

MINISTRY OF HEALTH OF THE REPUBLIC OF BELARUS
Educational Institution
BELARUSIAN STATE MEDICAL UNIVERSITY

**Контрольный
экземпляр**

APPROVED

by First Vice-Rector, Professor

I.N.Moroz



Reg. # 11D

2022

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RADIATION MEDICINE AND ECOLOGY

**Curriculum of higher educational institution
in the academic discipline for the specialty:**

1-79 01 01 «General Medicine»

Curriculum is based on the educational program «Radiation Medicine and Ecology», approved 16.11.2022, registration # УД-Л.703/2223/уч.; on the educational plan in the specialty 1-79 01 01 «General Medicine», approved 18.05.2022, registration # L 79-1-1/2223/mf.

COMPILERS:

A.R.Avetisov, Head of the Department of Radiation Medicine and Ecology of the educational institution «Belarusian State Medical University», PhD, Associate Professor;

G.D.Keis, Associate Professor of the Department of Radiation Medicine and Ecology of the educational institution «Belarusian State Medical University», PhD, Associate Professor;

L.M.Sheuchuk, Associate Professor of the Department of Radiation Medicine and Ecology of the educational institution «Belarusian State Medical University», PhD, Associate Professor;

V.A.Stahouskaya, Senior Teacher of the Department of Radiation Medicine and Ecology of the educational institution «Belarusian State Medical University»

RECOMMENDED FOR APPROVAL:

by the Department of Radiation Medicine and Ecology of the educational institution «Belarusian State Medical University»
(protocol # 2 of 14.09.2022);

by the Scientific and Methodological Council of the educational institution «Belarusian State Medical University»
(protocol # 9 of 16.11.2022)

EXPLANATORY NOTE

«Radiation Medicine and Ecology» – an academic discipline of the Medical Preventive Module containing systemized scientific knowledge in all aspects of the environmental impacts, ionizing radiation included, on human health, radiation-induced and environmental illnesses rise.

The goal of the discipline «Radiation Medicine and Ecology» is to bring up the basic professional competencies for environmental and radiation safety ensuring.

The objectives of the discipline «Radiation and Ecological Medicine» are to form students' scientific knowledge about the patterns of the impact of environmental factors on human health, the risks of development and pathogenetic mechanisms of the origin of radiation- and environmentally conditioned health abnormalities, methods for individual and population prevention of diseases and abnormal conditions, caused by chronic low-dose exposure to physical, chemical and biological factors; skills needed to reduce the impact of environmental factors and prevent environmentally conditioned illness.

The knowledge, proficiency and skills gained in the process of study of the discipline «Radiation Medicine and Ecology» are demanded for the successful study of the following disciplines: «Radiodiagnosis and Radiotherapy», «Internal Diseases», «Professional Diseases», «Pediatrics».

A student who has mastered the content of the educational material of the discipline «Radiation Medicine and Ecology» shall gain the following basic professional competency:

BPC. Use knowledge about the risks of development and pathogenetic mechanisms of formation of radiation and ecology induced pathology, apply the methods of individual and population based prevention of diseases and pathological conditions caused by chronic low-dose physicochemical and biological effects.

As a result of studying the discipline «Radiation Medicine and Ecology» the student should

know:

mechanisms of influence of natural and anthropogenic environmental factors on human health;

etiology, pathogenesis, clinical manifestations of radiation and environmentally conditioned pathology;

principles of origin and diminution of radiation exposure to the population due to the impact of natural and man-made sources of ionizing radiation;

a set of measures to protect the population in case of radiation accidents;

principles of adhering the healthy lifestyle and rational behavior in the relevant radiation and environmental situation;

be able to:

evaluate radiation dose burden on different categories of exposed individuals under normal operation of ionizing radiation sources and in the event of a radiation accident, to interpret the evaluation results;

analyze regulatory legal acts regulating legal relations in the field of environmental protection and ensuring human radiation safety;

master:

methodology of assessment of health risks from the exposure to environmental factors;

methods for reducing dose burden on the population exposed to radiation;

methodology for choosing the relevant therapeutic and preventive measures in the event of different categories of the population exposure to ionizing radiation;

methodology for conducting activities to promote a healthy lifestyle and rational behavior in the relevant radiation and environmental situation.

Total number of hours for the study of the discipline is 216 academic hours. Classroom hours according to the types of studies: lectures – 20 hours (including 6 hours of supervised student independent work, laboratory classes – 68 hours, student independent work (self-study) – 128 hours.

Intermediate assessment is carried out according to the syllabus of the specialty in the form of a credit (4th semester) and examination (5th semester).

Form of higher education – full-time.

ALLOCATION OF ACADEMIC TIME ACCORDING TO SEMESTERS OF STUDY

Code, name of the specialty	Semester	Number of academic hours						Form of intermediate assessment
		Total	In-class	included			out-of-class self-studies	
				lectures (including supervised independent work)	supervised student independent work	laboratory classes		
1-79 01 01 «General Medicine»	4	108	44	10	3	34	64	credit
	5	108	44	10	3	34	64	exam

THEMATIC PLAN

Section (topic) name	Number of class hours	
	lectures	laboratory classes
1. Ecological Medicine	10	34
1.1. Basics of environmental medicine. Environmental factors	2	4
1.2. Effect of physical factors on the human body and health		4
1.3. Effect of chemical factors on the human body and health	-	2
1.4. Effect of biological factors on the human body and health	-	2
1.5. Heredity and environment	-	2
1.6. Environmental and medical consequences of atmosphere pollution	2	4
1.7. Environmental and medical consequences of hydrosphere pollution		2
1.8. The impact of lithosphere condition and food quality on the human health	2	6
1.9. Medical aspects of indoor environment influence on population health	2	4
1.10. Monitoring of the environment and the health status of the population	2	2
1.11. Regulatory and legal foundation of environment protection		2
2. Radiation Medicine	10	34
2.1. Fundamentals of ionizing radiation action	2	6
2.2. Levels of exposure of humans to ionizing radiation. Radiation background of the Earth	2	4
2.3. Nature of radiation dose burden on humans in the Republic of Belarus following the Chernobyl Nuclear Plant Accident		4
2.4. Health and biological consequences of exposure to ionizing radiation. Radiosensitivity	-	2
2.5. Radiation injuries to humans	2	4
2.6. Deterministic and stochastic consequences of exposure to ionizing radiation		4
2.7. Control of radiation safety	2	4
2.8. Reduction in radiation burden on population	2	6
Total hours	20	68

CONTENT OF THE EDUCATIONAL MATERIAL

1. Ecological Medicine

1.1. Basics of environmental medicine. Environmental factors

Environmental medicine: concept, goals, objectives. Heredity, nutritional status and free radical stress as the prominent triggering moments in the environmental diseases evolving. Role and place of Environmental Medicine in the up-to-day system of medical professionals' tuition.

Ecosystem: concept, components (ecotope and biocenosis), profiles. Basic principles of ecosystem life. Ecosystems classification regarding energy sources accessibility; examples of ecosystems and profiles. Human activities pressure on the ecosystem's sustainability. Trophic levels and food chains. Producers, consumers, reducers. Patterns of energy and substance transfer within the food chain. Stepwise accumulation of foreign chemical substances, toxic compounds and radionuclides included, during their moving up the food chain. Contribution of the environmental factors into the known patterns of the human environmental diseases evolving.

Methods of studying the influence of the environment on human health. Ecologically dependent morbidity. Effect of chronic exposure of subthreshold values of environmental factors on the formation of ecologically dependent morbidity. Peculiarities of approach to diagnosis, treatment and prevention of diseases from the standpoint of ecological medicine.

Factors: basic concepts, classification. Characteristics of abiotic and biotic environmental factors. Mechanisms of influence of environmental factors human population. Human adaptation to ecological factors. Specific and nonspecific mechanisms of protection against the adverse effects of environmental factors. Ecological factors and human health.

1.2. Effect of physical factors on the human body and health

Chronobiology and chronomedicine. Influence of the visible portion of the solar spectrum and illuminance on the human being. Biological rhythms. Prevention and treatment of «winter depression (seasonal affective disorder)». Influence of ultraviolet radiation (UVR) on the human, mechanisms of natural protection from the damaging effect of ultraviolet radiation B-spectrum, ultraviolet radiation C-spectrum effects on the human.

Geomagnetic factors: characteristics, human reaction to the action of geomagnetic factors, prevention of their adverse effects. Meteosensitivity: concept, classification according to severity of clinical manifestations and types of meteopathical reactions.

1.3. Effect of chemical factors on the human body and health

Pathogenetic mechanisms of action of chemical factors on the human body. Foreign chemicals (xenobiotics): concept, classification, general characteristics. Xenobiotics properties that determine their toxicity. Mechanisms of toxic action. Toxicokinetic: resorption of xenobiotics, distribution in the body, metabolism of xenobiotics, excretion.

Effectors of the endocrine system: concept, classification, properties, metabolism and mechanism of the action, possible consequences of their long-term intake by the

person. Multiple chemical sensitivity: concept, causes of development, clinical manifestations, treatment and diagnosis tactic. Ecotoxicology: concept and tasks.

1.4. Effect of biological factors on the human body and health

Mechanisms of unfavorable effects of biological factors on human system. Fungi: the role in ecosystem and human pathology. Exorphins: concept, targets and biological effects in humans; chemical substances with exorphin-bearing properties. Hypersensitive pneumonia and Legionnaires' disease. House dust mites as a prominent biological factor of a polluted indoor environment.

1.5. Heredity and environment

The role of genetic factors in the occurrence of ecologically dependent human pathology. Frequency of mutations. Mechanisms of genotoxicity of xenobiotics. Mutations at the chromosomal level. Meaning of genomic instability in occurrence of human diseases. Somatic mutations and tumors meaning of oncogenes and repressor gene tumors. DNA reparation processes. Determination of mutational spectra genotoxic xenobiotics screening of the environment.

1.6. Environmental and medical consequences of atmosphere pollution

Chemical transformation of nitrogen oxide, sulfur and carbon in the atmosphere. Smog: concept, types, conditions of development. Photochemical smog; effects of photochemical oxidants on the human body. Ozone layer: characteristics, protective function. The problem of ozone layer depletion. Ecological and health consequences of reducing the total amount of stratospheric ozone. «Greenhouse effect»: concept, causes of development. Ecological and health consequences of the global rise of the temperature on the planet. Cross-border transfer of pollutants.

1.7. Environmental and medical consequences of hydrosphere pollution

Hydrosphere: concept, characteristics. Eutrophication: concept, causes of development consequences. Characteristics and peculiarities of the action of xenobiotics entering the human body with water, including peculiarities of neurotoxicity and nephrotoxicity. Ecologically depending morbidity. Drinking water quality criteria: epidemiological safety, chemical composition safety, favorable organoleptic properties, radiation safety.

1.8. The impact of lithosphere condition and food quality on the human health

Geomedicine - the area of ecological medicine. The concept of essential and non-essential elements, and their role in development of disease in humans. Migration of xenobiotics in the biosphere. Features of the toxic action of xenobiotics in ingestion into the human body. Endemic pathology in the World and Republic of Belarus. Iodine consumption standards for different population groups. Epidemiological criteria of population iodine provision. Iodine deficiency disorders among the population. Conditions and factors contributing to the formation of the endemic goiter, the influence of xenobiotics on the thyroid function. Nonspecific and specific prophylaxis of the endemic goiter. Side effects of specific iodine prophylaxis. Medical monitoring of iodine prophylaxis effectiveness.

Main sources and consequences of soil contamination. Ecological and health consequences of intensive agronomic and agrochemical activities soil contamination by sewage, exhaust gases, radioactive elements, waste of production and

consumption. Nitrites and nitrates: chemical characteristics, intake sources, metabolism, mechanism of damaging action, medical consequences of their intake, the role in childhood pathology. N-nitroso compounds: chemical characteristics, sources of intake, mechanisms of action, health consequences of their intake. Characteristics of food: composition; basic xenobiotics, intaken with food (pesticides, mycotoxins, fertilizers, heavy metals, carcinogens, radionuclides, etc.); compounds forming the organoleptic quality of products; biologically active substances.

Features of hepatotoxicity of xenobiotics entering the body with food. Genetically modified organisms and food products: concept, possible risks to the environment and human health, biosafety. Prevention of possible adverse effects of xenobiotics, intaken with food. Detoxification of xenobiotics: concept, phases. Chemical modification of xenobiotics. Microsomal oxidation system. Cytochrome P - 450. Main ways of oxidation of hydrophobic substrates. Concept of metabolic activation. Inhibitors and inducers of microsomal oxidation. Conjugation of xenobiotics; enzymes involved in conjugation reactions, regulation of their activity.

1.9. Medical aspects of indoor environment influence on population health

Ecological characteristics of the environment of residential and public buildings. Physical, chemical, biological factors of indoor environment affecting human health. Characteristics of non-ionizing electromagnetic radiation (NIEMR). International Classification of electromagnetic waves in frequencies. Use of non-ionizing electromagnetic radiation in medicine. Mechanisms of interaction of non-ionizing electromagnetic radiation and biological structures. Medical aspects of impact of non-ionizing electromagnetic radiation on the human body. Electro-sensitivity: concept prevalence among the population, clinical manifestations. Consequences of NIEM actions on the nervous, endocrine, immune and reproductive systems. Electromagnetic fields (electro smog): concept, sources, features, reducing the adverse effects of its impact on the population. Radiotelephony. Mobile communications: principles, particularities of the influence of pulsating radiation on the human body. Electromagnetic compatibility. Features of NIEMI standardisation effects on the population. Ionization of indoor air quality. «Sick Building Syndrome»: concept, causes of development, clinical manifestations (sensory irritation, skin irritation, and specific reactions, asthenic), treatment and diagnosis tactics.

1.10. Monitoring of the environment and the health status of the population

Monitoring: concept, types. Systems of global and local monitoring. National Environmental Monitoring System. Social and hygienic monitoring: concept, goals, objectives, stages. Analysis of monitoring information results, forecasting of possible developments. Study of environmental factor influence on human health: method of modeling on animals, observation population (questionnaire method, processing of statistical data, epidemiological studies), health risk assessment under the influence of environmental factors.

1.11. Regulatory and legal foundation of environment protection

Basic principles of ecological law. Ecological and natural conservation and resource legislation: Constitution of the Republic of Belarus, laws of the Republic of Belarus « On Ecological Protection» , « On State Ecological Expertise» , etc. The rights of citizens to health protection, healthy environment and compensation for damages caused by the violation of this right. Liability for contempt of the environmental law.

2. Radiation Medicine

2.1. Fundamentals of ionizing radiation action

Radiation medicine: concept, goals, objectives, methods. The role of radiation in human life and society. History of radiation medicine development.

Bonds between Radiation Medicine and Nuclear Physics, General Biology, Biochemistry, Cytology, Genetics, Radiobiology, Radiation Hygiene, clinical disciplines.

Origin of atoms (nucleosynthesis theory): concept, stages. Natural and man-made sources of ionizing radiation.

Ionizing radiation types classification, properties.

Essence of radioactivity phenomenon. Radioactivity units. Types of radioactive transformations of nuclei. The law of radioactive decay. Interaction between charged particles and substance. Linear energy transfer (LET) concept. Interaction of electromagnetic radiation and substance. Neutrons and substance interaction features. The phenomenon of induced radioactivity.

Stages of radiation damage. Direct and indirect effects ionizing radiation. Radiolysis of water, basic products of radiolysis. The effect of oxygen on the radiolysis progress. Oxygen effect. The role of water radiolysis products in the inactivation of macromolecules and cell death. Common pattern of oxidative stress. Radiotoxins. Radiation biochemistry of nucleic acids. DNA repair. Changes to supramolecular structures of chromatin. Chromosomal aberrations. Radiation biochemistry of proteins, lipids and carbohydrates. Effects of ionizing radiation on the cell membrane structure. Disorders in lipid, carbohydrate, water and mineral metabolism in the exposed to ionizing radiation organism. Types of cell responses to ionizing radiation exposure. Nowadays views on the mechanisms of interphase and mitotic cell death. Post-radiation recovery.

Methods for measurement of ionizing radiation: physical, chemical, biological, features and employment in radiation medicine and hygiene. Biological dosimetry. Reconstruction of doses incurred by humans.

Dosimetry: concept, essence. Radiological dose quantities: exposure, absorbed, equivalent, effective, ambient dose equivalent; correlation between traditional units and the units International System of Units. Air Kerma. Collective dose quantities. Radiological physical/basic, protective, operational dose quantities. Calculation of doses incurred from external and internal exposure of humans to radionuclides of Chernobyl Nuclear Power Plant accidental release. Common and individual dosimetry.

Radiometry. Principles of radiometric studies. Measurement of the dose incurred by humans from internal exposure to ionizing radiation. Methods of measurement of incorporated radioactive cesium.

2.2. Levels of exposure of humans to ionizing radiation. Radiation background of the Earth

Radiation background of the Earth, its components. The contribution of various components of the radiation background to the formation of the average annual effective dose in humans.

Natural radiation background, profiles of natural terrestrial and extraterrestrial sources of ionizing radiation. Radionuclides of decay chains, mostly contributing to the human dose burden from exposure to ionizing radiation: U-238, Th-232, Ra-226, Rn-222, Po-210, Pb-210, Bi-210. Radon, its sources, values of doses incurred in humans through exposure to radon. Optimization of human dose burden from exposure to radon and its decay products. Natural radionuclides beyond the decay chains. Significance of K-40 for the human radiation burden in the Republic of Belarus. State of the environmental radiation in the Republic of Belarus prior to the Chernobyl Nuclear Plant (NPP) Accident. Importance of the optimization of the dose burden from radiation background for the Republic of Belarus residents.

Man-made (artificial) radiation background, its components contributing to the human dose burden from exposure to ionizing radiation. Global fallout of radionuclides owing to nuclear weapons testing and regular operation of nuclear reactors. Contribution of ionizing radiation sources used for medical purposes to the radiation burden on patients in the Republic of Belarus.

Achievements of the nuclear energetics worldwide and in the Republic of Belarus. Stages of the nuclear fuel cycle; radionuclides generated during the nuclear reactor operation; dose values incurred in humans from the Nuclear Power Plant regular operation. Belarusian Nuclear Power Plant, radiation safety ensuring for the members of the public in planned exposure situation.

2.3. Nature of radiation dose burden on humans in the Republic of Belarus following the Chernobyl Nuclear Plant Accident

The Chernobyl Nuclear Plant Accident, radionuclides emission temporal and spatial aspects. Effect on humans of radionuclides of Chernobyl release in the Republic of Belarus. Migration of radionuclides in the biosphere: profiles of deposition of radionuclides in the lithosphere and hydrosphere, progressing accumulation of radionuclides moving up the food chain. Principal pathways for radionuclides entry into the body, types of distribution in the body. Features of the mostly dose causing radionuclides: C-14, Cs-137, Sr-90, H-3, I-131, Pu-239, Am-241, «hot» particles. The Law of the Republic of Belarus No. 1228-XII from 12.11.1991 «On the legal status of the territories contaminated as a result of the Chernobyl Nuclear Plant Accident». Radiation background in the Republic of Belarus nowadays. Radiation monitoring.

2.4. Health and biological consequences of exposure to ionizing radiation. Radiosensitivity

Radiosensitivity issue – the central problem of radiobiology and radiation medicine. Molecular basis of radiosensitivity. Radiosensitivity of cells, organs and tissues. The rule of Bergonie-Tribondeau. The effect of ionizing radiation on organs and systems. Individual and age variations in radiosensitivity. The effect of radiation on the embryo and fetus.

Modification of radiosensitivity of biological systems.

2.5. Radiation injuries to humans

Factors causing ionizing radiation injuries to human body. The concept of «critical organ». Acute Radiation Syndromes: red bone marrow syndrome, gastrointestinal syndrome, cerebral (neurovascular) syndrome, profiles. The radiation dose dependent clinical presentation of the syndromes; human death causes.

Radiation injuries: dependence on the type and the history of exposure; acute radiation sickness (ARS) and chronic radiation sickness; pathogenetic classification of ARS owing to the body homogeneous exposure to external radiation, dose dependence, characteristics.

2.6. Deterministic and stochastic consequences of exposure to ionizing radiation

Deterministic consequences of radiation: concept, dose dependence, characteristics of the effects.

Stochastic consequences of radiation: concept, dose dependence, characteristics of effects. Somatic and genetic stochastic effects. Concept of «low-dose ionizing radiation». Variants for dependence of stochastic effects in humans on received dose of low-dose range. Epigenetic responses to ionizing radiation exposure: radiation-induced genomic instability, signal transfer from the exposed cells to the non-exposed nearby cells («bystander effect»). Adaptive response and radiation hormesis. Radiation hormesis.

Expected health effects of the particular individual and overall human population under long-term low-dose exposure.

2.7. Control of radiation safety

Radiation safety: concept, guiding principles and ways of implementation. International organizations involved in the upgrade of the radiation safety provision. State administration and regulation in the field of radiation safety. Generic profile of the cornerstone legal acts regulating work with the sources of ionizing radiation: the Law of the Republic of Belarus «On radiation safety», sanitary standards and regulations «Requirements for radiation safety», hygienic standard «Criteria for radiation exposure assessment», sanitary standards and regulations «Requirements for provision of radiation safety of personnel and members of the public under execution of activities involving the employment of atomic energy and sources of ionizing radiation». Categories and situations of exposure, categories of exposed individuals and corresponding approaches to dose limitations.

Sealed and unsealed sources concept. Measures for protecting against ionizing radiation: measures based on time, distance, shielding, quantity-based protective approach. Radiation safety of the personnel and the members of the public in existing exposure situations.

Radiation accident concept. Decision making criteria for protecting members of the public in radiation accidents. Provision of radiation safety in emergency exposure situation. Criteria for transition to existing exposure situation.

2.8. Reduction in radiation burden on population

The state unified system for monitoring and recording the individual doses.

Exposure to ionizing radiation for medical purposes. Reducing exposure of patients and members of the public to the sources of ionizing radiation employed for medical purposes: legal acts regulating exposure incurred by patients; referral to X-ray and radiodiagnostic examination justification; reference levels for patients in X-ray and radiodiagnostic examinations; organizational, methodological and technical measures to diminish the dose received by the patient.

Principles of reduction of the annual effective dose incurred within the early, interim and recovery phases of the post-accidental period. Reduction of the annual effective dose from external exposure: decontamination of the terrain and the environmental objects; evacuation, resettlement and relocation of people, other measures. Reduction of the annual effective dose from internal exposure: limiting the intake of radionuclides, limiting the absorption of radionuclides in the gastrointestinal tract, exercising rational and healthy dietary habits, facilitating the excretion of radionuclides from the body, reducing the detrimental effects of radionuclides, enhancing the adaptive-compensatory potency of the human body.

Principles of habitation on the terrains contaminated with radionuclides.

ACADEMIC DISCIPLINE CURRICULAR CHART

Section, topic #	Section (topic) name	number of hours			Self-studies	Form of control
		lectures (including supervised work)	supervised student work	laboratory		
4th semester						
1	Ecological Medicine	10	3	34	64	
1.1.	<i>Basics of environmental medicine. Environmental factors</i>	2	0.5	4	14	
1.2.	<i>Effect of physical factors on the human body and health</i>			4		
	Basics of environmental medicine. Environmental factors. Effect of physical factors on the human body and health	2	0.5	-	2	Interviews
	Basics of environmental medicine. Environmentally dependent morbidity of the population. Laboratory work: «Human adaptation to environmental factors»	-	-	2	2	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests

	<p>Environmental factors. Effect of physical factors on the human body and health: the influence of the visible region of the solar spectrum and illumination on the human body. Laboratory work: «Assessment of the risk of seasonal emotional disease»</p>	-	-	2	3	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
	<p>Effect of physical factors on the human body and health: human health effect of ultraviolet radiation (UVR) Laboratory work «Evaluation of the type of skin sensitivity to UV radiation. Assessment of risk for skin malignancy»</p>	-	-	2	3	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, solving situational problems with their oral defense, electronic tests
	<p>The effect of ultraviolet radiation on humans. Stochastic and deterministic effects of UV exposure and Geomagnetic factors. Laboratory work: «Biological rhythms. The daily rhythm of human temperature and pulse»</p>	-	-	2	4	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
1.3.	<p>Effect of chemical factors on the human body and health. Laboratory work: «Epidemiological studies of the populations exposed to xenobiotics using the «case-control» method»</p>	-	-	2	4	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
1.4.	<p>Effect of biological factors on the human body and health</p>	-	-	2	4	Interviews, quizzes, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests

1.5.	Heredity and environment. The role of genetic factors in the occurrence of environmentally dependent human pathology	-	-	2	4	Interviuws, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, solving situational problems with their oral defense, electronic tests, colloquium
1.6.	<i>Environmental and medical consequences of atmosphere pollution</i>	2	0.5	4	12	
1.7.	<i>Environmental and medical consequences of hydrosphere pollution</i>			2		
	Environmental and medical consequences of atmosphere pollution	2	0.5	-	2	Interviuws
	Environmental and medical consequences of atmosphere pollution. Factors and sources of atmospheric pollution. Global and local environmental consequences of atmospheric pollution. Laboratory work: «Assessment of ozone level in ambient air»	-	-	2	3	Interviuws, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
	Environmental and medical consequences of atmospheric pollution. Medical consequences of atmospheric pollution. Acute and chronic effects of pollutants on the human body.	-	-	2	3	Interviuws, quizzes, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests

	Environmental and medical consequences of hydrosphere pollution. Laboratory work: «Quantitative estimation of sulfates and iron level in drinking water»	-	-	2	4	2	4	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
1.8.	<i>The impact of lithosphere condition and food quality on the human health</i>	2	0.5	6	8			Interviews
	The impact of lithosphere condition and food quality on the human health	2	0.5	-	2			Interviews
	The impact of lithosphere condition and food quality on the human health. Factors and sources of lithosphere contamination. Migration of xenobiotics in the Biosphere	-	-	2	2			Interviews, quizzes, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
	The impact of lithosphere condition and food quality on the human health. Characteristics of food products. Preventive practices addressing potential adverse effects of xenobiotics ingested with foods. Laboratory work: «Quantitative assessment of plants tissue nitrite burden»	-	-	2	2			Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
	The impact of lithosphere condition and food quality on the human health. Detoxification of xenobiotics. Laboratory work: «Evaluation of the composition of food products»	-	-	2	2			Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
1.9.	<i>Medical aspects of indoor environment influence on population health</i>	2	0.5	4	8			
	Medical aspects of indoor environment influence on population health	2	0.5	-	2			Interviews

	Medical aspects of indoor environment influence on population health. Ecological characteristics of the environment of residential and public premises. Laboratory work: «Assessment of the electromagnetic environment in the room»	-	-	2	3	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, solving situational problems with their oral defense, electronic tests
	Medical aspects of indoor environment influence on population health. Non-ionizing electromagnetic radiation as a factor of the indoor environment. Laboratory work: «Assessment of the environmental cancer risk»	-	-	2	3	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, solving situational problems with their oral defense, electronic tests
1.10.	<i>Monitoring of the environment and the health status of the population</i>	2	1	2	10	
1.11.	<i>Regulatory and legal foundation of environment protection</i>			2		
	Monitoring of the environment and the health status of the population. Regulatory and legal foundation of environment protection	2	1	-	2	Interviews
	Monitoring of the environment and the health status of the population	-	-	2	4	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, solving situational problems with their oral defense, electronic tests, colloquium

	Regulatory and legal foundation of environment protection	-	-	2	4	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, solving situational problems with their oral defense, electronic tests. Credit
5th semester						
2.	Radiation Medicine	10	3	34	64	
2.1.	<i>Fundamentals of ionizing radiation action</i>	2	0.5	6	8	
	Fundamentals of ionizing radiation action	2	0.5	-	2	Interviews
	Fundamentals of ionizing radiation action Laboratory work: «Calculation of the percentage of radionuclides after an accidental release»	-	-	2	2	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, solving situational problems with their oral defense, electronic tests
	Fundamentals of ionizing radiation action. Stages of radiation injury. Radiation biochemistry of macromolecules. Laboratory work: «Calculation of the time required to achieve a given activity in environmental objects»	-	-	2	2	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, solving situational problems with their oral defense, electronic tests
	Fundamentals of ionizing radiation action. Methods for registration of ionizing radiation. Dosimetry. Radiological dose quantites	-	-	2	2	Interviews, quizzes, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests

2.2.	<i>Levels of exposure of humans to ionizing radiation. Radiation background of the Earth</i>	2	0.5	4	17	
2.3.	<i>Nature of radiation dose burden on humans in the Republic of Belarus following the Chernobyl Nuclear Plant Accident</i>	4	4			
	Levels of exposure of humans to ionizing radiation. Radiation background of the Earth. Nature of radiation dose burden on humans in the Republic of Belarus following the Chernobyl Nuclear Plant Accident	2	0.5	-	3	Interviews
	Levels of exposure of humans to ionizing radiation. Radiation background of the Earth. Natural radiation background and the contribution of its components to the human incurred average annual effective dose	-	-	2	3	Interviews, quizzes, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
	Levels of exposure of humans to ionizing radiation. Radiation background of the Earth. Man-made (artificial) radiation background and the contribution of its components to the human incurred average annual effective dose. Laboratory work: «Evaluation of the ambient dose equivalent rate of roentgen and gamma radiation by the MKC-6130A dosimeter-radiometer»	-	-	2	3	Interviews, quizzes, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
	Nature of radiation dose burden on humans in the Republic of Belarus following the Chernobyl Nuclear Plant Accident. Radiation accidents: concept, stages of evolving. Formation of the doses incurred by population. Laboratory work: «Evaluation of radioactive cesium incorporated in the human body»	-	-	2	4	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, solving situational problems with their oral defense, electronic tests, colloquium

	Nature of radiation dose burden on humans in the Republic of Belarus following the Chernobyl Nuclear Plant Accident. Characteristics of the mostly dose causing radionuclides. Radiation background in the Republic of Belarus nowadays. Laboratory work: «Calculation the annual effective dose from external exposure of humans to radionuclides of the Chernobyl NPP accidental release»	-	-	2	4	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, solving situational problems with their oral defense, electronic tests
2.4.	Health and biological consequences of exposure to ionizing radiation. Radiosensitivity	-	-	2	4	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
2.5. 2.6.	<i>Radiation injuries to humans</i> <i>Deterministic and stochastic consequences of exposure to ionizing radiation</i>	2	0.5	4 4	17	
	Radiation injuries to humans. Deterministic and stochastic consequences of exposure to ionizing radiation	2	0.5	-	3	Interviews
	Radiation injuries to humans. Acute radiation syndromes. Laboratory work: «Individual dosimetry», «Measurement of an individual equivalent dose with a ДКC-AТ3509А dosimeter»	-	-	2	3	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
	Radiation injuries: dependence on the type and history of exposure; acute radiation sickness and chronic radiation sickness	-	-	2	4	Interviews, quizzes, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests

	Deterministic and stochastic consequences of exposure to ionizing radiation. Laboratory work: «Comparative profile of deterministic and stochastic effects of exposure»	-	-	2	4	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
	Deterministic and stochastic consequences of exposure to ionizing radiation. population health state in the Republic of Belarus after the accident at the Chernobyl nuclear power plant. Clinical accounting and examination	-	-	2	3	Interviews, quizzes, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
2.7.	<i>Control of radiation safety</i>	2	0.5	4	8	
	Control of radiation safety	2	0.5	-	2	Interviews
	Control of radiation safety. Prescriptive legal foundation for radiation safety. Principles of radiation safety, practical application	-	-	2	2	Interviews, quizzes, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
	Control of radiation safety. Sealed and unsealed sources of ionizing radiation concept. Methods of protection against ionizing radiation at work with sources of ionizing radiation and appliances generating ionizing radiation	-	-	2	4	Interviews, quizzes, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, electronic tests
2.8.	<i>Reduction in radiation burden on population</i>	2	1	6	10	
	Reduction in radiation burden on population	2	1	-	2	Interviews

	<p>Reduction in radiation burden on population. Medical exposure. Reduction of medical exposure of patients and members of the public from the sources of ionizing radiation used for medical purposes. Laboratory work: «Evaluation of the external radiation exposure of population living in a territory contaminated with radionuclides»</p>	-	-	2	2	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, solving situational problems with their oral defense, electronic tests
	<p>Reduction in radiation burden on population. Emergency exposure situation. Decision making criteria for protecting members of the public in radiation accidents. Reducing the annual effective dose from external exposure. Laboratory work: «Evaluation of the long-term radiation exposure of the population due to entry of radionuclides into the human body by oral and inhalation routes»</p>	-	-	2	2	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, solving situational problems with their oral defense, electronic tests
	<p>Reduction in radiation burden on population. Reducing the annual effective dose from internal exposure. Principles of habitation on the terrains contaminated with radionuclides. Laboratory work: «A set of measures to diminish the annual effective dose from external and internal exposure»</p>	-	-	2	4	Interviews, quizzes, written reports on laboratory work, reports on classroom laboratory exercises with their oral defense, reports in laboratory classes, reporting and defense of the essays, solving situational problems with their oral defense, electronic tests. Exam
		20	6	68	128	

INFORMATION AND INSTRUCTIONAL UNIT

LITERATURE

Basic (relevant):

1. Радиационная медицина = Radiation medicine : учеб. пособие для иностр. студентов учреждений высш. образования по мед. спец. / А. Н. Стожаров, Александр Николаевич [и др.]; под ред. А. Н. Стожарова. – Минск : Новое знание, 2020. – 205 с.

METHODOLOGICAL RECOMMENDATIONS FOR THE ORGANIZATION AND PERFORMANCE OF STUDENT INDEPENDENT WORK IN THE ACADEMIC DISCIPLINE

The time allotted for independent work can be used by students for:

- preparation for lectures, laboratory classes;
- preparation for the test in the academic discipline;
- elaboration of topics (questions) submitted for independent study;
- problem solving;
- performing research and creative tasks;
- preparation of thematic reports, abstracts, presentations;
- performing practical tasks;
- taking notes of educational literature;
- compilation of a review of scientific literature on a given topic;
- design of information and demonstration materials (stands, posters, graphs, tables, newspapers, etc.);
- production of layouts, laboratory and teaching aids;
- compilation of a thematic selection of literary sources, Internet sources;
- preparation of tests for the organization of mutual control.

METHODOLOGICAL RECOMMENDATIONS FOR THE ORGANIZATION AND PERFORMANCE OF SUPERVISED STUDENT INDEPENDENT WORK IN THE ACADEMIC DISCIPLINE

Main forms of supervised student independent work:

- preparation and presentation of abstracts;
- presentation of reports;
- studying topics and problems that have not been discussed at the lectures;
- taking notes of original sources (sections of anthologies, collections of documents, monographs, textbooks);
- computer testing;
- participation in active forms of education.

Control of supervised student independent work is carried out in the form of:

- final class, colloquium in the form of an oral interview, written work, testing;
- defense of educational assignments;
- assessment of an oral reply to a question, presentation, report or problem solving;

checking up abstracts, written reports, accounts, prescriptions;
checking up notes of original sources, monographs and articles;
individual interview.

LIST OF AVAILABLE DIAGNOSTIC TOOLS

The following forms are used for competences assessment:

Oral form:

interviews;
reports in laboratory classes;
exam;
credit.

Written form:

quizzes;
colloquiums;
written reports on laboratory work;

Oral and written form:

reports on classroom laboratory exercises with their oral defense;
solving situational problems with their oral defense;
reporting and defense of the essays.

Technical form:

electronic tests.

LIST OF USED TEACHING METHODS

Traditional method (lecture, laboratory practicals);

Active (interactive) methods:

problem-based learning PBL;
team-based learning TBL;
research-based learning RBL.

LIST OF PRACTICAL SKILLS

1. Evaluation of the Safe Time of Ultra Violet Irradiation Impact on Human Organism.
2. Evaluation of environment-associated human health risks.
3. Evaluation of the ambient equivalent dose rate.
4. Evaluation of the amount of radioactive caesium incorporated in the human body.
5. Calculation of the incurred effective dose from internal exposure grounding on the results of the direct radiometry.
6. Calculation and assessment of the estimated percentage of radionuclides remaining at different periods after the accident.
7. Calculation of the time period required for environmental objects to reach a given activity.

8. Calculation of the human annual effective dose incurred from external exposure to radionuclides of the Chernobyl NPP accidental release (calculation grounded on the ambient dose equivalent rate), assessment of the result obtained.

9. Calculation of the human annual effective dose incurred from internal exposure to radionuclides of the Chernobyl NPP accidental release (oral and inhalation routes of intake considered), assessment of the result obtained.

10. Elaboration of a set of relevant measures to reduce human doses burden from external and internal exposure.

LIST OF EQUIPMENT USED

Photoelectric colorimeter КФК-2МР.

Device for measuring parameters of the electric and magnetic fields BE-meter AT002.

MKC-6130A dosimeter-radiometer.

ДКC-AT3509A dosimeter.

LIST OF LECTURES

The 4th semester

1. Basics of environmental medicine. Environmental factors Effect of physical factors on the human body and health.

2. Environmental and medical consequences of atmosphere pollution. Environmental and medical consequences of hydrosphere pollution.

3. The impact of lithosphere condition and food quality on the human health.

4. Medical aspects of indoor environment influence on population health.

5. Monitoring of the environment and the health status of the population Regulatory and legal foundation of environment protection.

The 5th semester

1. Fundamentals of ionizing radiation action.

2. Levels of exposure of humans to ionizing radiation. Radiation background of the Earth. Nature of radiation dose burden on humans in the Republic of Belarus following the Chernobyl Nuclear Plant Accident.

3. Radiation injuries to humans. Deterministic and stochastic consequences of exposure to ionizing radiation.

4. Control of radiation safety.

5. Reduction in radiation burden on population.

LIST OF LABORATORY STUDIES

Number of the class	Nominated themes
The 4th semester	
1	Basics of Environmental Medicine. Environmental factors. Environmentally dependent morbidity of the population. Laboratory work: «Human adaptation to environmental factors»
2	Environmental factors. Effect of physical factors on the human body and health: the influence of the visible region of the solar spectrum and illumination on the human body. Laboratory work: «Assessment of the risk of seasonal emotional disease»
3	Effect of physical factors on the human body and health: human health effect of ultraviolet radiation (UVR) Laboratory work «Evaluation of the type of skin sensitivity to UV radiation. Assessment of risk for skin malignancy»
4	The effect of ultraviolet radiation on humans. Stochastic and deterministic effects of UV exposure and Geomagnetic factors. Laboratory work: «Biological rhythms. The daily rhythm of human temperature and pulse»
5	Effect of chemical factors on the human body and health. Laboratory work: «Epidemiological studies of the populations exposed to xenobiotics using the «case-control» method»
6	Effect of biological factors on the human body and health
7	Heredity and environment. The role of genetic factors in the occurrence of environmentally dependent human pathology
8	Environmental and medical consequences of atmosphere pollution. Factors and sources of atmospheric pollution. Global and local environmental consequences of atmospheric pollution. Laboratory work: «Assessment of ozone level in ambient air»
9	Environmental and medical consequences of atmospheric pollution. Medical consequences of atmospheric pollution. Acute and chronic effects of pollutants on the human body
10	Environmental and medical consequences of hydrosphere pollution. Laboratory work: «Quantitative estimation of sulfates and iron level in drinking water»
11	The impact of lithosphere condition and food quality on the human health. Factors and sources of lithosphere contamination. Migration of xenobiotics in the Biosphere
12	The impact of lithosphere condition and food quality on the human health. Characteristics of food products. Preventive practices addressing potential adverse effects of xenobiotics ingested with foods. Laboratory work: «Quantitative assessment of plants tissue nitrite burden»

Number of the class	Nominated themes
13	The impact of lithosphere condition and food quality on the human health. Detoxification of xenobiotics. Laboratory work: «Evaluation of the composition of food products»
14	Medical aspects of indoor environment influence on population health. Ecological characteristics of the environment of residential and public premises. Laboratory work: «Assessment of the electromagnetic environment in the room»
15	Medical aspects of indoor environment influence on population health. Non-ionizing electromagnetic radiation as a factor of the indoor environment. Laboratory work: «Assessment of the environmental cancer risk»
16	Monitoring of the environment and the health status of the population
17	Regulatory and legal foundation of environment protection
The 5th semester	
1	Fundamentals of ionizing radiation action Laboratory work: «Calculation of the percentage of radionuclides after an accidental release»
2	Fundamentals of ionizing radiation action. Stages of radiation injury. Radiation biochemistry of macromolecules. Laboratory work: «Calculation of the time required to achieve a given activity in environmental objects»
3	Fundamentals of ionizing radiation action. Methods for registration of ionizing radiation. Dosimetry. Radiological dose quantites
4	Levels of exposure of humans to ionizing radiation. Radiation background of the Earth. Natural radiation background and the contribution of its components to the human incurred average annual effective dose
5	Levels of exposure of humans to ionizing radiation. Radiation background of the Earth. Man-made (artificial) radiation background and the contribution of its components to the human incurred average annual effective dose. Laboratory work: «Evaluation of the ambient dose equivalent rate of roentgen and gamma radiation by the MKC-6130A dosimeter-radiometer»
6	Nature of radiation dose burden on humans in the Republic of Belarus following the Chernobyl Nuclear Plant Accident. Radiation accidents: concept, stages of evolving. Formation of the doses incurred by population. Laboratory work: «Evaluation of radioactive cesium incorporated in the human body»
7	Nature of radiation dose burden on humans in the Republic of Belarus following the Chernobyl Nuclear Plant Accident (continued). Characteristics of the mostly dose causing radionuclides. Radiation background in the Republic of Belarus nowadays.

Number of the class	Nominated themes
	Laboratory work: «Calculation the annual effective dose from external exposure of humans to radionuclides of the Chernobyl NPP accidental release»
8	Health and biological consequences of exposure to ionizing radiation. Radiosensitivity
9	Radiation injuries to humans. Acute radiation syndromes. Laboratory work: «Individual dosimetry», «Measurement of an individual equivalent dose with a ДКC-AT3509A dosimeter»
10	Radiation injuries: dependence on the type and history of exposure; acute radiation sickness and chronic radiation sickness
11	Deterministic and stochastic consequences of exposure to ionizing radiation. Laboratory work: «Comparative profile of deterministic and stochastic effects of exposure»
12	Deterministic and stochastic consequences of exposure to ionizing radiation. population health state in the Republic of Belarus after the accident at the Chernobyl nuclear power plant. Clinical accounting and examination
13	Control of radiation safety. Prescriptive legal foundation for radiation safety. Principles of radiation safety, practical application
14	Control of radiation safety. Sealed and unsealed sources of ionizing radiation concept. Methods of protection against ionizing radiation at work with sources of ionizing radiation and appliances generating ionizing radiation
15	Reduction in radiation burden on population. Medical exposure. Reduction of medical exposure of patients and members of the public from the sources of ionizing radiation used for medical purposes. Laboratory work: «Evaluation of the external radiation exposure of population living in a territory contaminated with radionuclides»
16	Reduction in radiation burden on population. Emergency exposure situation. Decision making criteria for protecting members of the public in radiation accidents. Reducing the annual effective dose from external exposure. Laboratory work: «Evaluation of the long-term radiation exposure of the population due to entry of radionuclides into the human body by oral and inhalation routes»
17	Reduction in radiation burden on population. Reducing the annual effective dose from internal exposure. Principles of habitation on the terrains contaminated with radionuclides. Laboratory work: «A set of measures to diminish the annual effective dose from external and internal exposure»

THE THEMES OF ESSAYS/ABSTRACTS

Ecological Medicine

1. Biological resources: concept, classification, profile; value for the biosphere.

2. Environment protection in the Republic of Belarus.
3. Environment protection in the student' native country.
4. Recreational resources in the Republic of Belarus.
5. Recreational resources in the student' native country.
6. Specially protected natural areas: concept, value for biosphere and humans.
7. Environmental legislation of the Republic of Belarus.
8. Environmental legislation of the student' native country.
9. Monitoring: concept, levels, profiles of monitoring various types.
10. Environment Monitoring National Network of the Republic of Belarus.
11. Environment Monitoring National Network of the student' native country.
12. Environmental monitoring: concept, goals, objectives, structural organization.
13. Bioindication: concept, types, bioindicator species and biological communities.
14. Socio-hygienic monitoring: concept, goals, objectives.
15. Socio-hygienic monitoring: pattern, stages, implementation.

Radiation Medicine


16. Diminishing radiation exposure to patients under X-ray and radiodiagnostic examinations.
17. Radiation hormesis: experimental and actual use.
18. Health and biological consequences of the Chernobyl Nuclear Power Plant Accident.
19. Efficiency of the systemic regular preventive medical examinations of the humans exposed to radiation during radiation accidents.
20. The State unified system for monitoring and recording the individual doses from exposure to ionizing radiation.
21. State Program on overcoming the Chernobyl accident consequences and contaminated with radionuclides territories recovery.
22. Modification of radiosensitivity: experimental and practical use.
23. Rational nutrition in long-term low-dose exposure to ionizing radiation and chemical agents.
24. Evolution of nuclear energetics in the Republic of Belarus.
25. Organization and execution of a set of protective measures in radiation accidents.
26. System for implementing the basic principles of radiation safety provision.
27. System of radiation monitoring in the Republic of Belarus.
28. Comparative profile of doses incurred in humans from internal exposure owing to ingestion and inhalation of naturally occurring and man-made radionuclides.
29. Control of radiation safety of food and water.

**PROTOCOL OF THE CURRICULUM APPROVAL
BY OTHER DEPARTMENTS**

The nomination of the academic discipline to achieve a required coordination.	Department name	Suggestions for changes in the content of the curriculum of a higher education establishment in the academic discipline	Decision made by the department that developed the curriculum (the date and registered number of the Minutes included)
1. Radiodiagnosis and Radiotherapy	Radiodiagnosis and Radiotherapy	No comments or suggestions	Recommended for approval, protocol # 2 of September 14, 2022
2. Internal Diseases	Internal Medicine No.1	No comments or suggestions	Recommended for approval, protocol # 2 of September 14, 2022

COMPILERS:

Head of the Department of Radiation
Medicine and Ecology of the
educational institution «Belarusian
State Medical University», PhD,
Associate Professor



A.R. Avetisov

Associate Professor of the Department
of Radiation Medicine and Ecology of
the educational institution «Belarusian
State Medical University», PhD,
Associate Professor



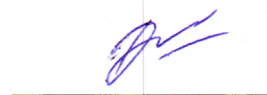
G.D. Keis

Associate Professor of the Department
of Radiation Medicine and Ecology of
the educational institution «Belarusian
State Medical University», PhD,
Associate Professor



L.M. Sheuchuk

Senior teacher of the Department of
Radiation Medicine and Ecology of the
educational institution «Belarusian
State Medical University»



V.A. Stahouskaya

Curriculum content, composition and the accompanying documents comply with the established requirements.

Dean of the Medical Faculty for
International Students of the
educational institution «Belarusian
State Medical University»

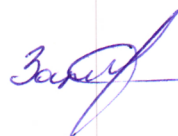
21. 11. 22



O.S. Ishutin





Methodist of the educational institution
«Belarusian State Medical University»

21. 11. 22



S.V. Zaturanova

Information about the authors (compilers) of the curriculum

Name		Avetisov Aram Rubenovich
Position, degree, academic title	academic	Head of the Department of Radiation Medicine and Ecology of the educational institution « Belarusian State Medical University» , Candidate of Medical Sciences, Associate Professor
 office		+375 17 363-58-96
FAX:		
<i>E-mail:</i>		radiomed@bsmu.by
Name		Keis Galina Dmitrievna
Position, degree, academic title	academic	Candidate of medical sciences, associate professor, Department of Radiation Medicine and Ecology, educational institution « Belarusian state medical university»
 office		+375 17 272-60-19
FAX:		
<i>E-mail:</i>		radiomed@bsmu.by
Name		Sheuchuk Larisa Mikhaylovna
Position, degree, academic title	academic	Candidate of medical sciences, associate professor, Department of Radiation Medicine and Ecology, educational institution « Belarusian state medical university»
 office		+375 17 272-60-19
FAX:		
<i>E-mail:</i>		radiomed@bsmu.by
Name		Stahouskaya Volha Anatolyeuna
Position, degree, academic title	academic	Senior teacher of the Department of Radiation Medicine and Ecology of the educational institution « Belarusian state medical university»
 office		+375 17 319-32-34
FAX:		
<i>E-mail:</i>		radiomed@bsmu.by