use basic biological, physico-chemical, mathematical methods for the development, research and examination of medicines.	Current	**Section 1.** *Mechanics.*	Situational tasks Individual survey Control work

UC-1 Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy. GPC -1 Able to use basic biological, physico-chemical, mathematical methods for the development, research and examination of medicines.	Current	**Section 2.** *Molecular physics, thermodynamics.*	Situational tasks Individual survey Control work Colloquium
UC-1 Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy. GPC -1 Able to use basic biological, physico-chemical, mathematical methods for the development, research and examination of medicines.	Current	**Section 3.** *Electricity and magnetism.*	Situational tasks Individual survey Colloquium
UC-1 Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy. GPC -1 Able to use basic biological, physico-chemical, mathematical methods for the development, research and examination of medicines.	Current	**Section 4.** *Optics.*	Situational tasks Individual survey Control work Colloquium
UC-1 Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy. GPC -1 Able to use basic biological, physico-chemical, mathematical methods for the development, research and examination of medicines.	Current	**Section 5.** *Quantum physics. Spectroscopy.*	Situational tasks Individual survey Control work
UC-1 Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy. GPC -1 Able to use basic biological, physico-chemical, mathematical methods for the development, research and examination of medicines.	Current	**Section 6.** *Physics of ionizing radiation.*	Situational tasks Individual survey Control work Colloquium
Credit		***All Sections***	***Credit Test***

4. The content of the assessment tools of entry, current control

Entry /current control is carried out by the discipline teacher when conducting classes in the form of: Test, Situational tasks, Individual survey, Control work, Colloquium.

4.1. Tasks for the assessment of competence "UC-1", "GPC -1" *(the competence code):*

Mechanics.

1. At what height from the bottom is a small hole from which water flows at a velocity of 2 m / s, located in an open vessel, if the height of the water column is 35 cm. (Take the rate of lowering of the water level in the vessel as zero, and neglect the viscosity).

2. Determine the volume of blood flowing through a vessel with a radius of 2 mm in 5 minutes, if the drop in static pressure in this vessel is 10^4 Pa. Take the length of the vessel equal to 3 cm. Consider the vessel walls rigid.

3. Determine the volume of blood flowing through a vessel with a radius of 3 mm in 10 minutes, if the pressure difference in the area of the vessel with a length of 5 cm is $2 \cdot 10^4$ Pa. The vessel walls are considered rigid, the flow is laminar.

4. Find the hydraulic resistance in a system of three rigid cylindrical tubes, if the length of the first - 4 mm, the second - 1 mm, the third - 5 mm. The radii of the tubes are, 0.3 mm, 0.5 mm, 0.1 mm, respectively. The blood flow is considered laminar (see Fig. 1).

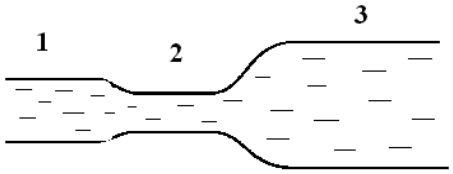

Fig. 1.

5. Find the hydraulic resistance of a rigid cylindrical tube with a diameter of 2 mm and a length of 10 cm, if there is a laminar flow of liquid through it, the viscosity coefficient of which is 0.7 mPa·s.

6. Determine at what velocity the flow of blood in a vessel with a radius of 1 cm will become turbulent. The critical value of the Reynolds number is 1500.

7. In the aorta of a dog with a diameter of 1.5 cm, determine the average blood flow rate, considering the kinematic viscosity coefficient equal to $5 \cdot 10^{-6}$ m^2/s, and the Reynolds number equal to 4500. (The blood flow changes from laminar to turbulent.)

8. The frequency range of the human ear ranges from 16 Hz to 16 kHz. Determine the long-wave range corresponding to the above – frequency, if the velocity of sound in the air is equal to 330 m/s. Find the appropriate ranges for water, whole blood, soft tissue, and bone.

9. The ultrasonic wave, with a frequency of 1 megahertz, is reflected from the surface of the heart valve, moving towards the propagation of the wave at a velocity of $6 \cdot 10^{-2}$ m/s. Determine the change in the frequency of vibrations in the reflected wave caused by the Doppler effect.

Molecular physics, thermodynamics

10. Find the mass of one hydrogen molecule.

11. Find the mass of one chlorine molecule.

12. Find the mass of one helium molecule.

13. Find the mass of one nitrogen molecule.

14. 300 ml of H2O evaporated from the glass in 20 days. Determine how many molecules flew out during evaporation in 10 seconds?

15. Find the arithmetic mean and the quadratic mean velocity of O_2 molecules at 27 ° C.
16. What is the absolute humidity of the air at a temperature of 50°C and a partial vapor pressure of 20 kPa in it.
17. Determine the absolute humidity of the air at a temperature of 30oC and a partial vapor pressure of 15 kPa in it.

Electricity and magnetism.

18. A mechanical pendulum oscillates according to the law X = 0,2Sin π(t+0,5) m. Determine the amplitude, period, initial phase of oscillations and acceleration at time t = 0.5 s.

19. Determine the amplitude, period, initial phase of oscillations and acceleration of the mathematical pendulum at time t = 0.5 s, if the load oscillates according to the law *X = 0,3Cos π(t+0,5) m.*

20. Determine the wavelength of light at the border of perception of the human eye and determine its frequency in a vacuum:
a) for the red border; b) for the violet border.

21. Determine the frequency of electromagnetic oscillations and the name of the frequency range, according to the medical classification, if the wavelength in a vacuum is: a) 3m, b) 15 cm, c) 3 mm.

22. Considering the heart as a current dipole, determine the dipole moment of the heart. The distance between the source and the drain is 2 cm, and the current strength is 0.1 mA.

23. The value of the dipole moment of the current dipole is 2 mA·cm. What is the moment of the force acting on this dipole, if the angle between the direction of the dipole moment and the intensity of the external homogeneous electric field is 30°, and the intensity of this field is 50 mV/cm?

24. What is the moment of the force acting on the dipole in an external uniform electric field, if the angle between the direction of the electric moment of the dipole and the field strength is 45°? The electric field strength is taken to be 50 mV/cm, and the dipole moment is $3 \cdot 10^{-10}$ Cl·m.

Optics.

25. The linear magnification of the microscope is 400, and the size of the object under study is 20 microns. What is equal to: the linear magnification of the lens, the linear dimensions of the image in the lens and in the eyepiece of the microscope, if the magnification of the eyepiece is 100?

26. In a microscope, the focal length of the lens is 4 mm, and the eyepiece is 20 mm. What is the magnification of the microscope, if the optical length of the tube is 17 cm.

27. The linear magnification of the microscope is 500. Determine the optical length of the tube, if the focal length of the lens is 6 mm, and the eyepiece is 18 mm.

28. What is the focal length of the eyepiece, if the magnification of the microscope is 450, the optical length of the tube is 15 cm, and the focal length of the lens is 6 mm?

29. In the microscope, the focal length of the lens is 5 mm, the eyepiece-25 mm. Find the optical length of the tube, if the linear magnification of the lens is 4, and the magnification of the eyepiece is 100.

30. Calculate the critical angle of total internal reflection, if refractive indices of the mediums are

1.36 and 1.59. Draw the diagram of ray-tracing.

31. Find the critical angle of total internal reflection on the interface of two mediums, if refractive indices of the mediums are 1.35 and 1.55. Draw the diagram of ray-tracing.

32. Find the critical angle of total internal reflection on the interface of two mediums, if refractive indices of the mediums are 1.47 and 2.42. Draw the diagram of ray-tracing.

33. Calculate the critical angle of refraction on the interface between two mediums, if refractive indices of the mediums are 1,63 and 1,50. Draw the diagram of ray-tracing.

Physics of ionizing radiation.

34. Radon activity in a closed vessel is 500 mCi. What time will the radon activity in the vessel be equal to $3 \cdot 10^9$ Bc? Take the decay constant equal to 10^{-2} day $^{-1}$. (Perform calculations by counting the time in days).

35. Radon activity in a closed vessel is 650 mCi. What time will the radon activity in the vessel be equal to $5 \cdot 10^8$ Bc? Take the decay constant equal to $2 \cdot 10^{-2}$ day^{-1}. (Perform calculations by counting the time in days).

36. Radon activity in a closed vessel is 470 mCi. What time will the radon activity in the vessel be equal to $23 \cdot 10^8$ Bk? Take the decay constant equal to $4 \cdot 10^{-2}$ day^{-1}. (Perform calculations by counting the time in days).

37. Determine the absorbed and equivalent dose, if a tissue weighing 0.5 kg absorbs X-ray radiation with the radiation energy of 0.1 MeV.

38. Determine the absorbed dose and the power of the absorbed dose, if the body weighing 36 kg absorbed the energy of 7.2 J in 1.5 hours.

39. Determine the absorbed and equivalent dose, exposure dose rate, obtained by human bone tissues. The value of the exposure dose of γ-radiation was $4.6 \cdot 10^{-8}$ Cl/kg. The exposure time is 4 hours. Take the transition coefficient equal to 2.

40. What are the absorbed and equivalent doses, the power of these doses, as well as the power of the exposure dose in human soft tissues, if the exposure dose of X-radiation is $4 \cdot 10^{-8}$ Cl/kg? The exposure time is 3 hours. Take the transition coefficient equal to 0.9.

4.3. Questions for colloquiums *(the competence code UC-1*, GPC -1*):*

Questions for colloquium «*Mechanics*».

1. Surface tension. Surfactants and surfactants. The phenomenon of capillarity. Gas embolism.

2. Phenomena of wetting, non-wetting, ideal wetting, edge angle. Hydrophilic and hydrophobic surfaces.

3.The equation of continuity of the jet. The Bernoulli equation. The Torricelli formula. Methods of measuring statistical, dynamic and total pressure.

4. The total pressure in the flow of the ideal liquid. A method for measuring static pressure and fluid flow velocity using pressure gauge tubes.

5. The concepts of stationary flow are laminar and turbulent flows. Lines, current surfaces (layers). Reynolds number. The critical value of the Reynolds number. Kinematic viscosity coefficient. Turbulence in the cardiovascular system.

6. Viscosity. Newton's formula. The viscosity coefficient. Newtonian and non-Newtonian fluids, examples. Blood flow rates in various departments of the Cardiovascular System (give a graph, explain qualitatively from the point of view of the continuity equation of the jet).

7. Laws of viscous fluid flow. Poiseuille formula, hydraulic resistance. The flow of viscous liquid through pipes (sequential and parallel connection of pipes). To draw an analogy with Ohm's law for a section of the chain.

8. Serial connection of the tubes, two conditions. Derive the formula for the hydraulic connection of series-connected tubes.

9. Parallel connection of the tubes, two conditions. Deduce the formula for the hydraulic connection of parallel connected tubes.

10. Methods for the determination of viscous liquid. Capillary method, Hess method, rotational viscometry. Types of viscometers, the principle of their operation. The concept of relative viscosity.

11. The phenomenon of a decrease in equivalent viscosity in small vessels. The Caisson equation. Theory of the cutting cylinder. "Coin column."

12. Stokes' law. Derive the formula for the viscosity of the liquid, the relationship of dynamic and kinematic viscosities.

13. Newton's equation. Newtonian and non-Newtonian fluids corresponding to their viscosities. Examples.

14. Describe the principle of pressure measurement by the "Korotkov Sounds" method.

15. Pulse waves, graphs of pressure fluctuations near the heart and in arterioles. Pulse wave length. Equation for pressure wave, pulse wave velocity

16. The work and power of the heart, the principle of operation of the artificial circulation apparatus.

Questions for colloquium « *Physics of ionizing radiation*».

l. What is ionizing radiation? Enumerate the kinds ionizing radiations and explain what is the constitution of each of them.

2.Interaction of ionizing radiation with matter. Absorption of photons with a homogeneous matter (exponential law); types (branches) of reactions of photons with atoms.

3.Coefficient of attenuation of X- and γ- radiation as a function of photon energy.

4.Enumerate the main stages of interaction of an ionizing particle with matter and explain what are a) elementary track volume, b)track of an ionizing particle.

5.Interaction of ionizing radiation with matter. Absorption of electrically charged ionizing particles in matter. Stopping power. Range.

6. What do you understand by biological effects of ionizing radiation?

7.What kinds of detectors of ionizing particles do you know? What are physical properties of these detectors?

8.Sketch a simple end-window Geiger tube and explain what are the main principles of operation a Geiger counter.

9.Explain the meaning of the words *scintillation materials.* Sketch a scintillation detector composition and explain the main principles of operation of scintillation detectors.

10.Sketch a diagram characterizing a photomultiplier tube composition, and explain it.

11.What do you understand by a) atomic nucleus, b) atomic (proton) number, c) radioactive decay, d) half-life time (what is its correlation with the decay constant?), e) activity of radioactive isotopes? What are units of activity?

12. Explain the law of radioactive decay. What do you understand by the methods of measurement of short and long half-life and by carbon dating?

13. What kinds of radioactive doses do you know? What do you understand by the quality factor?

14. What do you know about the typical radiation doses from the natural and the artificial sources? What is the most significant natural source of background radiation? What is the most significant artificial source of background radiation?

4.4. Tasks (assessment tools) for the credit *(the competence code UC-1, GPC -1):*

CARD № 1

1. Mechanical waves. The plane wave equation. Parameters of vibrations and waves.

2. Geometric optics. The phenomenon of total internal reflection of light. The maximum angle of total reflection (drawing, output of the formula for determining the angle). Fiber optics.

3. Determine the rate of fluid outflow from a small hole in an open vessel. The height of the liquid column in the vessel is 20 cm; the hole from which the liquid flows is at a height of 3 cm from the bottom of the vessel. (The rate of lowering the liquid level in the vessel should be taken equal to zero, the viscosity should be neglected).

CARD № 2

1. Refractometry. Explain in detail the course of the experiment on determining the refractive index of a transparent liquid with a refractometer.

2. The Doppler effect.

3. At what height from the bottom is a small hole from which water flows at a velocity of 2 m / s, located in an open vessel, if the height of the water column is 35 cm. (Take the rate of lowering of the water level in the vessel as zero, and neglect the viscosity).

CARD № 3

1. Sound. Types of sounds. Spectra. Wave resistance

2. Photoelectric effect. The laws of the photoelectric effect. Internal photoeffect.

3. Determine the velocity of the liquid flow from a hole with a diameter of 0.5 cm, located at the bottom of a cylindrical vessel with a diameter of 12 cm, the height of the liquid column is 0.1 m. (The rate of lowering the liquid level in the vessel should be taken equal to zero, the viscosity should be neglected).

CARD № 4

1. Microscopy. The course of rays in an optical microscope, the characteristics of images in the microscope and in the lens. Derivation of the linear magnification formula of the microscope.

2. Objective characteristics of sound.

3. Determine the volume of blood flowing through a vessel with a radius of 2 mm in 5 minutes, if the drop in static pressure in this vessel is 10^4 Pa. Take the length of the vessel equal to 3 cm. Consider the vessel walls rigid.

CARD № 5

1. Reynolds number. The critical value of the Reynolds number. Kinematic viscosity coefficient.

2. Photoelectric effect. The laws of the photoelectric effect. The external photoelectric effect, the Einstein equation, the concept of the "red border". Application of an external photo effect.

3. Find the optical length of the tube if an object of 10 mm in size, viewed under a microscope, has a linear image size of 600 mm; the focal length of the lens is 4 mm, and the eyepiece is 19 mm.

5. The content of the assessment tools of mid-term assessment

Mid-term assessment is carried out in the form of a credit.

5.1 The list of control tasks and other materials necessary for the assessment of knowledge, skills and work experience.

5.1.1. Questions for the discipline exam
FSES are not provided

5.1.2. Questions for the credit in the discipline “Physics”
https://sdo.pimunn.net/mod/quiz/view.php?id=207408

Question	Competence code (according to the WPD)
1. THE AUDIBLE SOUND FREQUENCY RANGE IS 1) 1.6 Hz - 16 Hz 2) 16 Hz - 16 MHz 3) 16 Hz - 16 kHz 4) 16 kHz - 16 MHz	UC-1, GPC -1
2. UNITS "W/M^2" MEASURE THE FOLLOWING ENERGY CHARACTERISTIC OF THE SOUND 1) strength 2) a flow 3) amplitude 4) intensity	UC-1, GPC -1
3. THE ULTRASOUND IS 1) electrical oscillation with a frequency higher than a sound 2) mechanical oscillation and waves with a frequency of less than 16 Hz 3) mechanical oscillation and waves with a frequency of more than 16 kHz 4) mechanical oscillation of molecules of a medium	UC-1, GPC -1
4. WHEN A TEMPERATURE REDUCES, THE VISCOSITY OF A LIQUID 1) decreases 2) increases 3) remains unchanged 4) grows quadratically	UC-1, GPC -1
5. UHF OSCILLATION FREQUENCY IS 1) 3 ÷ 30 MHz 2) 30 ÷ 300 MHz 3) 300 MHz ÷ 30 GHz 4) 30 GHz ÷ 3000 GHz	UC-1, GPC -1
6. THE CALIBRATION VOLTAGE USED IN THE ELECTROCARDIOGRAPH IS 1) 1 mV (milliVolt) 2) 1 V (Volt) 3) 1 kV (kiloVolt) 4) 1 MV (MegaVolt)	UC-1, GPC -1
7. THE ELECTRIC DIPOLE IS	UC-1,

1) a system of two bipolar electrical terminals in a conductive environment 2) a system of two bipolar electrical terminals in a dielectric medium 3) a system of two oppositely polar electric charges located in a conductive environment 4) a system of two oppositely polar electric charges located in a dielectric medium	GPC -1
8. SPECIFY THE PLANCK'S CONSTANT IN THE EQUATION FOR QUANTUM ENERGY $E = hc/\lambda$ 1) E 2) h 3) c 4) λ	UC-1, GPC -1
9. INTERNAL FRICTION FORCES ARE DIRECTED 1) at an angle of 90° to the surfaces of contacting layers 2) along the surfaces of contacting layers 3) at an angle of 30° to the surfaces of contacting layers 4) at an angle of 45° to the surfaces of contacting layers	UC-1, GPC -1
10. WITH AN INCREASE IN TEMPERATURE, A RATE OF THE THERMAL MOTION OF MOLECULES 1) decreases 2) increases 3) does not change 4) varies with viscosity	UC-1, GPC -1
11. AT NORMAL LIGHT INCIDENCE, THE MAIN DIFFRACTION MAXIMUMS ARISE UNDER THE FOLLOWING CONDITIONS: 1) $d\,Sin\alpha = \pm k\lambda$ 2) $d/Sin\alpha = \pm k\lambda$ 3) $d/Sin\alpha = \pm k/\lambda$ 4) $d + Sin\alpha = \pm(k+\lambda)$ 5) $d\,Sin\alpha = \pm k/\lambda$	UC-1, GPC -1
12. IT IS KNOWN THAT BLOOD IS A NON-NEWTONIAN LIQUID. THIS IS EXPLAINED BY THE FACT THAT 1) blood cells vary in shape and size 2) blood cells move chaotically 3) blood plasma has high viscosity 4) blood corpuscles form aggregations	UC-1, GPC -1
13. ABSORPTION OF X-RAY RADIATION IN A LAYER OF A SUBSTANCE IS HIGHER IN CASE OF… 1) harder beams (having shorter wavelengths) 2) softer rays (having longer waves) 3) more contrasting rays 4) more coherent beams	UC-1, GPC -1
14. THE ABSOLUTE ZERO TEMPERATURE IS APPROXIMATELY 1) -373° C 2) -273° C 3) -173° C 4) - 73° C	UC-1, GPC -1

Theoretical Questions for the test

Question	Competence code (according to the WPD)
1. Sound. Types of sounds (definitions). Wave resistance. Acoustic spectrum, types of spectra (draw).	UC-1, GPC -1
2. Objective (physical) characteristics of sound: energy flow, energy flow density (intensity). Definitions, units of measurement.	UC-1, GPC -1
3. Subjective characteristics of sound. The connection between them is objective.	UC-1, GPC -1
4. Ultrasound. Physical features of ultrasound, principles of operation of ultrasonic emitters (draw a block diagram). The principle of obtaining ultrasound.	UC-1, GPC -1
5. Ideal fluid. The laws of the flow of an ideal fluid (continuity, Bernoulli, Torricelli).	UC-1, GPC -1
6. Concepts of stationary flow. Laminar and turbulent flows. Current surface lines (layers). Reynolds number (explain, write formulas). The critical value of the Reynolds number. Kinematic viscosity coefficient.	UC-1, GPC -1
7. Viscosity of the liquid. Newton's equation. Viscosity coefficient (definition, units of measurement). Newtonian and non-Newtonian fluids, examples.	UC-1, GPC -1
8. Explain in detail the course of the experiment to determine the viscosity coefficient of liquids by the Ostwald method, give a formula for calculating the viscosity coefficient in this experiment.	UC-1, GPC -1
9. Poiseuille formula. Conditions for the applicability of Poiseuille's law. Hydraulic resistance.	UC-1, GPC -1
10. Serial and parallel connection of tubes. Formulas for hydraulic connection of series and parallel connected tubes.	UC-1, GPC -1
11. Geometric optics. The phenomenon of total internal reflection of light. The limiting angle of total reflection and the limiting angle of refraction. The course of the rays (draw). Derivation of formulas for determining the angle of total reflection and the limiting angle of refraction (figures). Fiber optics.	UC-1, GPC -1
12. Refractometry. The scheme of the refractometer. Explain in detail the course of the experiment to determine the refractive index of a transparent liquid with a refractometer (draw).	UC-1, GPC -1
13. Microscopy. The course of rays in an optical microscope. Characteristics of images. Derivation of the linear magnification formula of the microscope.	UC-1, GPC -1
14. Resolution and resolution limit of optical devices (microscope, eyes). The concept of Abbe theory, the main provisions of Abbe theory. The course of rays according to Abbe's theory. Useful magnification of the microscope.	UC-1, GPC -1
15. Polarization of light. Methods of obtaining polarized light. Malus' law. Optical activity.	UC-1, GPC -1
16. Laser. Coherence of radiation. The concepts of inverse population, forced radiation. The working substance of the laser. Types of energy pumping sources. Features of laser radiation.	UC-1, GPC -1
17. X-ray radiation. X-ray tube. Interaction of X-ray radiation with matter, physical bases of application in medicine.	UC-1, GPC -1
18. Radioactivity. The law of radioactive decay. Activity. Interaction of ionizing radiation with matter. Ionizing radiation detectors.	UC-1, GPC -1
19. Dosimetry of ionizing radiation. Types of dosimeters, technical principles of their operation. Absorbed, exposure and equivalent doses. Dose rate. Radiation background.	UC-1, GPC -1

5.1.3. The subject of term papers *(if provided by the curriculum)*
FSES are not provided

6. Criteria for evaluating learning outcomes

For the credit

Learning outcomes	**Evaluation criteria**	
	Not passed	**Passed**
Completeness of knowledge	The level of knowledge is below the minimum requirements. There were bad mistakes.	The level of knowledge in the volume corresponding to the training program. Minor mistakes may be made
Availability of skills	Basic skills are not demonstrated when solving standard tasks. There were bad mistakes.	Basic skills are demonstrated. Typical tasks have been solved, all tasks have been completed. Minor mistakes may be made.
Availability of skills (possession of experience)	Basic skills are not demonstrated when solving standard tasks. There were bad mistakes.	Basic skills in solving standard tasks are demonstrated. Minor mistakes may be made.
Motivation (personal attitude)	Educational activity and motivation are poorly expressed, there is no willingness to solve the tasks qualitatively	Educational activity and motivation are manifested, readiness to perform assigned tasks is demonstrated.
Characteristics of competence formation*	The competence is not fully formed. The available knowledge and skills are not enough to solve practical (professional) tasks. Repeated training is required	The competence developed meets the requirements. The available knowledge, skills and motivation are generally sufficient to solve practical (professional) tasks.
The level of competence formation*	Low	Medium/High

For testing:

Mark "5" (Excellent) - points (100-90%)
Mark"4" (Good) - points (89-80%)
Mark "3" (Satisfactory) - points (79-70%)

Less than 70% – Unsatisfactory – Mark "2"

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