

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION

**Federal State Autonomous Educational Institution of Higher Education  
«National Research Lobachevsky State University of Nizhny Novgorod»**

Институт клинической медицины

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УТВЕРЖДЕНО

решением Ученого совета ННГУ

протокол № 10 от 02.12.2024 г.

**Working programme of the discipline**

Health and Safety

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Higher education level

Specialist degree

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Area of study / speciality

31.05.03 - Dentistry

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Focus /specialization of the study programme

Dentistry

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Mode of study

full-time

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Nizhny Novgorod

Year of commencement of studies 2025

## 1. Место дисциплины в структуре ОПОП

Дисциплина Б1.О.18 Безопасность жизнедеятельности относится к обязательной части образовательной программы.

## 2. Планируемые результаты обучения по дисциплине, соотнесенные с планируемыми результатами освоения образовательной программы (компетенциями и индикаторами достижения компетенций)

Формируемые компетенции (код, содержание компетенции)	Планируемые результаты обучения по дисциплине (модулю), в соответствии с индикатором достижения компетенции		Наименование оценочного средства	
	Индикатор достижения компетенции (код, содержание индикатора)	Результаты обучения по дисциплине	Для текущего контроля успеваемости	Для промежуточной аттестации
УК-1: Способен осуществлять критический анализ проблемных ситуаций на основе системного подхода, вырабатывать стратегию действий	УК-1.1: Знать методы критического анализа и синтеза информации для применения системного подхода для решения поставленных задач УК-1.2: Уметь осуществлять поиск, критический анализ и синтез информации, применять системный подход для решения поставленных задач УК-1.3: Владеть опытом критического анализа и синтеза информации для применения системного подхода для решения поставленных задач	УК-1.1: Знает методы критического анализа и синтеза информации для применения системного подхода для решения поставленных задач  УК-1.2: Умеет осуществлять поиск, критический анализ и синтез информации, применять системный подход для решения поставленных задач  УК-1.3: Владе опытом критического анализа и синтеза информации для применения системного подхода для решения поставленных задач	Реферат	Зачёт: Контрольные вопросы
УК-8: Способен создавать и поддерживать в повседневной жизни и в профессиональной деятельности безопасные условия жизнедеятельности и для сохранения природной среды, обеспечения устойчивого развития общества, в том	УК-8.1: Обеспечивает безопасные и комфортные условия труда на рабочем месте, в т.ч. с помощью средств защиты. УК-8.2: Выявляет и устраняет проблемы, связанные с нарушениями техники безопасности на рабочем месте. УК-8.3: Осуществляет действия по предотвращению возникновения чрезвычайных	УК-8.1: Обеспечивает безопасные и комфортные условия труда на рабочем месте, в т.ч. с помощью средств защиты.  УК-8.2: Выявляет и устраняет проблемы, связанные с нарушениями техники безопасности на рабочем месте.	Реферат	Зачёт: Контрольные вопросы

числе при угрозе и возникновении чрезвычайных ситуаций и военных конфликтов	ситуаций (природного и техногенного происхождения) на рабочем месте, в т.ч. с помощью средств защиты. Принимает участие в спасательных и неотложных аварийно-восстановительных мероприятиях в случае возникновения чрезвычайных ситуаций.	УК-8.3: Осуществляет действия по предотвращению возникновения чрезвычайных ситуаций (природного и техногенного происхождения) на рабочем месте, в т.ч. с помощью средств защиты. Принимает участие в спасательных и неотложных аварийно-восстановительных мероприятиях в случае возникновения чрезвычайных ситуаций.		
ОПК-7: Способен организовывать работу и принимать профессиональные решения при неотложных состояниях, в условиях чрезвычайных ситуаций, эпидемий и в очагах массового поражения	ОПК-7.1: Знать принципы организации работы и принятия профессиональных решений при неотложных состояниях, в условиях чрезвычайных ситуаций, эпидемий и в очагах массового поражения ОПК-7.2: Уметь организовывать работу и принимать профессиональные решения при неотложных состояниях, в условиях чрезвычайных ситуаций, эпидемий и в очагах массового поражения ОПК-7.3: Владеть опытом организации работы и принятия профессиональных решений при неотложных состояниях, в условиях чрезвычайных ситуаций, эпидемий и в очагах массового поражения	ОПК-7.1: Знает принципы организации работы и принятия профессиональных решений при неотложных состояниях, в условиях чрезвычайных ситуаций, эпидемий и в очагах массового поражения  ОПК-7.2: Умеет организовывать работу и принимать профессиональные решения при неотложных состояниях, в условиях чрезвычайных ситуаций, эпидемий и в очагах массового поражения  ОПК-7.3: Владеет опытом организации работы и принятия профессиональных решений при неотложных состояниях, в условиях чрезвычайных ситуаций, эпидемий и в очагах массового поражения	Реферат	Зачёт: Контрольные вопросы

### 3. Структура и содержание дисциплины

#### 3.1 Трудоемкость дисциплины

	<b>очная</b>
<b>Общая трудоемкость, з.е.</b>	<b>2</b>
<b>Часов по учебному плану</b>	<b>72</b>
в том числе	

<b>аудиторные занятия (контактная работа):</b>	
- занятия лекционного типа	<b>32</b>
- занятия семинарского типа (практические занятия / лабораторные работы)	<b>32</b>
- КСР	<b>1</b>
<b>самостоятельная работа</b>	<b>7</b>
<b>Промежуточная аттестация</b>	<b>0</b> <b>Зачёт</b>

### 3.2. Содержание дисциплины

(структурированное по темам (разделам) с указанием отведенного на них количества академических часов и виды учебных занятий)

Наименование разделов и тем дисциплины	Всего (часы)	в том числе			
		Контактная работа (работа во взаимодействии с преподавателем), часы из них			Самостоятельная работа обучающегося, часы
		Занятия лекционного типа	Занятия семинарского типа (практические занятия/лабораторные работы), часы	Всего	
	о ф о	о ф о	о ф о	о ф о	о ф о
An introduction to security. Basic concepts, terms and definitions.	8.5	4	4	8	0.5
Man and the technosphere	8.5	4	4	8	0.5
Identification and impact of harmful and dangerous factors on humans and the environment	9	4	4	8	1
Protection of humans and the environment from harmful and dangerous factors of natural, anthropogenic and man-made origin	9	4	4	8	1
Providing comfortable conditions for human life and activity	9	4	4	8	1
Psychophysiological and ergonomic foundations of safety	9	4	4	8	1
Emergencies and protection methods in the context of their implementation	9	4	4	8	1
Life safety management	9	4	4	8	1
Аттестация	0				
КСР	1			1	
Итого	72	32	32	65	7

### Contents of sections and topics of the discipline

Section 1. An introduction to security. Basic concepts, terms and definitions.

The purpose, content, object and subject of study, tasks, methodological basis and means of cognition of life safety. The axioms of the theory of BDZ. The main stages of scientific and technical activity in the Belarusian Railways are: identification of sources and types of hazards; identification of dangerous zones of human living space; improvement of sources of hazards at the request of expertise; application of means and protective measures; monitoring of hazards and the condition of human residence zones.

Danger. The energetic nature of the dangers. Classification of hazards. Potential, real and realized hazards (accident, emergency, accident, catastrophe, emergency).

Characteristic systems of "human-habitat". The systems "man-technosphere", "technosphere-nature", "man-nature". The concept of the technosphere. Industrial, urban, household, natural environments and their brief characteristics. Human interaction with the environment.

The concept of "security". Security systems and their structure. Environmental, industrial, and industrial safety. Transport and fire safety. A brief description of the types of security systems.

The reasons for the manifestation of danger. Man as a source of danger. The role of the human factor in the causes of the dangers. The basic axioms and principles of life safety. The axiom of the riskiness of human activity, the axiom of the potential danger of the human environment (the axiom of the absence of zero risks), the principle of anthropocentrism in ensuring safety.

Objects of protection. The concept of "security of the object of protection". The causal field of negative effects on humans. Noxosphere, homosphere. Concepts of the dangers of the first, second and subsequent circles, their composition. Life safety systems.

Indicators of the negativity of the production environment: the injury frequency coefficient, the injury severity index and the fatal injury index.

Harm, damage, risk – types and characteristics. Harm, damage – environmental, economic, social. Risk is a measurement of risk, a type of risk. Environmental, professional, individual, collective, social, acceptable, motivated, unmotivated risks. Current levels of risk of dangerous events. Risk as a criterion for the probability of occurrence of dangerous effects on humans. The risk scale. Factors influencing the subjective perception of risk.

The concept of risk is a new approach in the state policy of life safety. Social aspects of risk; perception of risks and society's reaction to them. An economic approach to security problems: a cost assessment of risk; an acceptable level of risk. The relationship between the level of security and the economic opportunities of society. The elements of the risk concept are risk assessment (analysis) and risk management. The main stages of the risk assessment process. Methodological approaches to determining the magnitude of risk, failure trees and events. The main purpose and stages of risk management.

## Section 2. Man and the technosphere.

The concept of the technosphere, patterns and indicators of its development. The structure of the technosphere and its main components. Types of technosphere zones: industrial, industrial, urban, residential, transport and household. The stages of formation of the technosphere and its evolution. The human-habitat system. Human interaction of industrial society with the biosphere, technosphere and social environment, anthropogenic modification of flows of matter, energy and information. The law on the unavoidability of waste and side effects of production.

V. Shelford's Law of Tolerance. Typical types of human interaction with the environment: comfortable, acceptable, dangerous and extremely dangerous. The levels of negative impacts and the duration of their action in dangerous and extremely dangerous situations. The distinctive features of these situations are in terms of levels, time and negative impact. Harmfulness and injury risk.

Types of dangerous and harmful factors of the technosphere for humans and the natural environment: ingredient, biological and energy pollution, degradation of the natural environment, informational and psychological effects. Types of dangerous and harmful factors of the technosphere: emissions and discharges of harmful chemical and biological substances into the atmosphere and hydrosphere, acoustic, electromagnetic and radioactive pollution, industrial and household solid waste, information and transport flows. Interaction and transformation of pollution in the environment. Natural negative factors and their causes. The role of changes in the abiotic properties of the biosphere (climate change, solar radiation, indicators of the aquatic environment, terrain, etc.). The importance of natural hazards leading to natural disasters.

Anthropogenic hazards, their causes, types and role in the formation of natural and man-made hazards. The concept of environmental pollution. The law on the inevitability of waste generation.

Atmospheric air pollution. Types of pollution. The contribution of economic sectors to atmospheric air pollution

in Russia. Secondary phenomena that lead to atmospheric air pollution: photochemical smog, acid precipitation, greenhouse effect, depletion of the ozone layer. The influence of pollution on the state of the atmosphere: greenhouse effect, destruction of the ozone layer, acid precipitation, smog.

Pollution of surface waters. Biological, chemical and physical pollution. Sources and dynamics of wastewater discharge, the condition of reservoirs.

Land pollution. Causes and extent of pollution. Waste disposal. Sedimentation (precipitation) of toxic substances from the atmosphere. Hazardous waste: pesticides and their metabolites, heavy metals, hydrocarbons.

Energy pollution of the technosphere. Radioactive contamination

The current state of the technosphere and technosphere security. Historical, managerial, technical and economic reasons for the formation of an unfavorable technosphere for human life and existence. The criteria and safety parameters of the technosphere are the average life expectancy, the level of occupational and environmentally related diseases.

The inevitability of the expansion of the technosphere. Modern principles of technosphere formation.

Architectural and planning zoning of the territory into residential, industrial and recreational park areas, transport hubs. The priority of safety and nature conservation issues in the formation of the technosphere. Long-term planning of the technosphere development, minimization of dangerous and harmful factors through integrated and environmental logistics of the life cycle of material flows in the technosphere. The concept of urban and technosphere logistics of the life cycle of products and services as a method of improving safety and creating a human-friendly environment. The culture of security of the individual and society as a factor of ensuring security in the technosphere.

Global environmental crises throughout the geological history of the Earth and in historical times. A system of ideas about the current global environmental crisis. Aspects of the ecological crisis: expropriation of energy, loss of biodiversity, disruption of the water cycle, eutrophication of water bodies, desertification, chemical deformation of the environment.

Environmental problems and economics. Scientific and technological progress. The ecological equivalent of industrial and agricultural technologies.

People, population and the environment. Man as one of the biological species. The Neolithic (agricultural) revolution and its consequences. Population growth during the Industrial Revolution. The dynamics of the World's population growth and its results at the present time. Life expectancy growth trends. The relationship of life expectancy with the value of the gross domestic product (GDP) of the state. Demographic expectations. The demographic situation in modern Russia: life expectancy, fertility, mortality rate and structure. Mortality from external unnatural causes, ways to reduce it: a healthy lifestyle, the role of personal and collective security measures.

Environmentally driven changes in public health. Medical and environmental monitoring. Natural geochemical anomalies as a cause of violations in the health status of the population. Technosphere zones with a high combination of negative factors: the environment of regions and large cities, the production environment. The concepts of "environmental emergency zone", "environmental disaster zone", "high environmental risk zone", health and life expectancy of people in these territories.

Security and sustainable development. Safety as one of the basic human needs. The importance of security in the modern world. Sustainable development of society in an emerging risk society. Safety culture as a factor of sustainable development.

Section 3. Identification and impact of harmful and dangerous factors on humans and the environment.

Classification of negative factors of the human environment: physical, chemical, biological, psychophysiological. The concept of a dangerous and harmful factor, typical examples. Features of the interaction of the human body with the environment. Structural and functional systems of perception and compensation by the human body of changes in environmental factors. Natural human protection systems from negative influences Analyzers. Mechanisms of quantitative and qualitative analysis of analyzer characteristics: skin analyzer - sense of touch, pain sensation, temperature sensitivity, muscle feeling; perception of taste, sense

of smell, hearing, vision Brief description of the nervous system. Conditional and unconditional reflexes. The time of a person's reaction to the action of stimuli. The permissible impact of harmful factors on humans and the environment. The concept of the maximum permissible level (maximum permissible concentration) of a harmful factor and the principles of its establishment. The approximate safe level of exposure.

Section 4. Protection of humans and the environment from harmful and dangerous factors of natural, anthropogenic and man-made origin.

Basic principles of protection.

The concept of hazardous areas and areas of activity, possible options for their mutual location. Principles of reducing hazards in areas of activity:

- improvement of sources of danger;
- increasing the distance to the source of danger;
- reduction of exposure time to hazards;
- the use of eco-protective equipment and protective systems;
- the use of personal protective equipment and protective devices.

Methods of implementing safety in areas of vital activity:

- protection from negative anthropogenic influence by techniques and means aimed at training, instructing, professional selection of employees, and preparing the population to act in dangerous and extremely dangerous situations;
- protection of areas of vital activity from natural negative influences by compliance with regulatory requirements for their comfortable or acceptable condition;
- normalization of the noxosphere by reducing the negative impact of hazard sources through qualitative and quantitative analysis of hazard sources, implementation of measures to improve the safety and environmental friendliness of sources;
- normalization of the noxosphere by the use of protection by distance and time, the use of eco-protective equipment and organizational measures;
- the use of personal protective equipment and protective devices.

Stages of preparation and implementation of protection against sources of hazards at economic facilities:

- study of the main indicators of the object;
- identification of the dangers of the economic object. Determination of the nomenclature and mass of waste (emissions, discharges and waste products) generated by the technical system. Determination of the size of the zones of harmful effects of waste and energy emitted by the system in the habitat, a quantitative description of the level of hazards in these zones. Analysis of the negative impact of waste and energy impacts on residential areas near economic facilities during the implementation of technological processes;
- identification of the accident rate of technical systems; qualitative and quantitative methods; failure rate; risk fields near a dangerous object;
- implementation of measures to improve the safety and environmental friendliness of hazard sources;
- conducting environmental impact assessments and employee impact assessments;
- development and implementation of hazard monitoring systems at the facility and in residential areas.

Protection against chemical and biological negative factors. General tasks and methods of protection: rational placement of the source in relation to the object of protection, localization of the source, removal of harmful substances from the protective zone, the use of individual and collective cleaning and protection means.

Protection against air pollution. Ventilation: ventilation systems and their classification; natural and mechanical ventilation; general and local ventilation, supply and exhaust ventilation, their main types and examples of implementation. Requirements for the ventilation device.

Cleaning of harmful substances from the atmosphere and air of the work area. The main methods, technologies and means of cleaning from dust and harmful gases. The essence of the work of the main types of dust collectors and gas collectors. Personal respiratory protection equipment.

Protection against pollution of the aquatic environment. The main methods, technologies and means of water purification from soluble and insoluble harmful substances. The essence of mechanical, physico-chemical and

biological methods of water purification.

Dispersion and dilution of harmful emissions and discharges. The concept of maximum permissible and temporarily agreed emissions and discharges. The essence of dispersion and dilution.

Methods of ensuring the quality of drinking water and water treatment. Requirements for the quality of drinking water. Methods of purification and disinfection of drinking water. Chlorination, ozonation, ultraviolet and heat treatment. Sorption purification, desalination and desalination of drinking water. Advantages and disadvantages of the methods, application features. Collective and individual methods and means of drinking water preparation. Modular water treatment systems, individual drinking water purification devices.

Methods of utilization and processing of anthropogenic and man-made waste. Waste classification: household, industrial, agricultural, radioactive, biological, toxic – toxicity classes. Waste collection and sorting. Modern methods of waste disposal and disposal. Waste as secondary material resources. Methods of waste recycling and regeneration. Examples of waste recycling as a method of preserving natural resources.

Protection from energy influences and physical fields. The basic principles of protection from physical fields are: reducing the radiation level of the source, removing the object of protection from the radiation source, shielding radiation – absorption and reflection of energy.

Vibration protection: Vibration rationing, vibration sickness. Sources of vibration effects in the technosphere are their main characteristics and vibration levels. The main methods of protection and the principle of vibration reduction. Individual vibration protection equipment. Vibration level control.

Protection against noise, infra- and ultrasound. Characteristics of noise sources. The main methods of protection are: reduction of the sound power of the noise source, rational placement of the noise source and the object of protection relative to each other, distance protection, acoustic treatment of the room, sound insulation, sound absorption, shielding and the use of noise mufflers. The principle of noise reduction in each of the methods and the scope of their use. Features of protection against infra- and ultrasound. Personal protective equipment.

Control of the sound intensity level.

Protection against electromagnetic radiation, static electric and magnetic fields. General principles of protection against electromagnetic fields. Organizational and engineering measures to protect against fields and radiation.

Radiation shielding - electromagnetic shielding, electrostatic shielding, magnetostatic shielding. The effectiveness of shielding. Features of protection against industrial frequency radiation. The concept of radio forecasting on the ground, the features of the placement of radio frequency radiation sources. Personal protective equipment. Control of radiation levels and field strengths of various frequency ranges.

Protection from laser radiation. General principles of protection against laser radiation. Sources of laser radiation in the technosphere. The use of laser radiation in cultural and entertainment events, information and medical technologies. Safety requirements for lasers and laser installations. Classification of lasers according to the degree of danger. Requirements for premises and organization of workplaces. Control of laser radiation.

Protection against infrared (thermal) radiation. Thermal insulation, shielding – types of heat shields.

Protection against ionizing radiation. Protection from ionizing radiation and radioactive waste management. The basic principles of radiation safety are justification, optimization, and rationing. Classification of radiation objects by potential hazard. Working with radiation sources: protective measures, requirements for premises and equipment. Radiation monitoring. Systems and devices. Measured parameters, control levels. Sanitary and preventive measures

Methods and means of ensuring electrical safety. The use of low voltages, electrical separation of networks, electrical insulation, protection against touching live parts, protective grounding (requirements for grounding), zeroing, protective shutdown devices. Principles of operation of protective devices – advantages, disadvantages, typical applications, features of operation in relation to various types of electrical networks. Personal protective equipment against electric shock. Monitoring of power grid parameters – voltage, current, phase isolation, phase detection.

Protection against static electricity. Methods that exclude or reduce the formation of static charges; methods that eliminate forming charges. Lightning protection of buildings and structures – types of lightning rods, lightning protection device and requirements for its implementation.

Protection against mechanical injury. Protection against mechanical injury. Sources of mechanical injury.



Organizational, technical means and methods of protection against mechanical injury. Protective devices, safety and blocking devices, emergency shutdown devices, restrictive devices, braking devices, monitoring and alarm devices, remote control. Safety rules when working with a hand tool. Safety signs Safety features of lifting equipment and vehicles.

Ensuring the safety of pressurized systems. Safety devices and systems, marking and painting of vessels and cylinders, registration and technical inspection of pressure systems.

Analysis and assessment of man-made and natural risks. The subject, basic concepts and apparatus of risk analysis. Risk as the probability and frequency of the realization of danger, risk as the probability of material, environmental and social damage. Qualitative analysis and risk assessment is a preliminary risk analysis, the concept of failure trees, events, causes and consequences. Quantitative analysis and risk assessment are the general principles of numerical risk assessment. Methods of using expert assessments in risk analysis and assessment. The concept of a danger zone and the methodology of its definition.

Safety signs: prohibiting, warning, prescriptive, indicative, fire safety, evacuation, medical and sanitary purposes.

## Section 5. Providing comfortable conditions for human life and activity.

The concept of comfortable or optimal conditions. The relationship between the state of health, working capacity and labor productivity with the state of human living and working conditions, parameters of the human environment. The main methods that improve a person's well-being and performance: not exceeding the permissible levels of negative factors and reducing them to the lowest possible levels, rationalization of work and rest, convenience of the workplace and work area, a good psychological climate in the workforce, climatic conditions in the zone of vital activity, optimal illumination and a comfortable lighting environment.

Indoor microclimate. The mechanism of heat exchange between humans and the environment. Climatic parameters affecting heat transfer. The relationship of climatic conditions with human health and performance. Thermoregulation of the human body. Hygienic regulation of microclimate parameters. Methods of ensuring comfortable indoor climatic conditions: heating, ventilation and air conditioning systems, the device, the choice of systems and their performance; means for creating an optimal aeroion composition of the air environment. Control of indoor microclimate parameters.

Lighting and lighting environment in the room. The influence of the state of the light environment of the room on the well-being and efficiency of a person. Characteristics of lighting and light environment. Factors determining visual and psychological comfort. Types, systems and types of lighting. Rationing of artificial and natural lighting. Artificial light sources: types of light sources and main characteristics, advantages and disadvantages, application features. Features of the use of gas-discharge energy-saving light sources. Lamps: purpose, types, application features. Color environment: the influence of the color environment on performance, fatigue, features of the formation of a color interior for performing various types of work and recreation. The basic principles of workplace organization to create comfortable visual conditions and preserve vision. Selection and calculation of the main parameters of natural, artificial and combined lighting. Control of lighting parameters. Emergency, evacuation, duty, security lighting. Assessment of the effectiveness and quality of workplace lighting.

## Section 6. Psychophysiological and ergonomic fundamentals of safety.

Mental processes, properties and conditions affecting safety. Mental processes: memory, attention, perception, thinking, feelings, emotions, mood, will, motivation. Mental properties: character, temperament, psychological and sociogenic types of people. Mental states: long-term, temporary, periodic.

The mental processes underlying work activity. Motivation. Psychophysiological dangerous and harmful production factors (fatigue, monotony, inactivity, overstrain of analyzers, etc.), conditions of occurrence and prevention. Classification of working conditions. The severity and intensity of work. Load rationing. Methods for improving performance.

Excessive forms of mental stress. The effect of alcohol, narcotic and psychotropic drugs on safety. Human operator errors, the mechanism of their commission. The main psychological causes of mistakes and the

creation of dangerous situations. Features of group psychology. Professiogram. Engineering psychology. Psychodiagnostics, professional orientation and selection of specialists in the operator profile. Factors affecting the reliability of operators' actions. Safety analysis of ergonomic systems. Types and conditions of work. Types of work: physical and mental work, forms of physical and mental work, creative work. The human-machine system. Operator activity. Physical work: dynamic and static classification of working conditions according to the severity and intensity of the labor process. Classification of working conditions by factors of the production environment. Quantitative assessment of working conditions in production. Features of working in harmful working conditions. Ergonomic safety basics. Ergonomics as the science of the correct organization of human activity, the conformity of labor with the physiological and mental capabilities of a person, ensuring effective work that does not pose a threat to human health. The man-machine-environment system. Anthropometric, sensorimotor, energetic, biomechanical and psychophysiological compatibility of man and machine. Workplace organization: the choice of the position of the worker, the spatial layout and dimensional characteristics of the workplace, the relative position of the workplaces, the placement of technological and organizational equipment, the design and location of information display media. Technical aesthetics. Requirements for the organization of a computer user's workplace and office equipment.

Section 7. Emergency situations and methods of protection in the conditions of their implementation.

Emergency situations. Types and probability of emergency situations. Classification of emergency situations: man-made, natural, wartime. Lesions in emergency situations. The psychogenic effect of emergencies. The concept of a hazardous production facility, classification of hazardous facilities. Phases of development of emergency situations. Fundamentals of forecasting and prevention of emergency situations.

Fire and explosion. Classification of types of fires and their features. Basic information about the fire and explosion. The main causes and sources of fires and explosions. Fire hazards. Categorization of premises and buildings according to the degree of explosion and fire hazard. Gorenje buildings, reservoirs. Fireball: causes of occurrence, patterns of gorenje, damaging effect. Methods and means of protection. Spill fires: causes of occurrence, gorenje patterns, damaging effect. Methods and means of protection. The degree of damage to people, buildings and industrial facilities. Assessment of the fire situation. Fire protection. Passive and active methods of protection. Passive protection methods: zoning of the territory, fire breaks, fire walls, fire protection zones, fire ceilings, easily removable structures, fire barriers, smoke protection. Active protection methods: fire alarm, fire extinguishing methods. Extinguishing agents: water, foam, inert gases, powder formulations. Principles of fire extinguishing, features and applications. Fire extinguishing systems: stationary water installations (sprinkler, drencher), water extinguishing installations, gas extinguishing installations, powder extinguishing installations. Primary fire extinguishing agents, fire extinguishers, their main types and applications.

Emergencies caused by explosions. Classification of explosives. Damaging explosion factors. Features of the shock wave during the explosion of condensed explosives, gas-air and dust-air mixtures, vessels with non-reactive gas under pressure. The propagation of shock waves during ground, air and underground explosions. Methods and means of protection against shock waves. Safety of operation of high-pressure systems.

Forecasting the consequences and assessing the situation in the event of an explosion. Recommendations to the public on the prevention of fires and explosions, actions during these emergencies.

Radiation accidents. Their types, main hazards and sources of radiation hazard. Tasks, stages and methods of assessing the radiation situation. Zoning of territories in case of radiation contamination of the territory. The concept of radiation prediction. Determination of possible radiation doses and the permissible time spent by people in pollution zones. Permissible exposure levels in emergency situations. Dosimetric control. Radiation hazardous objects. Radiation accidents, their types, dynamics of development, main hazards. Typical radiation safety regimes. Methods and means of protection. The method of calculating the parameters of the radiation situation in radiation accidents. Modes of radiation protection of the population and industrial activity of the economic object. The basic norms of behavior of the population in case of radiation accidents and radioactive contamination of the area.

Accidents at chemically hazardous facilities. Classification of chemically hazardous objects (CSOs) and chemical emergencies. Hazard groups and classes, the main chemically hazardous objects. General measures for the prevention of accidents at the HOO. A chemically hazardous environment. The main methods of storage and transportation of chemically hazardous substances (HOV). Areas of chemical contamination. Chemical control and chemical protection. The main ways to protect personnel, the public and territories from chemically hazardous substances.

Forecasting and assessment of the consequences of chemical accidents. Methods for calculating the spread of contaminated air during an emergency release of HOV. Solving typical tasks for assessing and predicting the situation in a chemical accident. The basic norms of behavior of the population in case of accidents with the emission of HOV. Methods and means of protection.

Hydraulic engineering accidents. The main hazards and sources of hydraulic engineering and hydrodynamic accidents.

Wartime emergencies. Socio-political conflicts with the use of weapons as a source of emergency. General characteristics of weapons of mass destruction, their features and consequences of use.

Nuclear weapon. Damaging factors of ground, underground, and aerial nuclear explosions. The center of nuclear destruction, zones of destruction and radiation contamination. Exposure to radiation and electromagnetic pulse. Methods and means of protection.

Chemical weapons. Classification and toxicological characteristics of chemical weapons. Zones and lesions. Methods and means of protection.

Biological weapons. Classification and biomedical characteristics of biological weapons. Methods and means of protection.

New types of weapons, methods and means of protection.

Natural disasters. General characteristics and classification of natural hazards.

Geological emergencies. Earthquakes. Classification of earthquakes, scales for measuring the strength of earthquakes. Destruction of buildings and objects during earthquakes, the behavior of workers and the population in case of a geological emergency. Landslides and karst phenomena, mudflows, avalanches.

Natural (landscape) fires: classification, dangerous factors. Forest and steppe fires, burning of peat bogs; prevention and extinguishing. Gorenje The basic norms and rules of human behavior in landscape fires.

Hydrological emergencies. Hydrodynamic accidents, tsunamis, floods, floods, flooding. Safety and security measures. Destruction of buildings and facilities during floods and hydrological accidents. Human behavior during floods.

Meteorological and agrometeorological emergencies. Excessive rainfall, hail. Droughts and dry winds, heavy fog, icy phenomena. Hurricanes, storms, tornadoes, squalls: causes of occurrence classification, damaging effect. Human behavior during hurricanes, storms and tornadoes.

Mass diseases of people (epidemics, pandemics), animals (epizootics, panzootics), plants (epiphytotics, panphytotics), the spread of pests of forestry and agriculture. Prevention, safety and measures in the hearth: quarantine, observation.

Protection of the population in emergency situations.

Organization of public education in emergency situations. Training of the staff of civil defense organizations: methods of conducting and logistical support of classes. Organization and methodology of the exercises.

The basic principles of population protection are: timeliness, differentiated approach, complexity, alignment with economic and social development plans. Measures of anti-radiation, anti-chemical, antibacterial protection (PR, PH and PBZ) : content and main stages.

Organization of public notification, national economy facilities in emergency situations. Warning signals and actions of the population on them.

The use of collective protection means

Types of protective structures: shelters and anti-radiation shelters. SNiP requirements for space planning solutions and life support systems for shelters. Technological equipment and life support systems. The modes of operation of shelters. Maintenance and use of shelters in peacetime. The use of underground spaces of cities, subways and mine workings for shelters. Construction, equipment and features of the use of prefabricated

shelters.

Requirements for anti-radiation shelters. Planning and design solutions. Maintenance and use of anti-radiation shelters. The simplest shelters. Protection of the apartment (house) from the penetration of radioactive dust and dangerous aerosols.

Personal protective equipment (PPE)

Classification of personal protective equipment. Organization of providing the population and personnel of economic facilities with personal protective equipment. The need to use PPE under various working conditions. PPE for daily and short-term use. The need to use overalls and safety shoes. Protection of hands, skin, head, eyes and face, hearing organs.

Personal respiratory protection equipment (PPE OD). Purpose, selection of PPE OD during various technological processes. Types of PPE OD – filtering and insulating, their brief description.

Civilian gas masks: purpose, principle of protective action, equipment. Industrial gas masks and respirators: classification, device features, selection, application. Insulating gas masks, oxygen insulating gas masks, self-rescuers. Manufacture and application of the simplest respiratory protection products. Personal protective equipment for the skin. Standard (isolating, filtering) and simplest ones. Terms of use.

Medical personal protective equipment. Individual dressing package, individual anti-chemical package.

Individual and collective first aid kits, their configuration and application. Features of the organization of child protection. Means of protection for short-term use.

Conducting evacuation operations. Principles and possible scales of evacuation. Preparation of the population and the evacuation procedure. Emergency evacuation. Scheduled eviction.

Sustainability of the functioning of economic facilities in emergency situations.

The concept of stability of functioning. The stability of the functioning of economic facilities in emergencies of peacetime and wartime. Assessment of the readiness of the economic facility for a rapid recovery of production. Factors affecting the stability of the functioning of facilities. Principles and ways to increase the stability of the functioning of an economic facility in an emergency. Ways to increase the security of personnel. Measures to improve the stability of the engineering and technical complex and the facility management system.

Requirements of civil defense standards for industrial and civil facilities.

Extreme situations. Types of extreme situations. Terrorism, the nature and features of terrorist actions. Measures to combat terrorism. Assessment of an extreme situation, rules of conduct and personal safety. Forms of reaction to an extreme situation. Psychological stability in extreme situations.

Rescue operations in emergency situations. Elimination of the consequences of an emergency. Special treatment of territories, structures, technical facilities and sanitary treatment of people. The essence and content of special processing. Types of disinfection (decontamination, degassing, disinfection). Substances and solutions used for disinfection; features of decontamination in case of accidents at nuclear power plants. Sanitary treatment, purpose, types and methods of treatment, its organization and conduct. Safety measures during disinfection.

Fundamentals of the organization and conduct of emergency rescue and other emergency operations (ASDNR) in case of emergency. Objectives, composition, purpose, organization of the event, the forces involved in conducting the ASDNR, the methods of their implementation. A list of rescue and emergency operations.

Fundamentals of ASDNR management. Features of the ASDNR under the action of various damaging factors of peacetime and wartime.

Exploration and assessment of the situation at the production facility (in the locality) as a result of an emergency. Methodology for assessing the engineering situation, determining the composition of forces and means to eliminate the consequences of an emergency.

Fundamentals of disaster medicine. Principles and methods of first aid in an extreme situation and the focus of an emergency. The basics of basic resuscitation actions in the development of terminal conditions. First aid for injuries, wounds, and shock conditions. The basics of desmurgy.

## Section 8. Life safety management.

Legislative and regulatory legal bases of life safety management. The concepts of national security and demographic policy of the Russian Federation are the main provisions. General characteristics of the system of

legislative and regulatory legal acts regulating environmental, industrial, industrial safety and safety in emergency situations. Characteristics of the main legislative and regulatory acts: purpose, objects of regulation and main provisions. Safety requirements in technical regulations. Issues of life safety in laws and regulations. Legislation on environmental protection. The Environmental doctrine of the Russian Federation. Regulatory and technical documentation on environmental protection. The Federal Law "On Environmental Protection", "On sanitary and epidemiological welfare of the population", "On production and consumption waste". Regulatory legal acts on environmental protection. The Water and Land Codes of the Russian Federation. The system of standards "Nature Protection". International legal framework for environmental protection.

The system of standards "Nature Protection" (OP) is the structure and basic standards. Environmental legislation. Federal laws "On Environmental protection".

Labor protection legislation. The Labor Code is the main provisions of the X section of the Code concerning labor protection issues. Legislative acts of decision-making bodies.

By-laws on labor protection.

The Occupational Safety Standards System (OSS) is the structure and basic standards. Occupational safety standards of enterprises. Rules and instructions on labor protection.

Legislation on safety in emergency situations. The Law of the Russian Federation "On the Protection of the Population and Territories from natural and Man-made emergencies". The structure of the legislative base is the basic laws and their essence: the Federal Laws of the Russian Federation "On Fire Safety", "Technical Regulations on fire safety requirements", "On Industrial safety of hazardous production facilities", "On radiation safety of the population".

Systems of standards for safety in emergency situations (BCHs) - structure and basic standards. Public administration in emergency situations. Unified State Emergency prevention and response system: tasks, structure, forces and means.

Civil Defense (GO): tasks, structure, management bodies. The forces and means of GO. The structure of the GO at the object of the economy.

Protection of the population in emergency situations abroad. International cooperation.

The economic foundations of security management. Modern market methods of economic security management and the basic principles of regulation of various aspects of security: positive and negative methods of stimulating security.

The concept of economic damage, its components and methodological approaches to assessment. Financial liability for violation of safety requirements: accidents, accidents, environmental pollution.

The economics of environmental management. The concept of ecological and economic damage, its main components. Administrative, legal and economic methods of environmental management. International ISO standards. Environmental impact assessment, environmental assessment of projects, licensing of environmental management, environmental certification, declaration of safety of hazardous industrial facilities, environmental audit. Environmental funds. State control bodies, departmental and public control over environmental protection. Payment for emissions into the atmosphere, for discharges into surface and underground water bodies, for the disposal of waste (waste). The principles of "polluter pays" and "nature user pays", practical methods of their implementation. Ecological and economic damage – methods and problems of its assessment and calculation. The concepts of direct and indirect environmental and economic damages. Ecological externalities and their main types. Fines for environmental pollution. The essence of the "pollution trade" – features, advantages and disadvantages, examples of implementation, trading in quotas for greenhouse gas emissions.

The economics of occupational safety. Socio-economic importance of labor protection, financing of labor protection. Economic losses from occupational injuries, occupational diseases and unfavorable working conditions are the main components of the damage. The economic effect of measures to improve working conditions and occupational safety.

The economics of emergencies. Ecological, economic and socio-economic components of damage from emergency situations. Cost-effectiveness of preventive measures to prevent emergencies.

Risk insurance: environmental insurance, insurance of hazardous production facilities, insurance of occupational

risks. The basic concepts, functions, tasks and principles of risk insurance. Compensatory, preventive and investment economic functions of liability insurance. Environmental insurance – problems and insurance risks. Liability insurance of enterprises that are sources of increased danger. Insurance against accidents and occupational diseases. Federal Law "On Compulsory Social Insurance against industrial Accidents and occupational diseases".

State security management: security management, supervision and control bodies, their main functions, rights and obligations, structure. Ministries, agencies and services – their main functions, duties, rights and responsibilities in the field of various aspects of security. Management of environmental, industrial and industrial safety in regions, residential areas, enterprises and organizations.

Security supervision – the main supervisory authorities, their functions and rights. Crisis management in emergency situations – the Russian emergency management system – the emergency response system, the civil defense system – the essence of the structure, tasks and functions.

Organization of monitoring, diagnostics and control of the environment, industrial safety, working conditions and safety. State environmental expertise and assessment of the state of the environment, declaration of industrial safety, state examination of working conditions, certification of workplaces – the concept, tasks, main functions, essence, brief description of the procedure. Investigation and accounting of industrial accidents. The procedure for investigating the causes of accidents and incidents at hazardous production facilities.

Security audit and certification. Environmental audit and environmental certification, certification of production facilities for compliance with labor protection requirements – the essence and objectives.

Fundamentals of management in the field of environmental safety, working conditions and employee health: the main tasks, principles and essence of management. Safety policy, parameter monitoring and measurement, adjustment and continuous improvement.

The form of final control of students' knowledge in the discipline is a test, during which the level of theoretical knowledge and skills in solving practical problems are assessed.

#### **4. Учебно-методическое обеспечение самостоятельной работы обучающихся**

Самостоятельная работа обучающихся включает в себя подготовку к контрольным вопросам и заданиям для текущего контроля и промежуточной аттестации по итогам освоения дисциплины приведенным в п. 5.

Хван Т. А., Хван П. А. - Безопасность жизнедеятельности: учеб. пособие. - Ростов н/Д: Феникс, 2014. (60 экземпляров в библиотеке ННГУ). Режим доступа: <http://www.studentlibrary.ru/book/ISBN9785222222379.html>

#### **5. Assessment tools for ongoing monitoring of learning progress and interim certification in the discipline (module)**

##### **5.1 Model assignments required for assessment of learning outcomes during the ongoing monitoring of learning progress with the criteria for their assessment:**

##### **5.1.1 Model assignments (assessment tool - Abstract) to assess the development of the competency УК-1:**

1. Current levels of risk of dangerous events. Risk as a criterion for the probability of occurrence of dangerous effects on humans.
2. Security as one of the basic human needs. The importance of security in the modern world.
3. Protection against the danger of electric shock.

4. Safety of the population and territories in emergency situations.
5. Chemically hazardous facilities and ensuring their safety.
6. Classification of harmful substances and their effects on the body.
7. Ionizing radiation and its effects on the body.
8. The effects of electromagnetic fields and laser radiation on the body
9. Legal foundations of environmental safety.
10. Occupational safety management at enterprises.

**5.1.2 Model assignments (assessment tool - Abstract) to assess the development of the competency YK-8:**

Protection against static electricity discharges. Lightning protection.

2. Ensuring fire and explosion safety.
3. Methods of implementing safety in areas of vital activity.
4. Protection from chemical and biological negative factors.
5. Protection from air pollution.
6. Protection against pollution of the aquatic environment.
7. Radiation accidents, their types, methods and means of protection.
8. Global problems of waste disposal.
9. Waste management in the city and region. Problems and prospects.
10. Environmental assessment as a safety tool.

**5.1.3 Model assignments (assessment tool - Abstract) to assess the development of the competency OIK-7:**

1. Analysis and assessment of man-made and natural risks.
2. Classification of emergency situations: man-made, natural, wartime.
3. Fire protection
4. Methods and means of protection in case of radiation accidents.
5. The main ways to protect personnel, the public and territories from chemically hazardous substances
6. Wartime emergencies. Methods and means of protection.

7. Natural disasters. Means of individual and collective protection.
8. Types of extreme situations. Rescue operations in emergency situations.
9. Principles and methods of first aid in an extreme situation and the focus of an emergency.
10. The main provisions of the risk theory.

#### Assessment criteria (assessment tool — Abstract)

Grade	Assessment criteria
pass	The level of knowledge in the volume corresponding to the training program. Several gross mistakes were made.
fail	The level of knowledge is below the minimum requirements. There were gross mistakes.

#### 5.2. Description of scales for assessing learning outcomes in the discipline during interim certification

##### Шкала оценивания сформированности компетенций

Уровень сформированности компетенций (индикатора достижения компетенций)	плохо	неудовлетворительно	удовлетворительно	хорошо	очень хорошо	отлично	превосходно
	не зачтено			зачтено			
<u>Знания</u>	Отсутствие знаний теоретического материала. Невозможность оценить полноту знаний вследствие отказа обучающегося от ответа	Уровень знаний ниже минимальных требований. Имели место грубые ошибки	Минимально допустимый уровень знаний. Допущено много негрубых ошибок	Уровень знаний в объеме, соответствующем программе подготовки. Допущено несколько негрубых ошибок	Уровень знаний в объеме, соответствующем программе подготовки. Допущено несколько несущественных ошибок	Уровень знаний в объеме, соответствующем программе подготовки. Ошибок нет.	Уровень знаний в объеме, превышающем программу подготовки.
<u>Умения</u>	Отсутствие минимальных умений. Невозможность оценить наличие умений вследствие отказа обучающегося от ответа	При решении стандартных задач не продемонстрированы основные умения. Имели место грубые ошибки	Продemonстрированы основные умения. Решены типовые задачи с негрубыми ошибками. Выполнены все задания, но не в полном	Продemonстрированы все основные умения. Решены все основные задачи с негрубыми ошибками. Выполнены все задания в полном объеме, но	Продemonстрированы все основные умения. Решены все основные задачи. Выполнены все задания в полном объеме, но некоторые с	Продemonстрированы все основные умения. Решены все основные задачи с отдельными несущественными недочетами	Продemonстрированы все основные умения. Решены все основные задачи. Выполнены все задания, в полном объеме без недочетов



			объеме	некоторые с недочетами	недочетами	и, выполнены все задания в полном объеме	
<u>Навыки</u>	Отсутствие базовых навыков. Невозможность оценить наличие навыков вследствие отказа обучающегося от ответа	При решении стандартных задач не продемонстрированы базовые навыки. Имели место грубые ошибки	Имеется минимальный набор навыков для решения стандартных задач с некоторым и недочетами	Продемонстрированы базовые навыки при решении стандартных задач с некоторым и недочетами	Продемонстрированы базовые навыки при решении стандартных задач без ошибок и недочетов	Продемонстрированы навыки при решении нестандартных задач без ошибок и недочетов	Продемонстрирован творческий подход к решению нестандартных задач

### Scale of assessment for interim certification

Grade		Assessment criteria
pass	outstanding	All the competencies (parts of competencies) to be developed within the discipline have been developed at a level no lower than "outstanding", the knowledge and skills for the relevant competencies have been demonstrated at a level higher than the one set out in the programme.
	excellent	All the competencies (parts of competencies) to be developed within the discipline have been developed at a level no lower than "excellent",
	very good	All the competencies (parts of competencies) to be developed within the discipline have been developed at a level no lower than "very good",
	good	All the competencies (parts of competencies) to be developed within the discipline have been developed at a level no lower than "good",
	satisfactory	All the competencies (parts of competencies) to be developed within the discipline have been developed at a level no lower than "satisfactory", with at least one competency developed at the "satisfactory" level.
fail	unsatisfactory	At least one competency has been developed at the "unsatisfactory" level.
	poor	At least one competency has been developed at the "poor" level.

### 5.3 Model control assignments or other materials required to assess learning outcomes during the interim certification with the criteria for their assessment:

#### 5.3.1 Model assignments (assessment tool - Control questions) to assess the development of the competency УК-1

1. The concept of danger. Classification of hazards. Potential, real and realized dangers.
2. The causal field of negative effects on humans. Noxosphere, homosphere. Life safety systems.
3. Risk as a criterion for the probability of occurrence of dangerous effects on humans. The concept of acceptable and unacceptable risk. Individual and social risk. The risk scale.

4. The concept of risk is a new approach in the state policy of life safety. Social aspects of risk; perception of risks and society's reaction to them.
5. The relationship between the level of security and the economic opportunities of society. An economic approach to security problems: a cost assessment of risk; an acceptable level of risk.
6. Elements of the risk concept – risk assessment (analysis) and risk management. The main stages of the risk assessment process. The main purpose and stages of risk management.
7. Biosphere: basic principles of the device, flows of matter, energy and information, stages of development. Physical and biogeochemical cycles.
8. The concept of the technosphere, patterns and indicators of its development. The human–habitat system. Human interaction with the biosphere, technosphere and social environment.
9. V. Shelford's Law of Tolerance. Types of human interaction with the environment: comfortable, acceptable, dangerous and extremely dangerous.
10. Types of natural negative factors and their causes. The levels of negative impacts and the duration of their action in dangerous and emergency situations. Harmfulness and injury risk.

### **5.3.2 Model assignments (assessment tool - Control questions) to assess the development of the competency YK-8**

11. Systems of human perception of the state of the external environment.
12. Exposure to harmful substances and their rationing.
13. The effects of vibration and acoustic vibrations, their normalization.
14. Exposure to electromagnetic fields and radiation, their rationing.
15. Exposure to ionizing radiation, their rationing.
16. The effect of electric current and its regulation.
17. The combined effect of harmful factors.
18. Explosion protection of technological equipment.
19. Protection against mechanical injury.
20. Automatic control and alarm systems.
21. Electrical safety and protection against static electricity.
22. Means of protection of the atmosphere.
23. Means of protection of the hydrosphere.
24. Protection from energy influences (vibration, noise).

25. Protection from energy influences (electromagnetic fields, ionizing radiation).

### **5.3.3 Model assignments (assessment tool - Control questions) to assess the development of the competency ОПК-7**

26. Personal protective equipment.

27. Protection from emergencies (sustainability, forecasting).

28. Emergency response.

29. The legal basis of life safety.

30. Organizational bases of labor protection and environmental protection management.

31. Environmental expertise.

32. International cooperation.

### **Assessment criteria (assessment tool — Control questions)**

Grade	Assessment criteria
pass	The level of knowledge in the volume corresponding to the training program. Several gross mistakes were made.
fail	The level of knowledge is below the minimum requirements. There were gross mistakes.

## **6. Учебно-методическое и информационное обеспечение дисциплины (модуля)**

Основная литература:

1. Безопасность жизнедеятельности. Ч. 1. Безопасность жизнедеятельности. Часть 1 / Быстров Е. Н., Тихомиров О. И., Терехова И. Р., Харитonenко А. Л. - Санкт-Петербург : ПГУПС, 2022. - 48 с. - Книга из коллекции ПГУПС - Инженерно-технические науки. - ISBN 978-5-7641-1704-1., <https://e-lib.unn.ru/MegaPro/UserEntry?Action=FindDocs&ids=884060&idb=0>.

Дополнительная литература:

1. Безопасность жизнедеятельности человека в окружающей среде : учебное пособие для обучающихся по дисциплине «безопасность жизнедеятельности» по специальности лечебное дело (спо). - Рязань : РязГМУ, 2022. - 244 с. - Библиогр.: доступна в карточке книги, на сайте ЭБС Лань. - Книга из коллекции РязГМУ - Медицина., <https://e-lib.unn.ru/MegaPro/UserEntry?Action=FindDocs&ids=876980&idb=0>.

Программное обеспечение и Интернет-ресурсы (в соответствии с содержанием дисциплины):

ЭБС «Юрайт». Режим доступа: <http://biblio-online.ru>.

ЭБС «Консультант студента». Режим доступа: <http://www.studentlibrary.ru>.

ЭБС «Лань». Режим доступа: <http://e.lanbook.com/>.

ЭБС «Znaniium.com». Режим доступа: [www.znaniium.com](http://www.znaniium.com).

## **7. Материально-техническое обеспечение дисциплины (модуля)**

Учебные аудитории для проведения учебных занятий, предусмотренных образовательной программой, оснащены мультимедийным оборудованием (проектор, экран), техническими средствами обучения.

Помещения для самостоятельной работы обучающихся оснащены компьютерной техникой с возможностью подключения к сети "Интернет" и обеспечены доступом в электронную информационно-образовательную среду.

Программа составлена в соответствии с требованиями ФГОС ВО по направлению подготовки/специальности 31.05.03 - Dentistry.

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Заведующий кафедрой: Тиунова Наталья Викторовна, доктор медицинских наук.

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