

KAZAKH NATIONAL WOMEN'S TEACHER TRAINING UNIVERSITY
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CATALOG OF ELECTIVE DISCIPLINES

Almaty 2024

**EDUCATIONAL PROGRAM:
6B01507-CHEMISTRY**

1. OPTIONAL COMPONENTS OF THE CYCLE OF GENERAL COURSES

Optional component 1

Course: Fundamentals of Legal Literacy and Anti-Corruption culture

Intensity of the Course: 5 academic credits

Module Code: **GES -1**

Module Name: General educational subjects module

Prerequisites: Basics Law (school cours)

Purpose: formation of a legally competent, law-abiding person who knows his rights and duties, intolerant of any manifestations of corruption.

Short Description: The course is aimed at the formation of a legally competent, law-abiding person who knows his rights and obligations, intolerant of any manifestations of corruption. Students will be able to operate with the social, legal and ethical norms of Kazakhstani society.

Learning Outcomes in EP (LOP):

LOP 1 - Applies a variety of communication formats taking into account socio-cultural diversity, adheres to the principles of equality and accessibility in education, to create a prosperous and inclusive environment, has leadership qualities and is able to apply them to develop collective potential

LOP 2 - Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

Learning Outcomes in Course (LOC):

LOC 1 - To know the importance and role of legal culture in the life of society, its relationship with the political culture of the individual and the main definitions of corruption;

LOC 2 - Analyze the main obstacles on the way to ensuring the inalienable human rights; the role of human rights in personal life and in the life of society;

LOC 3 - Apply the acquired knowledge in political analysis, in the activities of public authorities, political and public organizations, analyze problems related to corruption and countering it;

LOC 4 - Be able to engage in dialogue as a way of relating to legal culture and society.

Post requisites: no

Optional component 1

Course: Ecology and Sustainable Development

Intensity of the Course: 5 academic credits

Module Code: **GES -1**

Module Name: General educational subjects module

Prerequisites: Biology (school program)

Purpose: To develop students' environmental skills, address modern ecological issues, strengthen the relationship between society and nature, and enhance environmental awareness and responsibility for protecting the environment, thereby ensuring their formation as active and responsible citizens.

Short Description: The course aims to develop students' environmental skills, solve modern environmental problems, form ways to develop relationships between society and nature, increase students' awareness of the environment, and their responsibility for protecting it. As a result, students will learn how to maintain vital balance by analyzing environmental trends and identifying priority areas for conserving nature. They will also be able to identify the main directions of modern environmental policy and practical approaches to addressing environmental issues at the global, regional and local levels. In addition, students will gain knowledge of various tools for managing environmental quality that can be used to achieve sustainable development objectives.

Learning Outcomes in EP (LOP):

LOP 1 - Applies a variety of communication formats taking into account socio-cultural diversity, adheres to the principles of equality and accessibility in education, to create a prosperous and inclusive environment, has leadership qualities and is able to apply them to develop collective potential

LOP 2 - Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

LOP 3 - Demonstrate knowledge of and adherence to ethical and legal norms in research and use of digital technologies. Apply security measures when working with digital information and data protection, promote the active, safe and ethical use of digital resources.

Learning Outcomes in Course (LOC):

LOC 1 - Environmental Education and Skills: Students gain deep knowledge about environmental issues and principles of sustainable development, and acquire skills in environmental monitoring and data analysis.

LOC 2 - Environmental Responsibility and Activism: Students recognize their responsibility for protecting the environment and strive to actively participate in environmental initiatives, aiming to make changes in society.

LOC 3 - Understanding the Relationship between Society and Nature : Students comprehend the relationship between society and nature, develop environmental ethics and sustainable development strategies, enabling them to address social and environmental issues.

Post requisites: no

Optional component 1

Course: Fundamentals of Economics and Entrepreneurship

Intensity of the Course: 5 academic credits

Module Code: **GES -1**

Module Name: General educational subjects module

Prerequisites: Fundamentals of Entrepreneurship and business (school course)

Purpose: familiarization of students with the basics of economics and entrepreneurship, mastering the conceptual apparatus and basic forms of doing business.

Short Description: The discipline is focused on the formation of students' skills of entrepreneurship and business thinking. Through a comprehensive view of the laws of the functioning of the economy, the conditions for doing business, its internal and external environment, students will have the skills to develop a business plan, create and successfully run their own business.

Learning Outcomes in EP (LOP):

LOP 1 - Applies a variety of communication formats taking into account socio-cultural diversity, adheres to the principles of equality and accessibility in education, to create a prosperous and inclusive environment, has leadership qualities and is able to apply them to develop collective potential

LOP 2 - Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

LOP 3 - Demonstrate knowledge of and adherence to ethical and legal norms in research and use of digital technologies. Apply security measures when working with digital information and data protection, promote the active, safe and ethical use of digital resources.

Learning Outcomes in Course (LOC):

LOC 1 - Know the basic concepts in the field of economics and entrepreneurship;

LOC 2 - Be able to find and use the necessary economic information; determine the organizational and legal forms of organizations;

LOC 3 - Determine the composition of the material, labor and financial resources of the organization;

LOC 4 - Evaluation of a business idea and development of a business plan.

Post requisites: no

Optional component 1

Course: Fundamentals of Leadership and receptivity to innovation

Intensity of the Course: 5 academic credits

Module Code: **GES -1**

Module Name: General educational subjects module

Prerequisites: no

Purpose: in the process of studying the discipline, the student develops the skills of setting goals and objectives, timely planning of group work, problem solving, a sense of responsibility and effective communication.

Short Description: The course contributes to the disclosure and development of leadership qualities in the personality of each student, the development of innovative susceptibility skills in him, as a process of adaptation to innovations caused by innovative processes, as well as the use of the results of scientific and technical processes in his life and professional activities. Studies the current state and prospects for the development of leadership qualities and the human factor in management.

Learning Outcomes in EP (LOP):

LOP 1 - Applies a variety of communication formats taking into account socio-cultural diversity, adheres to the principles of equality and accessibility in education, to create a prosperous and inclusive environment, has leadership qualities and is able to apply them to develop collective potential

LOP 2 - Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

Learning Outcomes in Course (LOC):

LOC 1 - Understands theoretical and applied research in the field of modern management achievements in Kazakhstan and abroad using modern scientific methods;

LOC 2 - Knows how to work effectively individually and in a team;

LOC 3 - Independently study and continuously improve their qualifications throughout the entire period of professional activity;

LOC 4 - Applies professional knowledge in the field of organizational and managerial activities.

Post requisites: no

Optional component 1

Course: **Emotional Intellect**

Intensity of the Course: 5 academic credits

Module Code: **GES -1**

Module Name: General educational subjects module

Prerequisites: no

Purpose: knowledge and ability to apply modern methods of diagnostics and development of emotional intelligence of students and soft skills, including in the format of distance learning.

Short Description: The discipline is aimed at mastering the role of a tutor by the teacher in the context of strategic guidelines and priority areas of the state educational policy of Kazakhstan. Students determine the place of emotional intelligence and "flexible competencies" in the educational process of the modern school. They apply modern methods and technologies for organizing educational activities, taking into account the development of soft skills, including in the digital environment. They possess technologies for assessing and developing the emotional intelligence of students of different age groups.

Learning Outcomes in EP (LOP):

LOP 1 - Applies a variety of communication formats taking into account socio-cultural diversity, adheres to the principles of equality and accessibility in education, to create a prosperous and inclusive environment, has leadership qualities and is able to apply them to develop collective potential

LOP 2 - Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

LOP 3 - Demonstrate knowledge of and adherence to ethical and legal norms in research and use of digital technologies. Apply security measures when working with digital information and data protection, promote the active, safe and ethical use of digital resources.

Learning Outcomes in Course (LOC):

LOC 1 - Modern methods and technologies of organizing educational activities taking into account the development of soft skills, diagnostics and evaluation of flexible skills, the formation of individual educational directions and methods of organizing group activities;

LOC 2 - Application of modern methods and technologies for organizing educational activities, taking into account the development of flexible skills, including in the digital environment;

LOC 3 - Flexible skills on the skillfolio platform have the ability to carry out complex diagnostics of soft skills, interpret the results and develop them both in individual and group forms of training.

Post requisites: no

Course: **Fundamentals of mathematical statistics**

Intensity of the Course: 5 academic credits

Module Code: **GES -1**

Module Name: General educational subjects module

Prerequisites: Mathematics (school programme)

Purpose: is to familiarize students with the forms and laws of consistent thinking, to teach students to think consistently, to contribute to the development of skills of sound argumentation.

Short Description: Students understand the process of collecting, processing data and transmitting ideas, develop skills in using quantitative and qualitative data analysis in assessing the state of the object or phenomenon in question.

Learning Outcomes in EP (LOP):

LOP 1 - Applies a variety of communication formats taking into account socio-cultural diversity, adheres to the principles of equality and accessibility in education, to create a prosperous and inclusive environment, has leadership qualities and is able to apply them to develop collective potential

LOP 2 - Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

LOP 3 - Demonstrate knowledge of and adherence to ethical and legal norms in research and use of digital technologies. Apply security measures when working with digital information and data protection, promote the active, safe and ethical use of digital resources.

Learning Outcomes in Course (LOC):

LOC 1 - The student summarizes the results of pedagogical and scientific research and learns to process them mathematically.

LOC 2 - Learns to systematize, clarify and use statistical data using statistical and mathematical methods.

LOC 3 - Effectively uses Chi-square, SSPP and Jamovi applications that statistically process the collected numbers.

Post requisites: no

Optional component 1

Course: **Financial Literacy**

Intensity of the Course: 5 academic credits

Module Code: **GES -1**

Module Name: General educational subjects module

Prerequisites: no

Purpose: is to develop students' knowledge and practical skills in personal finance management, allowing them to make informed financial decisions and ensure their financial well-being.

Short Description: The discipline is focused on the development of students' knowledge about the financial system, financial institutions and their products, and financial risks. As a result, students will be able to find, analyze, interpret, evaluate financial information from various sources and use it to solve financial problems. In general, the course forms students' competent rational financial behavior in conditions of increased risk of financial fraud.

Learning Outcomes in EP (LOP):

LOP 1 - Applies a variety of communication formats taking into account socio-cultural diversity, adheres to the principles of equality and accessibility in education, to create a prosperous and inclusive environment, has leadership qualities and is able to apply them to develop collective potential

LOP 2 - Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

LOP 3 - Demonstrate knowledge of and adherence to ethical and legal norms in research and use of digital technologies. Apply security measures when working with digital information and data protection, promote the active, safe and ethical use of digital resources.

Learning Outcomes in Course (LOC):

LOC 1 - To know the basic financial concepts, the principles of financial markets, types of taxes, the basics of insurance, the possibilities of financial technologies.

LOC 2 - Be able to make a personal budget, analyze financial proposals, choose suitable financial products and services, make informed financial decisions, and protect your financial interests.

LOC 3 - Possess the skills of financial planning, investment, and risk management.

LOC 4 - Demonstrate financial literacy in everyday life, make responsible decisions in the field of finance.

Post requisites: no

2. OPTIONAL COMPONENTS OF THE CYCLE OF CORE COURSES

Optional component 1

Course: **English for Academic Purposes**

Intensity of the Course: 5 academic credits

Module Code: GLC -2

Module Name: Language communication

Prerequisites: Foreign Language

Purpose: students' mastery of a foreign language as a means of learning and the basics of scientific academic communication.

Short Description: The subject forms knowledge about the genre varieties of the scientific style, mastering modern methods of collecting, storing and processing information and materials in the field of professional activity, as well as the development of skills and abilities of academic communication in four types of speech activity: reading, speaking, writing, listening.

Learning Outcomes in EP (LOP):

LOP 1 - Applies a variety of communication formats taking into account socio-cultural diversity, adheres to the principles of equality and accessibility in education, to create a prosperous and inclusive environment, has leadership qualities and is able to apply them to develop collective potential

LOP 2 - Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

Learning Outcomes in Course (LOC):

LOC 1 – They know general scientific terms to the extent sufficient to work with original scientific texts and texts of a professional nature;

LOC 2 – They understand the peculiarities of the organization of the structure and content of an academic text/discourse, compositional and speech types, forms of presentation, methods of analysis and argumentation;

LOC 3 – They are able to conduct scientific research, including the choice of a topic, its justification, determination of relevance, novelty and significance, organization of research stages, registration of results, formulation of conclusions, conclusions and recommendations;

LOC 4 – Apply the acquired knowledge in educational and research activities in the specialty profile.

Post requisites: no

Optional component 1

Course: Academic writing

Intensity of the Course: 5 academic credits

Module Code: GLC -2

Module Name: Language communication

Prerequisites: Foreign Language

Purpose: students' mastery of the theory of academic writing as a system, as well as concepts and models of academic writing.

Short Description: The discipline develops students' skills in functional style and writing scientific articles, industry-specific subject terminology, office management, and academic literacy. Students also learn how to compile scientific reports, professional text analysis, critical thinking, plagiarism prevention and information retrieval in scientific databases, and systematization of written work.

Learning Outcomes in EP (LOP):

LOP 1 - Applies a variety of communication formats taking into account socio-cultural diversity, adheres to the principles of equality and accessibility in education, to create a prosperous and inclusive environment, has leadership qualities and is able to apply them to develop collective potential

LOP 2 - Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

LOP 3 - Demonstrate knowledge of and adherence to ethical and legal norms in research and use of digital technologies. Apply security measures when working with digital information and data protection, promote the active, safe and ethical use of digital resources.

Learning Outcomes in Course (LOC):

LOC 1 – They know the models of academic writing, the logical and syntactic rules of scientific text, the methodology of scientific text execution;

LOC 2 – They are able to collect and process material, structure work and describe bibliographic sources;

LOC 3 – She is able to substantiate the relevance, theoretical and practical significance of the chosen topic of scientific research and present its results;

LOC 4 – He knows the methodology of writing the scientific text of an article, an abstract, an essay, a graduation project.

Post requisites: no

3. OPTIONAL COMPONENTS OF THE CYCLE OF MAJOR COURSES

Optional component 1

Course: Professional Ethics and Identity

Intensity of the Course: 5 academic credits

Module Code: **GER – 3**

Module Name: Global Ethics and Research

Prerequisites: no

Purpose: is to acquaint students with the attitudes, values, knowledge, beliefs and skills adopted in the professional pedagogical environment.

Short Description: Students develop leadership and proactivity skills in the context of pedagogical activity or outside it, develop a commitment to the national and cultural values of Kazakhstan, get acquainted with and accept as a value the strict observance of professional ethics. Students plan their career path, develop introspection and self-management skills.

Learning Outcomes in EP (LOP):

LOP 1 - Applies a variety of communication formats taking into account socio-cultural diversity, adheres to the principles of equality and accessibility in education, to create a prosperous and inclusive environment, has leadership qualities and is able to apply them to develop collective potential

LOP 2 - Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

Learning Outcomes in Course (LOC):

LOC 1 – Be able to work in a team, be tolerant social, ethnic, religious and cultural differences

LOC 2 – They know classical and modern theories in the field of professional ethics and identity;

LOC 3 – Apply theoretical knowledge and practical skills in the subject area in solving professional tasks;

Post-requisites: no

Optional component 1

Course: Basics of artificial intelligence

Intensity of the Course: 5 academic credits

Module Code: **GER – 3**

Module Name: Global Ethics and Research

Prerequisites: Information – communication technologies

Purpose: The aim of teaching this discipline is to form theoretical knowledge and practical skills in artificial intelligence (AI), including implementing the contemporary tools and methods of AI.

Short Description: Students will be introduced to fundamental AI concepts, study its basic principles and methods, gain the skills to apply these theories, methods, and principles in simple intelligent software systems.

Learning Outcomes in EP (LOP):

LOP 1 - Applies a variety of communication formats taking into account socio-cultural diversity, adheres to the principles of equality and accessibility in education, to create a prosperous and inclusive environment, has leadership qualities and is able to apply them to develop collective potential

LOP 2 - Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

Learning Outcomes in Course (LOC):

LOC 1- know about the basic concepts of artificial intelligence (machine learning, neural networks, natural language processing), algorithms and artificial intelligence tools.

LOC 2- create simple artificial intelligence tools (for example, chatbots, recommendation systems, applications) adapted to the needs of their industry.

LOC 3 - be able to use practical AI tools and techniques to solve specific tasks.

Post-requisites: no

2. OPTIONAL COMPONENTS OF THE CYCLE OF CORE COURSES

Optional component 1

Course: Chemistry of elements

Intensity of the Course: 5 academic credits

Module Code: FGCh-6

Module Name: Fundamentals of General Chemistry

Prerequisites: Inorganic chemistry

Purpose: Formation of students' ideas about the relationship between the structure and chemical properties of the main classes of inorganic compounds, the material unity of chemical elements and substances, the relationship of qualitative and quantitative changes.

Short Description: To form the ability to interpret the main classes of elements, to understand the features of their structure, to evaluate the methods of preparation, to understand the relationship of chemical and physical properties and the field of their practical application. It studies the main aspects: the specifics of elements, molecules and their reactions, chemical bonds in compounds, the structure of molecules and their reactivity, the position of an element in the Periodic system

Learning Outcomes in EP (LOP):

LOP 4 – Able to form judgments during independent assessment, interpretation and synthesis of experimental data obtained in the course of laboratory work and be able to relate them to the corresponding theory.

LOP 8 – He is able to analyze, evaluate and adjust the processes and results of his own pedagogical activity.

LOP 9 – Apply knowledge on the theoretical and practical foundations of inorganic, organic, analytical chemistry, according to the methodology of teaching chemistry in professional activity.

LOP 11 – They know the structure and content of the basic chemistry course in a secondary school; they are able to plan the educational process, design lessons; use specific techniques characteristic of chemical science itself; solve computational and experimental tasks provided for in the school curriculum.

Learning Outcomes in Course (LOC):

LOC 1 - Knows the practical and scientific significance of the elements of the subgroup and the compounds formed by them and the classification of chemical elements according to the electronic configuration of the valence layer.

LOC 2 - Knows to independently carry out the basic methods of work in a chemical laboratory, plan the synthesis of the required compound.

LOC 3 - Knows how to compare the physical and chemical properties of simple substances formed by the elements of this subgroup;

LOC 4 - Can independently carry out the basic methods of work in a chemical laboratory, plan the synthesis of the required compound.

LOC 5 - owns mathematical calculations and the presentation of experimental results in graphical form and the search for chemical information using various sources (reference, scientific and popular scientific publications, computer databases, Internet resources).

LOC 6 - Possesses the skills of laboratory experiment technique and regularities in changing the physical and chemical properties of simple substances, taking into account the structure of their atoms and molecules, crystal structure;

LOC 7 - Possesses the basic principles and methodology of inorganic synthesis and knowledge of the chemical and physical properties of substances and their compounds to ensure the safety of life.

Post requisites: Analytical chemistry, Organic chemistry 1, Organic chemistry 2, Method of realization of school chemical experiment, Methods of solving problems in chemistry, Chemistry of natural compounds.

Course: **Chemistry of metals and nonmetals**

Intensity of the Course: 5 academic credits

Module Code: FGCh-6

Module Name: Fundamentals of General Chemistry

Prerequisites: Inorganic chemistry

Purpose: Formation of students' ideas about the relationship between the structure and chemical properties of the main classes of inorganic compounds, the material unity of chemical elements and substances, the relationship of qualitative and quantitative changes.

Short Description: The discipline is a fundamental science for bachelors of various specialties, on the knowledge of which the study of all subsequent chemical or related disciplines is based. The course provides a modern scientific understanding of matter and its forms, the mechanism of transformation of chemical compounds, the properties of modern inorganic materials and the application of chemical processes in modern technologies.

Learning Outcomes in EP (LOP):

LOP 4 – Able to form judgments during independent assessment, interpretation and synthesis of experimental data obtained in the course of laboratory work and be able to relate them to the corresponding theory.

LOP 8 – He is able to analyze, evaluate and adjust the processes and results of his own pedagogical activity.

LOP 9 – Apply knowledge on the theoretical and practical foundations of inorganic, organic, analytical chemistry, according to the methodology of teaching chemistry in professional activity.

LOP 11 – Knows the structure and content of a basic chemistry course in a secondary school; know how to plan the educational process, design lessons; use specific techniques characteristic of chemical science itself; solve computational and experimental problems provided for in the school curriculum

Learning Outcomes in Course (LOC):

LOC 1 - Knows the practical and scientific significance of the elements of the subgroup and the compounds formed by them and the classification of chemical elements according to the electronic configuration of the valence layer.

LOC 2 - Knows to independently carry out the basic methods of work in a chemical laboratory, plan the synthesis of the required compound.

LOC 3 - Knows how to compare the physical and chemical properties of simple substances formed by the elements of this subgroup;

LOC 4 - Can independently carry out the basic methods of work in a chemical laboratory, plan the synthesis of the required compound.

LOC 5 - owns mathematical calculations and the presentation of experimental results in graphical form and the search for chemical information using various sources (reference, scientific and popular scientific publications, computer databases, Internet resources).

LOC 6 - Possesses the skills of laboratory experiment technique and regularities in changing the physical and chemical properties of simple substances, taking into account the structure of their atoms and molecules, crystal structure;

LOC 7 - Possesses the basic principles and methodology of inorganic synthesis and knowledge of the chemical and physical properties of substances and their compounds to ensure the safety of life.

Post requisites: Analytical chemistry, Organic chemistry 1, Organic chemistry 2, Method of realization of school chemical experiment, Methods of solving problems in chemistry, Chemistry of natural compounds.

Optional component 2

Course: **Qualitative analysis**

Intensity of the Course: 5 academic credits

Module Code: FGCh 204/1

Module Name: Fundamentals of General Chemistry

Prerequisites: Chemistry (school course), Inorganic chemistry

Purpose: Formation of the student's analytical skills in determining the chemical composition of a substance.

Short Description: Studies basic chemical analysis methods (titrimetric, gravimetric), separation and concentration methods. Practical classes are aimed at obtaining their experimental skills of working on modern analytical equipment in various methods of chemical analysis.

Learning Outcomes in EP (LOP):

LOP 3 - Demonstrate knowledge of and adherence to ethical and legal norms in research and use of digital technologies. Apply security measures when working with digital information and data protection, promote the active, safe and ethical use of digital resources.

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 7 – Knows and applies the basic principles in the field of natural sciences that contribute to the formation of a highly educated personality with a broad outlook and culture of thinking; content of the regulatory framework of the education system of the Republic of Kazakhstan (laws, concepts, international agreements, standards, instructions, rules, etc.).

LOP 9 – Apply knowledge on the theoretical and practical foundations of inorganic, organic, analytical chemistry, according to the methodology of teaching chemistry in professional activity.

Learning Outcomes in Course (LOC):

LOC 1 - determines the chemical composition analyzed object

LOC 2 - uses an analytical signal to determination of specific elementary ions

LOC 3 - distinguishes between methods of analytical chemistry: chemical, physicochemical and physical

LOC 4 - uses analytical instruments: analytical balance, pH meter, potentiometer

LOC 5 - separates the analyte different separation methods

LOC 6 - evaluates and proves based on obtained laboratory results on the composition of the substance

LOC 7 - conducts a scientific search for information on new methods for the determination of substances

Post requisites: Fundamentals of scientific research, Methods of solving problems in chemistry, Method of realization of school chemical experiment

Course: Chromatographic methods of analysis

Intensity of the Course: 5 academic credits

Module Code: FGCh 204/2

Module Name: Fundamentals of General Chemistry

Prerequisites: Chemistry (school course), Inorganic chemistry

Purpose: Formation of the student's analytical skills in determining the chemical composition of a substance.

Short Description: Studies and examines the theoretical foundations and areas of application of modern instrumental methods of analysis: spectroscopic, electrochemical, chromatographic and physical. Practical classes are aimed at obtaining their experimental skills of working on modern analytical equipment in various methods of chemical analysis

Learning Outcomes in EP (LOP):

LOP 3 - Demonstrate knowledge of and adherence to ethical and legal norms in research and use of digital technologies. Apply security measures when working with digital information and data protection, promote the active, safe and ethical use of digital resources.

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 7 – They know and apply the basic foundations in the field of natural sciences that contribute to the formation of a highly educated person with a broad outlook and a culture of thinking; the content of the regulatory framework of the education system of the Republic of Kazakhstan (laws, concepts, international agreements, standards, instructions, rules, etc.)

Learning Outcomes in Course (LOC):

LOC 1 - determines the chemical composition analyzed object

LOC 2 - uses an analytical signal to determination of specific elementary ions

LOC 3 - distinguishes between methods of analytical chemistry: chemical, physicochemical and physical

LOC 4 - uses analytical instruments: analytical balance, pH meter, potentiometer

LOC 5 - separates the analyte different separation methods

LOC 6 - evaluates and proves based on obtained laboratory results on the composition of the substance

LOC 7 - conducts a scientific search for information on new methods for the determination of substances

Post requisites: Fundamentals of scientific research, Methods of solving problems in chemistry, Method of realization of school chemical experiment

Course: Quantitative analysis

Intensity of the Course: 5 academic credits

Module Code: FGCh 205/1

Module Name: Fundamentals of General Chemistry

Prerequisites: Chemistry (school course), Inorganic chemistry

Purpose: Formation of the student's analytical skills in determining the chemical composition of a substance.

Short Description: To give students the theoretical foundations of modern quantitative analysis, to acquaint them with the general basics of the mechanisms of chemical reactions used in analytical chemistry, separation methods, chemical and a number of physico-chemical methods for determining elements and their compounds.

Learning Outcomes in EP (LOP):

LOP 3 - Demonstrate knowledge of and adherence to ethical and legal norms in research and use of digital technologies. Apply security measures when working with digital information and data protection, promote the active, safe and ethical use of digital resources.

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 7 – Knows and applies the basic principles in the field of natural sciences that contribute to the formation of a highly educated personality with a broad outlook and culture of thinking; content of the regulatory framework of the education system of the Republic of Kazakhstan (laws, concepts, international agreements, standards, instructions, rules, etc.).

LOP 9 – Apply knowledge on the theoretical and practical foundations of inorganic, organic, analytical chemistry, according to the methodology of teaching chemistry in professional activity.

Learning Outcomes in Course (LOC):

LOC 1 - determines the chemical composition analyzed object

LOC 2 - uses an analytical signal to determination of specific elementary ions

LOC 3 - distinguishes between methods of analytical chemistry: chemical, physicochemical and physical

LOC 4 - uses analytical instruments: analytical balance, pH meter, potentiometer

LOC 5 - separates the analyte different separation methods

LOC 6 - evaluates and proves based on obtained laboratory results on the composition of the substance

LOC 7 - conducts a scientific search for information on new methods for the determination of substances

Post requisites: Fundamentals of scientific research, Methods of solving problems in chemistry, Method of realization of school chemical experiment

Course: Theoretical foundations and calculations of analytical chemistry

Intensity of the Course: 5 academic credits

Module Code: FGCh 205/1

Module Name: Fundamentals of General Chemistry

Prerequisites: Chemistry (school course), Inorganic chemistry

Purpose: Formation of the student's analytical skills in determining the chemical composition of a substance.

Short Description: The course examines in detail the basic principles of analytical chemistry, including methods of analysis and construction of reaction schemes, basic concepts of measurement and accuracy of results, methods for calculating chemical reactions and the composition of mixtures.

Learning Outcomes in EP (LOP):

LOP 3 - Demonstrate knowledge of and adherence to ethical and legal norms in research and use of digital technologies. Apply security measures when working with digital information and data protection, promote the active, safe and ethical use of digital resources.

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 7 – Knows and applies the basic principles in the field of natural sciences that contribute to the formation of a highly educated personality with a broad outlook and culture of thinking; content of the regulatory framework of the education system of the Republic of Kazakhstan (laws, concepts, international agreements, standards, instructions, rules, etc.).

LOP 9 – Apply knowledge on the theoretical and practical foundations of inorganic, organic, analytical chemistry, according to the methodology of teaching chemistry in professional activity.

Learning Outcomes in Course (LOC):

LOC 1 - determines the chemical composition analyzed object

LOC 2 - uses an analytical signal to determination of specific elementary ions

LOC 3 - distinguishes between methods of analytical chemistry: chemical, physicochemical and physical

LOC 4 - uses analytical instruments: analytical balance, pH meter, potentiometer

LOC 5 - separates the analyte different separation methods

LOC 6 - evaluates and proves based on obtained laboratory results on the composition of the substance

LOC 7 - conducts a scientific search for information on new methods for the determination of substances

Post requisites: Fundamentals of scientific research, Methods of solving problems in chemistry, Method of realization of school chemical experiment

Optional component 3

Course: Physico-chemical methods of research

Intensity of the Course: 5 academic credits

Module Code: FGCh 308/1

Module Name: Fundamentals of General Chemistry

Prerequisites: Inorganic chemistry, Analytical Chemistry, Organic Chemistry 1, Organic Chemistry 2

Purpose: The objectives of the development of the discipline is to form the skills, abilities and competencies of students in the field of basic theoretical knowledge related to the classification, capabilities and limitations of modern physical research methods, to instill an understanding of the fundamental principles of methods and methods of their practical implementation.

Short Description: The discipline is aimed at mastering the theoretical foundations and experimental techniques of modern physical research methods for the characterization and solution of chemical problems. In the process of mastering the discipline, students should develop knowledge and skills that allow them to use the possibilities of physico-chemical methods in chemical research.

Learning Outcomes in EP (LOP):

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 6 - Able to conduct analyzes when researching, solving problems of a pedagogical or methodological nature in English, Russian and Kazakh languages

LOP 7 – They know and apply the basic foundations in the field of natural sciences that contribute to the formation of a highly educated person with a broad outlook and a culture of thinking; the content of the regulatory framework of the education system of the Republic of Kazakhstan (laws, concepts, international agreements, standards, instructions, rules, etc.)

LOP 9 – Applies knowledge of the theoretical and practical fundamentals of inorganic, organic, analytical chemistry, and methods of teaching chemistry in professional activities.

LOP 11 – They know the structure and content of the basic chemistry course in a secondary school; they are able to plan the educational process, design lessons; use specific techniques characteristic of chemical science itself; solve computational and experimental tasks provided for in the school curriculum.

Learning Outcomes in Course (LOC):

LOC 1 – Knows the nomenclature of organic Compounds and properties of various classes organic compounds;

LOC 2 - Compiles the mechanisms of reactions of organic compounds.

LOC 3 - Determines organic compounds with various functional groups, carrying out qualitative reactions.

LOC 4 - Knows modern problems of purposeful synthesis of classes of chemical various organic compounds

LOC 5 - Knows the safety rules for working with organic substances and the rules for compiling installations for organic synthesis and purification of organic compounds.

Post requisites: Methods of solving problems in chemistry, Foundations nanochemistry, Methods of teaching chemistry, Teaching school chemistry course

Course: Multicomponent systems

Intensity of the Course: 5 academic credits

Module Code: FGCh 308/2

Module Name: Fundamentals of General Chemistry

Prerequisites: Inorganic chemistry, Chemistry of elements

Purpose: to give students a clear idea of the fundamental theoretical and experimental foundations of colloidal chemistry, to show the application of these foundations in the practical activities of people.

Short Description: The discipline teaches the basic theoretical and experimental methods of studying phase equilibria and chemical interaction in complex systems. The course forms proficiency skills used in physico-chemical analysis to study phase equilibria, which will allow students to explore new, as yet unexplored multicomponent systems on their basis and apply the knowledge gained in their practical and professional activities

Learning Outcomes in EP (LOP):

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 6 – They are able to conduct analyses in the study, solving problems of a pedagogical or methodological nature in English, Russian and Kazakh.

LOP 7 – They know and apply the basic foundations in the field of natural sciences that contribute to the formation of a highly educated person with a broad outlook and a culture of thinking; the content of the regulatory framework of the education system of the Republic of Kazakhstan (laws, concepts, international agreements, standards, instructions, rules, etc.)

LOP 9 – Apply knowledge on the theoretical and practical foundations of inorganic, organic, analytical chemistry, according to the methodology of teaching chemistry in professional activity.

LOP 11 – They know the structure and content of the basic chemistry course in a secondary school; they are able to plan the educational process, design lessons; use specific techniques characteristic of chemical science itself; solve computational and experimental tasks provided for in the school curriculum.

Learning Outcomes in Course (LOC):

LOC 1 – Knows the nomenclature of organic Compounds and properties of various classes organic compounds;

LOC 2 - Compiles the mechanisms of reactions of organic compounds.

LOC 3 - Determines organic compounds with various functional groups, carrying out qualitative reactions.

LOC 4 - Knows modern problems of purposeful synthesis of classes of chemical various organic compounds

LOC 5 - Knows the safety rules for working with organic substances and the rules for compiling installations for organic synthesis and purification of organic compounds.

Post requisites: Methods of solving problems in chemistry, Foundations nanochemistry, Methods of teaching chemistry, Teaching school chemistry course.

Optional component 4

Course: Chemistry of high-molecular compounds

Intensity of the Course: 5 academic credits

Module Code: FChE304/1

Module Name: Fundamentals of General Chemistry

Prerequisites: Inorganic chemistry, Organic chemistry 1, Organic chemistry 2, Digital Technologies in Education

Purpose: In the learning process, the student must acquire the skills of meaningful assimilation of modern methods and technologies of the fundamentals of teaching chemistry in secondary school, and form the professional skills necessary for a chemistry teacher for the successful teaching, upbringing and development of students with the optimal use of innovative methods, experiment, and visualization.

Short Description: During the course to form students' abilities: to explain the basic concepts of physico-chemical and physico-mechanical properties of polymers; to determine the structural features of macromolecules, mechanisms of bending of polymer molecules, to classify the main processes of polymerization and polycondensation; to evaluate the mechanical properties of polymers, to choose the optimal type of polymerization for a given monomer; to evaluate the composition of the final polymer after chemical reactions.

Learning Outcomes in EP (LOP):

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 8 – He is able to analyze, evaluate and adjust the processes and results of his own pedagogical activity.

LOP 9 – Apply knowledge on the theoretical and practical foundations of inorganic, organic, analytical chemistry, according to the methodology of teaching chemistry in professional activity.

LOP 11 – They know the structure and content of the basic chemistry course in a secondary school; they are able to plan the educational process, design lessons; use specific techniques characteristic of chemical science itself; solve computational and experimental tasks provided for in the school curriculum.

Learning Outcomes in Course (LOC):

LOC 1 - Knows the basics of information technology, the basic capabilities and rules for working with standard software products when solving professional problems.

LOC 2 - Understands the principles of building pedagogical activities in educational institutions

LOC 3 - Knows how to use information, communication and computer technologies to present the results of professional activities.

LOC 4 - knows how to use teaching methods and teaching aids that are appropriate for the selected content, control the assimilation of knowledge, diagnose the acquired chemical knowledge and correct the learning process.

LOC 5 - master the theoretical and psychological and pedagogical foundations of the management of teaching chemistry, know the methods of determining the scientific content of education and the requirements of State educational standards.

LOC 6 - Have experience in teaching and are familiar with the basics of management of learning processes in educational institutions.

Post requisites: Teaching school chemistry course, Computer technologies in teaching chemistry, Professional reference points of Teacher.

Course: Polymer Chemistry

Intensity of the Course: 5 academic credits

Module Code: FChE 304/2

Module Name: Fundamentals of General Chemistry

Prerequisites: Inorganic chemistry, Organic chemistry 1, Organic chemistry 2, Digital Technologies in Education

Purpose: In the learning process, the student must acquire the skills of meaningful assimilation of modern methods and technologies of the fundamentals of teaching chemistry in secondary school, and form the professional skills necessary for a chemistry teacher for the successful teaching, upbringing and development of students with the optimal use of innovative methods, experiment, and visualization.

Short Description: When studying the discipline, students will study the following aspects: classification and nomenclature of polymers, basic concepts and physico-chemical properties of polymers, features of the main methods and laws of the processes of obtaining and chemical transformations of polymers, aggregate, phase and physical states of amorphous and crystalline polymers.

Learning Outcomes in EP (LOP):

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 8 – He is able to analyze, evaluate and adjust the processes and results of his own pedagogical activity.

LOP 9 – Apply knowledge on the theoretical and practical foundations of inorganic, organic, analytical chemistry, according to the methodology of teaching chemistry in professional activity.

LOP 11 – They know the structure and content of the basic chemistry course in a secondary school; they are able to plan the educational process, design lessons; use specific techniques characteristic of chemical science itself; solve computational and experimental tasks provided for in the school curriculum.

Learning Outcomes in Course (LOC):

LOC 1 - Knows the basics of information technology, the basic capabilities and rules for working with standard software products when solving professional problems.

LOC 2 - Understands the principles of building pedagogical activities in educational institutions

LOC 3 - Knows how to use information, communication and computer technologies to present the results of professional activities.

LOC 4 - knows how to use teaching methods and teaching aids that are appropriate for the selected content, control the assimilation of knowledge, diagnose the acquired chemical knowledge and correct the learning process.

LOC 5 - master the theoretical and psychological and pedagogical foundations of the management of teaching chemistry, know the methods of determining the scientific content of education and the requirements of State educational standards.

LOC 6 - Have experience in teaching and are familiar with the basics of management of learning processes in educational institutions.

Post requisites: Teaching school chemistry course, Computer technologies in teaching chemistry, Professional reference points of Teacher.

Optional component 5

*Course: **Chemical technology***

Intensity of the Course: 5 academic credits

Module Code: FChE 302/1

Module Name: Fundamentals of chemical education

Prerequisites: Inorganic chemistry, Organic chemistry 1, Organic chemistry 2

Purpose: acquaintance of students with the theoretical foundations of chemical technology and the general principles of organizing chemical production.

Short Description: When studying the discipline, it is considered: obtaining knowledge about the principles and methods of organizing the most important chemical and technological processes for obtaining inorganic substances, to form engineering thinking among future specialists, skills for solving various problems of real production, its organization and management, mastering by students the basic methods of technological calculation of the most important devices of chemical production

Learning Outcomes in EP (LOP):

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 8 – He is able to analyze, evaluate and adjust the processes and results of his own pedagogical activity.

LOP 9 – Apply knowledge on the theoretical and practical foundations of inorganic, organic, analytical chemistry, according to the methodology of teaching chemistry in professional activity.

Learning Outcomes in Course (LOC):

LOC 1 – Basic principles of the organization of chemical production

LOC 2 – Hierarchical structure of chemical production

LOC 3 – Calculate the basic characteristics of the chemical process

LOC 4 – Choose a rational scheme of production of the product

LOC 5 – To evaluate the technological efficiency of production
LOC 6 – Methods of analysis of the efficiency of chemical production
LOC 7 – Ability and readiness to carry out the technological process in accordance with regulations and use of technical means for measurement of basic parameters of technological process, properties of raw materials and products

Post requisites: no

Course: Chemical technology of inorganic substances

Intensity of the Course: 5 academic credits

Module Code: FChE 302/2

Module Name: Fundamentals of chemical education

Prerequisites: Inorganic chemistry, Organic chemistry 1, Organic chemistry 2

Purpose: The basics of theories and foundations of all modern years; - senseless chemical properties of inorganic acids and bases;

Short Description: Products of inorganic technology, their field of application; the main directions of development of inorganic technology; classification of technological processes, their economic efficiency; raw materials sources for the production of inorganic technology; general patterns and basic principles of mineral processing for the production of inorganic products.

Learning Outcomes in EP (LOP):

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 8 – He is able to analyze, evaluate and adjust the processes and results of his own pedagogical activity.

LOP 9 – Apply knowledge on the theoretical and practical foundations of inorganic, organic, analytical chemistry, according to the methodology of teaching chemistry in professional activity.

Learning Outcomes in Course (LOC):

LOC 1 – The basics of theories and foundations of all modern years; - senseless chemical properties of inorganic acids and bases;

LOC 2 - Deudin's technology and the schemes and technology of chemical raw materials are used further in the distillation process.

LOC 3 - Technology for obtaining inorganic acids and bases from mineral raw materials; - applied inorganic acids and non-producer technologist.

LOC 4 - The ability to distinguish between volatile and basic substances in systems;

- for cleaning raw materials from impurities;

LOC 5 - I get a description of natural raw materials; - selection of optimal conditions, synthesis of inorganic fibers and bases from sinizate;

LOC 6 - Assessment of the strengths and weaknesses of the scheme of a particular technology, conducting a disciplinary analysis of the established technology for processing raw materials;

LOC 7 - Chemical technology and experience in neutral chemistry

Post requisites: no

Optional component 6

Course: Methods of solving tasks in chemistry

Intensity of the Course: 5 academic credits

Module Code: SBCh 201/1

Module Name: Selected Chemistry Industries

Prerequisites: Inorganic chemistry, Analytical chemistry, Organic chemistry 1, Organic chemistry 2, Physical and chemical research methods

Purpose: To develop the creative abilities of students and teach them to use the basic laws and concepts of inorganic chemistry in solving experimental, computational and other problems

of increased complexity, to teach students to solve problems in several alternative ways, to choose the most elegant ways of solving them. Formation of students' knowledge and skills for teaching students to solve chemical problems.

Short Description: An important component of this course is the ability to solve problems and exercises in chemistry, tasks of increased complexity. The ability to solve problems and exercises in chemistry is the main criterion for the creative assimilation of the discipline, contributes to the formation of students' attentiveness, the ability to think logically, formulate questions and look for extraordinary solutions.

Learning Outcomes in EP (LOP):

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 7 – Knows and applies the basic foundations in the field of natural sciences, contributing to the formation of a highly educated personality with a broad outlook and a culture of thinking; the content of the regulatory framework of the education system of the Republic of Kazakhstan (laws, concepts, international agreements, standards, instructions, rules, etc.).

LOP 8 – He is able to analyze, evaluate and adjust the processes and results of his own pedagogical activity.

LOP 11 – They know the structure and content of the basic chemistry course in a secondary school; they are able to plan the educational process, design lessons; use specific techniques characteristic of chemical science itself; solve computational and experimental tasks provided for in the school curriculum.

Learning Outcomes in Course (LOC):

LOC 1 - Owns methodological techniques for solving problems of varying degrees of complexity in the main sections of chemistry.

LOC 2 - Owns methodological techniques for solving Olympiad problems.

LOC 3 - Knows how to solve complex creative problems of a theoretical and applied nature.

LOC 4 - Knows how to solve problems using a computer and a personal computer.

LOC 5 - Owns computer programs for solving problems.

LOC 6 - Proficient in the use of multimedia to teach students how to solve chemical problems.

LOC 7 - Knows how to draw up conditions and draw up solutions to problems and exercises of increased complexity.

Post requisites: Professional reference points of Teacher, Teaching school chemistry course

Course: Methods of solving Olympiad tasks in chemistry

Intensity of the Course: 5 academic credits

Module Code: SBCh 201/2

Module Name: Selected Chemistry Industries

Prerequisites: Inorganic chemistry, Analytical chemistry, Organic chemistry 1, Organic chemistry 2, Physical and chemical research methods

Purpose: To develop the creative abilities of students and teach them to use the basic laws and concepts of inorganic chemistry in solving experimental, computational and other problems of increased complexity, to teach students to solve problems in several alternative ways, to choose the most elegant ways of solving them. Formation of students' knowledge and skills for teaching students to solve chemical problems.

Short Description: During the course to develop students' creative abilities and teach them to use; to teach students to solve Olympiad problems in several alternative ways, to choose the most elegant solutions; to form students' knowledge and skills to teach students to solve Olympiad chemical problems

Learning Outcomes in EP (LOP):

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 7 – Knows and applies the basic foundations in the field of natural sciences, contributing to the formation of a highly educated personality with a broad outlook and a culture of thinking; the content of the regulatory framework of the education system of the Republic of Kazakhstan (laws, concepts, international agreements, standards, instructions, rules, etc.).

LOP 8 – He is able to analyze, evaluate and adjust the processes and results of his own pedagogical activity.

LOP 11 – They know the structure and content of the basic chemistry course in a secondary school; they are able to plan the educational process, design lessons; use specific techniques characteristic of chemical science itself; solve computational and experimental tasks provided for in the school curriculum.

Learning Outcomes in Course (LOC):

LOC 1 - Owns methodological techniques for solving problems of varying degrees of complexity in the main sections of chemistry;

LOC 2 - Owns methodological techniques for solving Olympiad problems;

LOC 3 - Knows how to solve complex creative problems of a theoretical and applied nature;

LOC 4 - Knows how to solve problems using a computer and a personal computer;

LOC 5 - Owns computer programs for solving problems;

LOC 6 - Proficient in the use of multimedia to teach students how to solve chemical problems;

LOC 7 - Knows how to draw up conditions and draw up solutions to problems and exercises of increased complexity.

Post requisites: Professional reference points of Teacher, Teaching school chemistry course

Optional component 7

Course: Chemistry of natural compounds

Intensity of the Course: 5 academic credits

Module SBCh 402/1

Module Name: Selected Chemistry Industries

Prerequisites: Inorganic chemistry, Analytical chemistry, Organic chemistry 1, Organic chemistry 2

Purpose: To develop the creative abilities of students and teach them to use the basic laws and concepts of inorganic chemistry in solving experimental, computational and other problems of increased complexity, to teach students to solve problems in several alternative ways, to choose the most elegant ways of solving them. Formation of students' knowledge and skills for teaching students to solve chemical problems.

Short Description: Formation of students' professional competencies in the field of knowledge and use of products of chemical industries and the study of the impact of chemicals and materials on the environment and human health. This knowledge will be necessary for the organization of their professional activities at school and the ability to use them to understand and study the processes of life.

Learning Outcomes in EP (LOP):

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 9 – Apply knowledge on the theoretical and practical foundations of inorganic, organic, analytical chemistry, according to the methodology of teaching chemistry in professional activity.

LOP 11 – They know the structure and content of the basic chemistry course in a secondary school; they are able to plan the educational process, design lessons; use specific techniques

characteristic of chemical science itself; solve computational and experimental tasks provided for in the school curriculum.

Learning Outcomes in Course (LOC):

LOC 1 - Knows about the structure, physicochemical properties and biological functions of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids; about the main experimental and theoretical methods of structural and functional analysis of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids; on the methods of synthesis and biosynthesis of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids.

LOC 2 - Knows the basic terminology and rules for constructing the chemical names of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids according to the IUPAC nomenclature;

LOC 3 - Knows the physical and chemical properties and methods of synthesis of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids;

LOC 4 - Understands the principles of experimental and theoretical methods of structural and functional analysis of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids.

LOC 5 - Has the skills to conduct independently experimental work

LOC 6 - Knows how to establish the relationship between different levels of structural organization of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids with their biochemical and biological properties;

LOC 7 - Knows how to solve problems in this discipline.

Post requisites: Foundations nanochemistry

Course: Chemistry of medicinal compounds

Intensity of the Course: 5 academic credits

Module Code: SBCh 402/2

Module Name: Selected Chemistry Industries

Prerequisites: Inorganic chemistry, Analytical chemistry, Organic chemistry 1, Organic chemistry 2

Purpose: To develop the creative abilities of students and teach them to use the basic laws and concepts of inorganic chemistry in solving experimental, computational and other problems of increased complexity, to teach students to solve problems in several alternative ways, to choose the most elegant ways of solving them. Formation of students' knowledge and skills for teaching students to solve chemical problems.

Short Description: During the course of studying the chemistry of medicinal substances, students should acquire knowledge about synthetic drugs of inorganic and organic origin, methods for obtaining the main classes of compounds and the dependence of their properties on the structure, as well as have a holistic understanding of the problems of the modern pharmaceutical industry and applications in medicine.

Learning Outcomes in EP (LOP):

LOP 4 – They are able to form judgments when conducting an independent assessment, interpretation and synthesis of experimental data obtained during laboratory work and be able to link them with the relevant theory.

LOP 9 – Apply knowledge on the theoretical and practical foundations of inorganic, organic, analytical chemistry, according to the methodology of teaching chemistry in professional activity.

LOP 11 – They know the structure and content of the basic chemistry course in a secondary school; they are able to plan the educational process, design lessons; use specific techniques characteristic of chemical science itself; solve computational and experimental tasks provided for in the school curriculum.

Learning Outcomes in Course (LOC):

LOC 1 - Knows about the structure, physicochemical properties and biological functions of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids; about the main

experimental and theoretical methods of structural and functional analysis of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids; on the methods of synthesis and biosynthesis of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids.

LOC 2 - Knows the basic terminology and rules for constructing the chemical names of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids according to the IUPAC nomenclature;

LOC 3 - Knows the physical and chemical properties and methods of synthesis of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids;

LOC 4 - Understands the principles of experimental and theoretical methods of structural and functional analysis of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids.

LOC 5 - Has the skills to conduct independently experimental work

LOC 6 - Knows how to establish the relationship between different levels of structural organization of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids with their biochemical and biological properties;

LOC 7 - Knows how to solve problems in this discipline.

Post requisites: Foundations nanochemistry

Optional component 9

Course: **STEM technology in teaching chemistry**

Intensity of the Course: 4 academic credits

Module Code: SBCh 403/1

Module Name: Selected Chemistry Industries

Prerequisites: Methods of teaching chemistry

Purpose: To develop the creative abilities of students and teach them to use the basic laws and concepts of inorganic chemistry in solving experimental, computational and other problems of increased complexity, to teach students to solve problems in several alternative ways, to choose the most elegant ways of solving them. Formation of students' knowledge and skills for teaching students to solve chemical problems.

Short Description: The subject of STEM technology in teaching chemistry is a subject that improves the development of students' interest in learning, creativity, interest and creativity in the educational process, being a powerful tool that encourages students to deeper knowledge of the subject and develops their abilities. When using STEM technologies, the ability to find a solution to a problem and learn how to work with information develops.

Learning Outcomes in EP (LOP):

LOP 2 - Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

LOP 3- Demonstrate knowledge of and adherence to ethical and legal norms in research and use of digital technologies. Apply security measures when working with digital information and data protection, promote the active, safe and ethical use of digital resources.

LOP 5 – Apply knowledge and understanding when using innovative teaching methods and new technologies in the field of chemical disciplines.

LOP 10 – Possess methods of using modern educational (teaching and controlling) technologies; techniques and methods of chemical experiment

LOP 11 – They know the structure and content of the basic chemistry course in a secondary school; they are able to plan the educational process, design lessons; use specific techniques characteristic of chemical science itself; solve computational and experimental tasks provided for in the school curriculum.

Learning Outcomes in Course (LOC):

LOC 1 - allows students to get a complete picture of the world being studied and demonstrates the conventionality of dividing science into separate subjects;

LOC 2- is able to formulate conclusions, apply the acquired knowledge in practice;
LOC 3 - is able to work independently, make generalizations and conclusions, creatively apply knowledge in new situations;
LOC 4 - is able to offer their own (or group) view of the problem;
LOC 5 - is able to use achievements and information from one scientific discipline to solve problems in the study of other scientific disciplines;
LOC 6 - develops creative thinking and breadth of vision of the problem, which are necessary for solving scientific problems with many variables;
LOC 7 - able to find a solution to a problem and learn to work with information.
Post requisites: Computer technologies in teaching chemistry

Course: Digital resources in Chemistry education

Intensity of the Course: 4 academic credits

Module Code: SBCh 403/2

Module Name: Selected Chemistry Industries

Prerequisites: Methods of teaching chemistry

Purpose: To develop the creative abilities of students and teach them to use the basic laws and concepts of inorganic chemistry in solving experimental, computational and other problems of increased complexity, to teach students to solve problems in several alternative ways, to choose the most elegant ways of solving them. Formation of students' knowledge and skills for teaching students to solve chemical problems.

Short Description: The subject increases the efficiency of using digital educational resources in chemistry lessons. One of the main issues of using new information technologies in education is the formation of an interactive environment in the management of cognitive activity.

Learning Outcomes in EP (LOP):

LOP 2 - Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional problems

LOP 3- Demonstrate knowledge of and adherence to ethical and legal norms in research and use of digital technologies. Apply security measures when working with digital information and data protection, promote the active, safe and ethical use of digital resources.

LOP 5 – Apply knowledge and understanding when using innovative teaching methods and new technologies in the field of chemical disciplines.

LOP 10 – Possess methods of using modern educational (teaching and controlling) technologies; techniques and methods of chemical experiment

LOP 11 – They know the structure and content of the basic chemistry course in a secondary school; they are able to plan the educational process, design lessons; use specific techniques characteristic of chemical science itself; solve computational and experimental tasks provided for in the school curriculum.

Learning Outcomes in Course (LOC):

LOC 1 - allows students to get a complete picture of the world being studied and demonstrates the conventionality of dividing science into separate subjects;

LOC 2- is able to formulate conclusions, apply the acquired knowledge in practice;

LOC 3 - is able to work independently, make generalizations and conclusions, creatively apply knowledge in new situations;

LOC 4 - is able to offer their own (or group) view of the problem;

LOC 5 - is able to use achievements and information from one scientific discipline to solve problems in the study of other scientific disciplines;

LOC 6 - develops creative thinking and breadth of vision of the problem, which are necessary for solving scientific problems with many variables;

LOC 7 - able to find a solution to a problem and learn to work with information.

Post requisites: Computer technologies in teaching chemistry

Post requisites: no

