ЛД-21 ИН

FEDERAL STATE BUDGET EDUCATIONAL INSTITUTION OF HIGHER EDUCATION
"NORTH OSSETIAN STATE MEDICAL ACADEMY"
OF THE MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION

ДОКУМЕНТ ПОДПИСАН
ЭЛЕКТРОННОЙ
ПОДПИСЬЮ

Сертификат:
2D4EFF8215A48D63793F851FADB089F4
Владелец: Ремизов Олег Валерьевич
Действителен: с 23.05.2023 до 15.08.2024

APPROVED
Rector
O.V.Remizov
May 24, 2023

WORKING PROGRAM OF THE DISCIPLINE

CHEMISTRY

Specialty **31.05.01 General medicine (**Educational program, partially implemented in English**)**

Form of Education **Full-time**
(Full-time, part-time (evening), correspondence)

The Duration of mastering the basic professional educational program 6 years
(Standard Duration of training)

The Department of Chemistry and Physics

VLADIKAVKAZ, 2023

The basis of this working program are the following documents:

1. Federal State Educational Standard of Higher Education in the specialty 31.05.01 **General medicine** approved by the Ministry of Science and high Education of the Russian Federation of **August 12, 2020 № 988.**

2. Academic plan on specialty 31.05.03 Dentistry:
ЛД-21-01-21ИН, approved by the Scientific Council of the Federal State Budgetary Educational Institution of Higher Education «North-Ossetia State Medical Academy» of the Ministry of Healthcare of the Russian Federation from **"25" December 2020, Protocol № 3;**

ЛД-21-02-22ИН, approved by the Scientific Council of the Federal State Budgetary Educational Institution of Higher Education «North-Ossetia State Medical Academy» of the Ministry of Healthcare of the Russian Federation from **"30" March 2022, Protocol № 6;**
ЛД-21-03-23ИН, approved by the Scientific Council of the Federal State Budgetary Educational Institution of Higher Education «North-Ossetia State Medical Academy» of the Ministry of Healthcare of the Russian Federation from **"24" Mae 2023, Protocol № 8.**

The working program of the discipline was approved at the conference of the Department of Chemistry and Physics of «**22» May, 2023, protocol No. 9**.

The working program of the discipline was approved at the meeting of the Central Coordination Educational and Methodical Council in **«23» May, 2023, protocol No. 5**.

The working program of the discipline was approved by the Academic Council of the Federal State Budget Educational Institution of Higher Education "NORTH OSSETIAN STATE MEDICAL ACADEMY" of the Ministry of Health of the Russian Federation of **«24» May, 2023**, **protocol № 8.**

Developer:
Head of the Department of Chemistry and Physics
of the Federal State Budget Educational Institution
of Higher Education "NORTH OSSETIAN STATE
MEDICAL ACADEMY" of the Ministry of Health

of the Russian Federation R.V. Kalagova

Reviewers:

Associate Professor **L.M. Kubalova** (NORTH-OSSETIAN STATE UNIVERSITY)

Head of the Department of Biochemistry **A.E. Gurina** (NORTH-OSSETIAN STATE MEDICAL ACADEMY)

Contents of the work program

1. the name of the discipline;
2. list of planned results of training in the discipline, correlated with the planned results of the development of the educational program;
3. indication of the place of the discipline in the structure of the educational program;
4. the amount of discipline in credit units, indicating the number of academic or astronomical hours allocated to the contact work of students with the teacher (by types of training sessions) and to the independent work of students;
5. content of the discipline, structured according to topics (sections) indicating the number of academic or astronomical hours assigned to them and types of training sessions;
6. list of educational and methodological support for independent work of students on discipline;
7. evaluation materials for the interim certification of students in the discipline;
8. list of basic and additional educational literature necessary for mastering the discipline;
9. list of resources of the information and telecommunication network "Internet" (hereinafter referred to as the "Internet" network), necessary for mastering the discipline;
10. methodical instructions for students to learn the discipline;
11. list of information technologies used in the implementation of the educational process for discipline, including a list of software and information reference systems (if necessary);
12. a description of the material and technical base necessary for the implementation of the educational process for discipline;
13. conducting educational activities using e-learning and distance learning technologies.

1. **List of planned learning outcomes for the discipline and the results of mastering the educational program**

№	Name of the controlled section (topic) of the discipline / module	Comp e-tency numb er / index	Content of competence (or part thereof)	Competence achievement indicators	Learning outcomes for students		
					to know	be able to do	To possess
1	2	3	4	5	6	7	8
1.	**Fundamentals of General Chemistry:** Solutions and their physical and chemical properties. The main types of chemical reactions and processes in the functioning of living systems. Types of chemical equilibrium (protolytic, heterogeneous, red/ox, complexation). (protolytic, heterogeneous, red/ox, complexation).	UC -1 Univer sal compe tence	The ability to carry out a critical analysis of problem situations based on a systematic approach, to develop a strategy of action	Ind. 1 UC -1 Identify problematic situations and search for the necessary information to solve problems in the professional sphere	safety rules and work in chemical and physical laboratories with reagents and devices the main types of chemical equilibrium and vital processes: protolytic, heterogeneous, ligand-exchange, red/ox, in life processes; the main provisions of Werner's coordination theory, the role of metal biocomplexes in living organisms	calculate the results of the experiment write of reaction equations and expressions for the constants of equilibrium processes; explain the rules for the displacement of equilibrium; determine the degree of oxidation, the coordination of the complexing ion; write the equations of reactions of primary and secondary dissociation of complex compounds	independently work with educational, scientific and reference literature; to search for and draw general conclusions basic concepts and laws of equilibrium processes; the skills of a chemical experiment
	Buffer solutions.	UC -1	The ability to carry out a critical analysis	Ind. 1 UC -1 Identify	the definition and classification of buffer systems;	explain the mechanism of the action of buffer mixtures, be able to	the technique of preparation buffer solutions, the

			of problem situations based on a systematic approach, to develop a strategy of action	problematic situations and search for the necessary information to solve problems in the professional sphere	basic buffer systems of living organisms the definition and classification of buffer systems; basic buffer systems of living organisms	derive the Henderson- Hasselbach for type I and type II buffer mixtures explain the mechanism of the action of buffer mixtures, be able to derive the Henderson- Hasselbach for type I and type II buffer mixtures	technique of determining the buffer capacity the technique of preparation buffer solutions, the technique of determining the buffer capacity
2.	**Fundamentals of Physical Chemistry**: Basic concepts of chemical kinetics. Classification of reactions in kinetics.	UC -1	The ability to carry out a critical analysis of problem situations based on a systematic approach, to develop a strategy of action	Ind. 1 UC -1 Identify problematic situations and search for the necessary information to solve problems in the professional sphere	basic concepts of chemical kinetics; factors affecting the reaction rate; the reaction rate constant; law of the acting masses Rule of Van't Hoff; the Arrhenius equation; molecularity of the reaction; order of reaction	determine the rate constant of the reaction. To explain in which cases the order and molecular nature of the reaction do not coincide, Describe the kinetics of absorption processes, distribution of metabolites	basic concepts and laws of kinetics
	Basic concepts of thermodynamics. The first and second principles of thermodynamics	UC -1	The ability to carry out a critical analysis of problem situations based on a systematic approach, to	Ind. 1 UC -1 Identify problematic situations and search for the necessary	Basic laws of nature associated with chemical and biochemical processes Basic concepts and laws of thermodynamics	To analyze thermal processes Calculate the basic thermodynamic quantities	The fundamentals of abstract thinking and analysis Thermodynamic terms, concepts and laws

			develop a strategy of action	information to solve problems in the professional sphere			
3.	**Fundamentals of colloid chemistry:** Physical chemistry of surface phenomena. Adsorption.	UC -1	The ability to carry out a critical analysis of problem situations based on a systematic approach, to develop a strategy of action	Ind. 1 UC -1 Identify problematic situations and search for the necessary information to solve problems in the professional sphere	Determination of adsorption, surface tension. The Langmuir theory. Shilov's rule	Determine the surface tension and adsorption on the moving interface. Quantitatively measure adsorption from solutions on solid adsorbents. Determine the influence of the specific surface of the adsorbent, the nature of the adsorbent, adsorbent	Physical and chemical aspects of surface phenomena, terminology and basic law[r]s of surface processes
	Dispersed (colloidal) systems.	UC -1	The ability to carry out a critical analysis of problem situations based on a systematic approach, to develop a strategy of action	Ind. 1 UC -1 Identify problematic situations and search for the necessary information to solve problems in the professional sphere	Role of colloidal surfactants in the assimilation and transport of low-polar substances in the living body	Depict the structure of the micelle in excess of one of the reagents	The main methods of obtaining and purifying colloidal solutions

4.	**Organic chemistry: biologically active high-molecular substances (structure, properties, participation in the functioning of living systems)**	UC -1	The ability to carry out a critical analysis of problem situations based on a systematic approach, to develop a strategy of action	Ind. 1 UC -1 Identify problematic situations and search for the necessary information to solve problems in the professional sphere	Basic principles of the theory of the structure of organic compounds Butlerova Classification of organic compounds, nomenclature	Apply the basic laws of organic chemistry to biological systems Classify organic compounds taking into account the structure of the chain of carbon atoms and the functional groups present in the molecule	International terminology, nomenclature Modern nomenclature, the skills of writing isomeric structures of organic substances
	Classification of organic compounds and reactions. Conjugated and aromatic compounds.	UC -1	The ability to carry out a critical analysis of problem situations based on a systematic approach, to develop a strategy of action	Ind. 1 UC -1 Identify problematic situations and search for the necessary information to solve problems in the professional sphere	Chemical properties of the main classes of biologically important biologically active compounds, the role and classification of chemical processes affecting human physiology	Predict the possibility of the occurrence of reactions between molecules exhibiting acid-base properties	Methods of writing organic reactions, determining electronic effects
	Biologically active poly- and hetero-functional organic compounds. Biologically active	UC -1	The ability to carry out a critical analysis of problem situations based	Ind. 1 UC -1 Identify problematic situations and search for the	How the presence of different functional groups affects the change. Enantiomers. σ-Diastereomers.	Write reaction equations that confirm the properties of biologically important compounds.	Skills of practical experiment confirming the properties of poly- and hetero-functional compounds

	high-molecular substances carbohydrates		on a systematic approach, to develop a strategy of action	necessary information to solve problems in the professional sphere	Relative configuration. D- and L-Stereochemical series. Monosaccharides. Structure and stereoisomerism. Chemical properties of monosaccharides. Polysaccharides. The most important representatives of polysaccharides, their chemical properties.	Write a diagram of keto-enol tautomerism. Use knowledge to explain the biological functions of carbohydrates. Confirm the chemistry of biological processes with reaction equations. Write diagrams of conformational transformations and explain types of isomerism.	Physicochemical methods of studying the properties of organic substances

3.The place of discipline in the structure of the educational program

Discipline chemistry refers to the basic part of the Bloc 1 of the Federal State Educational Standard of Higher Education in the specialty **31.05.01 General Medicine**.

The purpose and objectives of the discipline.

The **purpose** of studying the discipline "Chemistry" is the formation of system knowledge and skills in students to perform calculations of the parameters of physical and chemical processes, when considering their physical and chemical nature and the mechanisms of interaction the substances occurring in the human body at the cellular and molecular levels, as well as when acting on Living organism of the environment.

The **tasks** of the discipline are:

- familiarize students with the principles of organization and operation of the chemical laboratory;
- familiarize students with health and safety measures in the chemical laboratory;
- the formation in students the ideas about physical and chemical aspects as the most important biochemical processes and various types of homeostasis in the body;
- studying the properties of substances of organic and inorganic nature by students; Properties of solutions, various types of equilibrium of chemical reactions and processes of vital activity; mechanisms of action of the body's buffer systems;
- studying the laws of the How of physical and chemical processes in living systems from the point of view of their competition, resulting from the combination of different types of equilibrium;
- formation of students' skills in studying scientific chemical literature;
- formation of students' skills to solve problem and situational problems;
- forming students practical skills in setting and performing experimental work.

4. Scope of discipline

№	Type of work		Total credit units (CU)	Total study hours	Semesters	
					1 **hours**	2 **hours**
1	2		3	4	5	6
1	**Contact work of students with Teacher (total), including:**		-	80	-	80
2	Lectures (L)		-	20	-	20
3	Clinical practical exercises (PE)		-	-	-	-
4	Seminars (S)		-	-	-	-
5	Laboratory works (LW)			60	-	60
6	**Independent work of students (IWoS)**		-	28	-	28
7	**Type of intermediate Attestation**	Credit (C)	-			Credit
8	**TOTAL:**	**hours**		108		108
		CU	3			3

5. Content of the discipline

п/п №	№ Semester	Title of the topic (section) of the discipline	Types of learning activities, (in hours)				Forms of ongoing monitoring of academic performance (for the week of the semester)
			L	**LW**	IWoS	**Tot. hours**	
1	2	3	4	5	6	7	8
1.	II	Fundamentals of General Chemistry: Solutions and their physical and chemical properties. The main types of chemical reactions and processes in the functioning of living systems. Types of chemical equilibrium (protolytic, heterogeneous,	6	26	1 2	44	TL, ML, SI. MSG. S, MW, LWP. T, CW. PrS

		red/ox, complexation). Basic concepts of chemical kinetics. Classification of reactions in kinetics. Buffer solutions.					
2.	II	Fundamentals of Physical Chemistry: Basic concepts of thermodynamics. The first and second principles of thermodynamics.	4	6	6	16	TL, ML, SI. MSG. S, MW, LWP. T, CW. PrS
3.	II	Organic chemistry: biologically active high-molecular substances (structure, properties, participation in the functioning of living systems) Classification of organic compounds and reactions. Conjugated and aromatic compounds. Biologically active poly- and hetero functional organic compounds. Biologically active high-molecular substances.	10	28	10	48	TL, ML, SI. MSG. S, MW, LWP. T, CW. PrS
		TOTAL:	**20**	**60**	**28**	**108**	

TL-traditional lecture;
ML-multimedia lecture;
SI-independent study of topics reflected in the program, but considered in the classroom;
MSG-method of small groups

Forms of monitoring
S-score based on interview results (oral survey);
HW-checking the performance of written homework assignments;
LWP-protection of laboratory works;
CW-control and independent work;
PrS-assessment of the development of practi-cal skills (skills).

6. List of educational and methodological support for independent work of students in discipline

№	**№** semester	Name of the teaching methodical development
1.	2	**Kalagova R.V., Skupnevskiy S.V**. Educational-methodical handbook "Chemistry" for implementation of laboratory works and external auditorial work for students of the 1-st course of specialty 31.05.01 General medicine. Part 1**.** / Vladikavkaz, 2023.
2.	2	**Kalagova R.V., Skupnevskiy S.V.** Educational-methodical handbook "Chemistry" for implementation of laboratory works and external auditorial work for students of the 1-st course of specialty 31.05.01 General medicine. Part 2**.** / Vladikavkaz, 2023.

7. **Evaluation materials for the interim certification of students in the discipline**

№/п	List of competences	**№** semester	Indicator assessments	Evaluation Criteria	Scale of assessment	Name **EM**
1	**2**	**3**	**4**	**5**	**6**	**7**
1.	UC-1	2	See standard for quality assessment of education, approved by order SBEE HPE NOSMA Ministry of Health of RF 10.07.2018г., №264/о	See standard for quality assessment of education, approved by order SBEE HPE NOSMA Ministry of Health of RF 10.07.2018г., №264/о	See standard for quality assessment of education, approved by order SBEE HPE NOSMA Ministry of Health of RF 10.07.2018г., №264/о	Standards of test tasks; Examination tickets on credit.

8. **The list of basic and additional educational literature necessary for mastering the discipline**

п/п №	**NAME**	**Author (S)**	**Year, place publications**	**Number of copies**	
				in library	**at the department**
1	**2**	**3**	**4**	**5**	**6**
Basic literature					
1.	Общая химия. Биофизическая химия. Химия биогенных элементов: учебник/ под ред.Ю.А.Ершова	Ершов Ю.А., Попков А.С. , Берлянд В.А. и др	М.: Высш.шк., 2005 г. 2007 г. 2009 г. М.: Юрайт, 2012г.	11 243 7 4	5 4 2 5
2.	Биоорганическая химия Биоорганическая химия	Тюкавкина Н.А., Бауков Ю.И. Тюкавкина Н.А., Бауков Ю.И., Зурабян С.Э.	М.: Дрофа, 2005 г. 2006 г. 2007 г. 2008 г. М.: ГЭОТАР-Медиа, 2009 г. 2010 г. 2012 .- 416.:ил.	22 17 8 27 104 3 4	2 4
3.	Биоорганическая химия: руководство к практическим занятиям: учеб.пособие	Под ред. Н.А.Тюкавкиной	М.: ГЭОТАР-Медиа, 2014 .- 168с.	http://www.studmedlib.ru/ru/book/ISBN9785970428214.html	

Additional literature					
1.	Educational-methodical handbook "Chemistry" for implementation of laboratory works and external auditorial work for students of the 1-st course of specialty31.05.01 General medicine. Part 1	Kalagova R.V., Skupnevskiy S.V.	Vladikavkaz, NOSMA , 2022		-
2.	Educational-methodical handbook "Chemistry" for implementation of laboratory works and external auditorial work for students of the 1-st course of specialty31.05.01 General medicine. Part 2	Kalagova R.V., Skupnevskiy S.V.	Vladikavkaz, NOSMA, 2022		-
3.	Общая химия. Учебник для фак. ВСО	Попков В.А., Пузаков С.А.	М.: ГЭОТАР Медиа, 2007 г.	7	
4.	Практикум по общей химии. Биофизическая химия. Химия биогенных элементов: учеб. пособие для студентов мед. спец. вузов/ под ред. Ю.А.Ершова	Ершов Ю.А., Попков А.С. , Берлянд В.А. и др.	М.: Высш.шк., 1993 г.	50	
5.	Общая химия	Попков В.А., Пузаков С.А.	М.: ГЭОТАР Медиа, 2010.- 976 с.:ил.	http://www.studmedlib.ru/ru/book/ISBN9785970415702.html	
6.	Физическая и коллоидная химия: учебник	Под ред.Беляев А.П.	М.: ГЭОТАР-Медиа, 2008 г. 2010 г. 2014.- 752 с.	5 30 1	2 1
7.	Методические материалы и указания для выполнения самостоятельной (внеаудиторной) работы по дисциплине «Химия» для студентов 1 курса лечебного факультета. Часть 1. Общая химия.	Калагова Р.В., Закаева Р.Ш., Плиева А.Г. и др.	Владикавказ, 2023 г.	-	10
8.	Методические материалы и указания для выполнения самостоятельной (внеаудиторной) работы по дисциплине «Химия» для студентов 1 курса лечебного факультета. Часть 2. Биоорганическая химия.	Калагова Р.В., Закаева Р.Ш., Плиева А.Г. и др.	Владикавказ, 2023 г.	-	10

СОГЛАСОВАНО
Зав. библиотекой

9. The list of resources of the information and telecommunication network "Internet", necessary for mastering the discipline

№№	Topic Title	Source
1.	Solutions and their physical and chemical properties. Osmosis.	https://chem.libretexts.org/Textbook_Maps/General_Chemistry Textbook Maps/Map%3A_Cheml (Lower)/ 08%3A Solution Chemistry/8.5%3A ColligativePr operties%3A_Osmotic Pressure
2.	Proton theory of acids and bases. Lewis' theory. Hydrolysis of salts.	https://chem.libretexts.org/Textbook_Maps/General_Chemistry Textbook Maps/Map%3A Cheml (Lower)/ 10._Acids_andBases/9.5%3A _Lewis Acids and_Bas es
3.	The main types of reactions occurring in the body. Basic concepts of Werner's coordination theory.	http://www.zstreamng.com/Courses/Details7courseCode=Cl 1M%20423%20
4.	Buffer solutions.	https://www.liverpool.ac.uk/buffers/Chl .pdf
5.	Physical chemistry of surface phenomena. Dispersed systems, their role in the functioning of living organisms.	A.J. Hickey and H.D.C. Smyth, Pharmaco-Complexity, Outlines in 5 Pharmaceutical Sciences 1, DOI 10.1007/978-1-4419- 7856-l_2
6.	Classification of organic compounds and reactions. Acidity and basicity of organic compounds.	https://chem.libretexts.org/Textbook_Maps/Organic__C hemistry Textbook Maps/Map%3A BasicPrinciples _of_Organic_Chemistry_(Roberts__and_Caserio)/02%3 A Structural Organic Chemistry . T h e Shapes of_Molccules_andFunctional Group/2.3%3 AClassification byFunctional Groups
7.	Biologically active poly- and hetero-functional organic compounds. a-Amino acids.	http://stgmu.ru/userfiles/depts/general_bioorg

		anic che mistry/specialitet/English/2_ semester/Chapter 11. PO LY- _AND_HETEROFUN CTIONAL_COMPOUNDS.d ocx
8.	Nucleic acids.	http://stgmu.ru/user files/depts/general_bioorg anic_che mistry/specialitet/English/2 semester/Chapter_ 1 E PO LY- _AND_FlETER0FUN CT10NAL_C0MP0UNDS.do cx
9.	Biologically active high- molecular substances, peptides and proteins.	http://global.oup.co m/us/companion.websites /fdsconten t/uscompanion/us/static/comp anion.websites/97801997 30841/McKee Chapters Sample.pdf
10.	Carbohydrates. Lipids	http://www.cuchd.i n/e- library/resource library/University%201nstitut es%20of %20Sciences/Fundamentals% 20of%20Biochemistry/C hap-14.pdf

- wikipedia.org
- http://www.mednik.com.ua
- ELS "Student Consultant" www.studmedlib.ru
- EBS "BookUP" books-up.ru
- MedExplorer, MedHunt, PubMed.
- http://elibrary.ru

10. Guidelines for students on the development of discipline

Training consists of contact work of students with teacher (80 hours), including a lecture course and practical classes, and independent work (28 hours). The main study time is allocated for practical work. During classes, students acquire the following practical skills: using thermodynamic terms, concepts and laws, international terminology, nomenclature, methods of writing organic reactions, methods of studying the properties of organic substances.

Work with educational literature is considered as a type of educational work on the discipline and is performed within the hours of independent work of students assigned to study it. Various types of educational work, including independent work of a student, contribute

to mastering the culture of thinking, the ability to formulate its results logically and correctly in written and oral speech; willingness to form a systematic approach to the analysis of medical information, the perception of innovation; form the ability and willingness to self-improvement, self-realization, personal and objective reflection. Each student is provided with access to library funds of the North Ossetian State Medical Academy and the Department of Chemistry and Physics . For each section of the discipline developed guidelines for students and guidelines for teachers. The department created the conditions for independent work of students.

Special attention at the department is paid to the organization of independent extracurricular work of students. Student work in a group creates a sense of collectivism and sociability. It is necessary to educate students, guided by the traditional principles of humanism and mercy, respectful and careful attitude to the object being studied; inculcate high moral standards of behavior in the sectional halls of a medical school. Educational activity of students at the department is assessed in the framework of the implemented point-rating system for assessing their knowledge and skills. It is conducted in accordance with the provision on the point-rating system for evaluating the educational activities of students of the North Ossetian State Medical Academy. The final certification is carried out at the end of the 2-nd semester of studies and includes three stages: pre-examination testing, assessment of practical skills, interview. The chemistry exam is conducted in the scope of this program. The list of information technologies used in the implementation of the educational process in the discipline Microsoft Office PowerPoint; Acrobat Reader; Internet Explorer 12.

11. List of information technologies used in the implementation of the educational process in discipline

1. Microsoft Office
2. Internet Explorer
3. Microsoft Power Point
4. TEST Pro
5. Microsoft excel
6. Adobe photoshop
7. Adobe Finereader
8. Adobe Acrobat

12. **Description of the material and technical base necessary for the implementation of the educational process in discipline**

Laboratory equipment			
№	**Name of equipment**	**Quantity**	**Technical condition**
1	Analytical scales	3	Satisfactory
2	Electronic scales	2	Satisfactory
3	polarimeter	1	Satisfactory
4	Photoelectrocolorimeter	1	Satisfactory
5	Spectrophotometer	1	Satisfactory

Technical means of instruction, computer technology			
№	**Name of equipment**	**quantity**	**Technical condition**
1	Set: PC, monitor, uninterruptible power supply, keyboard, mouse	4	Satisfactory
2	Notebook	2	Satisfactory
3	Projector "Vivitek"	1	satisfactory
4	Canon Laser Printer	2	satisfactory

13. Conducting educational activities using e-learning and distance learning technologies.

In the context of the introduction of restrictive measures (quarantine) associated with an unfavorable epidemiological situation, the threat of the spread of a new coronavirus infection and other force majeure events that do not allow full-time training, it is possible to study this discipline or part of it using e-learning and distance educational technologies. Teaching the discipline in the above situations will be carried out through the development of an electronic course with access to video lectures and interactive course materials: presentations, articles, additional materials, tests and various tasks. When conducting training sessions, monitoring progress, as well as intermediate certification of students, platforms of the electronic information and educational environment of the academy and / or other e-learning systems recommended for use in the academy, such as Moodle, Zoom, Webinar, etc., can be used. Lectures can be presented in the form of audio, video, "live lectures", etc. Conducting seminars and practical classes is possible on-line both in synchronous and asynchronous modes. Seminars can be held in the form of web conferences.