KAZAKH NATIONAL WOMEN'S TEACHER TRAINING UNIVERSITYINSTITUTE OF NATURAL SCIENCES

7M01509 – CHEMISTRY

Catalog of elective disciplines

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KAZAKH NATIONAL WOMEN'S TEACHER TRAINING UNIVERSITY
INSTITUTE OF NATURAL SCIENCES
7M01509 – ХИМИЯ
Catalog of elective disciplines

1. OPTIONAL COMPONENT OF THE CYCLE OF CORE COURSES

Component of choice 1

Course: **Selected chapters in inorganic chemistry**
Intensity of the Course: 6 academic credits
Module Code: APMCh 501/1
Module Name: **Current problems of modern chemistry**
Prerequisites: ICh 1205 Inorganic chemistry
Purpose: Equipping undergraduates with theoretical knowledge about inorganic chemistry, teaching them to apply the knowledge gained in other areas of chemistry and practice.
Short Description: The place of modern inorganic chemistry in the system of sciences of the natural science cycle. The importance of inorganic chemistry for various fields of technology, medicine and agriculture. Periodic law, Periodic table of chemical elements: current state of the problem. The main features and tasks of modern inorganic chemistry: search, synthesis and design of new chemical compounds, creation of structural materials of the future.
Learning Outcomes:
Learning Outcomes in EP (LOP)
Learning Outcomes in EP (LOP)
LOP 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course.
LOP 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.
Learning Outcomes in Course (LOC)
LOC 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.
LOC 2 To explain the methods of management and evaluation of professional qualities of the individual ,the system of relations of subjects of the organization of education; to present the results of research in a foreign language.
LOC 3 To know and have the skills to apply knowledge in the field of pedagogy, psychology, be ready to ensure the protection of the life and health of students in the educational process and extracurricular activities.
LOC 4 To know the fundamentals of physical and colloid chemistry, the thermodynamic bases of chemical processes.
LOC 5 To know the main stages and patterns of development of chemical science, an understanding of the objective necessity for the emergence of new trends, knowledge about the system of fundamental chemical concepts and methodological aspects of chemistry, forms and methods of scientific knowledge, its role in the general educational professional training of chemists.
LOC 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course
LOC 7 To make a program of scientific research ,justifying its goals and objectives; applying methodological tools in the process of scientific research; working with various sources of scientific and practical information; to develop research stages; analyzes the results, justifying recommendations and suggestions.
LOC 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.
Post requisites: HDChSK 5302 History and development of chemical science in Kazakhstan.

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Component of choice 1

Course: **Theoretical inorganic chemistry**
Intensity of the Course: 6 academic credits
Module Code: APMCh 501/2
Module Name: **Current problems of modern chemistry**
Prerequisites: ICh 1205 Inorganic chemistry
Purpose: Study and master the knowledge gained by students in the field of chemistry, inorganic chemistry and organic chemistry.
Short Description: The place of modern inorganic chemistry in the system of sciences of the natural science cycle. The importance of inorganic chemistry for various fields of technology, medicine and agriculture. Periodic law, Periodic table of chemical elements: current state of the problem. The main features and tasks of modern inorganic chemistry: search, synthesis and design of new chemical compounds, creation of structural materials of the future.
Learning Outcomes:
Learning Outcomes in EP (LOP)
Learning Outcomes in EP (LOP)
LOP 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course.
LOP 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.
Learning Outcomes in Course (LOC)
LOC 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.
LOC 2 To explain the methods of management and evaluation of professional qualities of the individual ,the system of relations of subjects of the organization of education; to present the results of research in a foreign language.
LOC 3 To know and have the skills to apply knowledge in the field of pedagogy, psychology, be ready to ensure the protection of the life and health of students in the educational process and extracurricular activities.
LOC 4 To know the fundamentals of physical and colloid chemistry, the thermodynamic bases of chemical processes.
LOC 5 To know the main stages and patterns of development of chemical science, an understanding of the objective necessity for the emergence of new trends, knowledge about the system of fundamental chemical concepts and methodological aspects of chemistry, forms and methods of scientific knowledge, its role in the general educational professional training of chemists.
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LOC 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.
Post requisites: FN 6305 Fundamentals of Nanotechnology, ASCh 6304.1 Aspects of Surface Chemistry

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Component of choice 2

Course: **Applied Foundations of Modern Organic Chemistry**

Intensity of the Course: 5 academic credits

Module Code: APMCh 502/1

Module Name: **Current problems of modern chemistry**

Prerequisites: SChOCh3206 Selected Chapters in Organic Chemistry, ChTOS 4302.2 Chemical Technology of Organic Substances

Purpose: Fundamental education of undergraduates in organic chemistry. Basic theoretical problems of organic chemistry, hydrocarbons, nomenclature, isomerism, basic classes.

Short Description: The current state of applied organic chemistry. Organic synthesis: main stages, patterns and development trends. Organic catalysis. Reactivity and catalysis, mechanisms of catalytic reactions. Computer synthesis of complex organic compounds, molecular design. Mathematical and computer modeling in organic chemistry. Chemistry of life processes. New in the chemistry of proteins and nucleic acids. Engineering enzymology. Green chemistry as a way to create waste-free industries.

Learning Outcomes: Learning Outcomes in EP (LOP)

LOC 7 To make a program of scientific research ,justifying its goals and objectives; applying methodological tools in the process of scientific research; working with various sources of scientific and practical information; to develop research stages; analyzes the results, justifying recommendations and suggestions.

LOP 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.

Learning Outcomes in Course (LOC)

LOC 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOC 2 To explain the methods of management and evaluation of professional qualities of the individual ,the system of relations of subjects of the organization of education; to present the results of research in a foreign language.

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LOC 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.

Post requisites: MNTPhChA 5302 Methods of new technologies for physical and chemical analyzes

Component of choice 2

Course: **Heterocyclic compounds**

Intensity of the Course: 5 academic credits

Module Code: APMCh 502/2

Module Name: **Current problems of modern chemistry**

Prerequisites: APMOCh 5205 Actual problems of modern organic chemistry

Purpose: The ring of heterocycles can contain elements other than carbon. Construction of many derivatives of furan, thiophene, pyrrole, pyridine, pyrimidine compounds; production methods, chemical properties, and the importance of natural derivatives.

Short Description: Classification of heterocyclic compounds. Five-membered heterocycles with one heteroatom. Five-membered heterocycles with two or more heteroatoms. Six-membered heterocycles with one heteroatom. Six and seven membered heterocycles with two heteroatoms. Bicyclic heterocycles. Nucleic acids. The structure and structure of nucleic acids. DNA (deoxyribonucleic acids). RNA (ribonucleic acids).

Learning Outcomes:

Learning Outcomes in EP (LOP)

Learning Outcomes in EP (LOP)

LOP 7 To make a program of scientific research ,justifying its goals and objectives; applying methodological tools in the process of scientific research; working with various sources of scientific and practical information; to develop research stages; analyzes the results, justifying recommendations and suggestions.

LOP 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.

Learning Outcomes in Course (LOC)

LOC 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

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LOC 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.

Post requisites: AC 2303 Analytical Chemistry, MMA 3233 Modern Methods of Analysis

2 CYCLE OF PROFILING DISCIPLINE

Component of choice 1
Course: **Educational technologies and methodology of teaching general chemistry**
Intensity of the Course: 5 academic credits
Module Code: MDC 501
Module Name: **The main directions of modern chemistry**
Prerequisites: Solving complex problems in chemistry *Purpose:* To teach to solve problems of a complex level

Short Description: Technique for solving problems of an increased level of complexity: calculations by chemical formulas. Calculations by equations of chemical reactions. Problems on the equations of parallel reactions. Physicochemical calculations. Derivation of formulas of chemical compounds in various ways. Derivation of the formula of a substance based on the mass fraction of elements. Derivation of the molecular formula of a substance from the relative density of its vapors and mass, volume or amount of substance of combustion products. Derivation of the formula of a substance based on the general formula of a homologous series of organic compounds. Methodology for solving combined problems. Non-standard and Olympiad problems.

Learning Outcomes:
Learning Outcomes in EP (LOP)

LOP 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOP 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course.

Learning Outcomes in Course (LOC)

LOC 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOC 2 To explain the methods of management and evaluation of professional qualities of the individual ,the system of relations of subjects of the organization of education; to present the results of research in a foreign language.

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LOC 4 To know the fundamentals of physical and colloid chemistry, the thermodynamic bases of chemical processes.

LOC 5 To know the main stages and patterns of development of chemical science, an understanding of the objective necessity for the emergence of new trends, knowledge about the system of fundamental chemical concepts and methodological aspects of chemistry, forms and methods of scientific knowledge, its role in the general educational professional training of chemists.

LOC 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course

LOC 7 To make a program of scientific research ,justifying its goals and objectives; applying methodological tools in the process of scientific research; working with various sources of scientific and practical information; to develop research stages; analyzes the results, justifying recommendations and suggestions.

LOC 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.

Post requisites: Chemistry tasks for high school

Component of choice 2

Course: **Modern problems of analytical chemistry**
Intensity of the Course: 5 academic credits
Module Code: **APMCh-503/1**
Module Name: **The main directions of modern chemistry**
Prerequisites: Prerequisites: AC 2303 Analytical Chemistry,
Purpose: To acquaint undergraduates with the latest achievements in analytical chemistry, modern methods of detection, dissemination and determination. Provide the wizard with an understanding of the analytical methods used to quickly and fully assess the content of chemicals in an industrial and disaster area, as well as for eco-analytical monitoring of environmental objects.
Short Description: Introduction. Metrological foundations of chemical analysis. Types of chemical reactions and processes in analytical chemistry. Identification methods. Methods for isolation, separation and concentration. Chromatographic analysis methods. Gravimetric analysis method. Titrimetric methods of analysis. Kinetic methods of analysis. Electrochemical methods of analysis: potentiometry, coulometry, voltammetry, etc. Spectroscopic methods of analysis.
Learning Outcomes:
Learning Outcomes in EP (LOP)
Learning Outcomes in EP (LOP)
LOP 4 To know the fundamentals of physical and colloid chemistry, the thermodynamic bases of chemical processes.
LOP 5 To know the main stages and patterns of development of chemical science, an understanding of the objective necessity for the emergence of new trends, knowledge about the system of fundamental chemical concepts and methodological aspects of chemistry, forms and methods of scientific knowledge, its role in the general educational professional training of chemists.
Learning Outcomes in Course (LOC)
LOC 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.
LOC 2 To explain the methods of management and evaluation of professional qualities of the individual ,the system of relations of subjects of the organization of education; to present the results of research in a foreign language.
LOC 3 To know and have the skills to apply knowledge in the field of pedagogy, psychology, be ready to ensure the protection of the life and health of students in the educational process and extracurricular activities.
LOC 4 To know the fundamentals of physical and colloid chemistry, the thermodynamic bases of chemical processes.
LOC 5 To know the main stages and patterns of development of chemical science, an understanding of the objective necessity for the emergence of new trends, knowledge about the system of fundamental chemical concepts and methodological aspects of chemistry, forms and methods of scientific knowledge, its role in the general educational professional training of chemists.
LOC 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course
LOC 7 To make a program of scientific research ,justifying its goals and objectives; applying methodological tools in the process of scientific research; working with various sources of scientific and practical information; to develop research stages; analyzes the results, justifying recommendations and suggestions.
LOC 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.
Post requisites: MPhChR 2303 Methods of physical and chemical research

Component of choice 2

Course: Spectroscopic analysis methods
Intensity of the Course: 5 academic credits
Module Code: APMCh 503/2
Module Name: **The main directions of modern chemistry**
Prerequisites: AC 2303 Analytical Chemistry
Purpose: "Analytical chemistry of biological objects and medicines" is the development of professional skills of undergraduates in the study of the chemical composition of wildlife and medicines using modern methods of analysis of elements and materials, taking into account their specificity as objects of research, allowing to evaluate the processes of transformation and transfer. Biologically active substances and their metabolites in living organisms. At the same time, special attention is paid to practical skills with an emphasis on monitoring the reliability of the results obtained. During the course, undergraduates get acquainted with the theoretical parts of modern elementary and instrumental analysis of materials using inductively coupled plasma, capillary electrophoresis and high performance liquid chromatography and atomic emission spectrometry, based on basic knowledge of analytical chemistry. In practical classes, undergraduates master the methods of work and methodological techniques using these methods of analysis, the purpose of which is to determine the composition of micro- and macroelements, as well as organic substances and drugs in biosubstrates of humans and animals, including those on a plant basis.

Short Description: Absorption, scattering, or emission of electromagnetic energy by atoms and molecules. Molecular absorption spectroscopy. The Booger Lambert-Behr law. Radiation absorption spectroscopy. Spectroscopy of radiant scattering. Radiation spectroscopy of radiation. X-ray spectroscopy. Optical spectroscopy. Spectroscopy in the visible region. IR spectroscopy. Radiospectroscopy. Nuclear spectroscopy. NMR. An atomic emission facility. X-ray fluorescent object

Learning Outcomes:

Learning Outcomes in EP (LOP)

LOP 4 To know the fundamentals of physical and colloid chemistry, the thermodynamic bases of chemical processes.

LOP 5 To know the main stages and patterns of development of chemical science, an understanding of the objective necessity for the emergence of new trends, knowledge about the system of fundamental chemical concepts and methodological aspects of chemistry, forms and methods of scientific knowledge, its role in the general educational professional training of chemists.

Learning Outcomes in Course (LOC)

LOC 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOC 2 To explain the methods of management and evaluation of professional qualities of the individual ,the system of relations of subjects of the organization of education; to present the results of research in a foreign language.

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LOC 7 To make a program of scientific research ,justifying its goals and objectives; applying

methodological tools in the process of scientific research; working with various sources of scientific and practical information; to develop research stages; analyzes the results, justifying recommendations and suggestions.

LOC 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.

Post requisites: no

Component of choice 3

Course: **Methods of solving problems in high level of chemistry**
Intensity of the Course: 6 academic credits
Module Code: MDC 502/1
Module Name: **The main directions of modern chemistry**
Prerequisites: Solving complex problems in chemistry *Purpose:* To teach to solve problems of a complex level

Short Description: Methods for solving problems of an increased level of complexity: calculations based on chemical formulas. Calculations based on the equations of chemical reactions. Problems with equations of parallel reactions. Physico - chemical calculations. Derivation of formulas of chemical compounds in various ways. The derivation of the formula of the substance based on the mass fraction of the elements. The derivation of the molecular formula of a substance by the relative density of its vapors and the mass, volume or amount of the substance of the combustion products. The derivation of the formula of a substance based on the general formula of a homological series of organic compounds. The method of solving combined problems. Non-standard and Olympiad tasks.

Learning Outcomes:

Learning Outcomes in EP (LOP)

LOP 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOP 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course.

Learning Outcomes in Course (LOC)

LOC 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOC 2 To explain the methods of management and evaluation of professional qualities of the individual ,the system of relations of subjects of the organization of education; to present the results of research in a foreign language.

LOC 3 To know and have the skills to apply knowledge in the field of pedagogy, psychology, be ready to ensure the protection of the life and health of students in the educational process and extracurricular activities.

LOC 4 To know the fundamentals of physical and colloid chemistry, the thermodynamic bases of chemical processes.

LOC 5 To know the main stages and patterns of development of chemical science, an understanding of the objective necessity for the emergence of new trends, knowledge about the system of fundamental chemical concepts and methodological aspects of chemistry, forms and methods of scientific knowledge, its role in the general educational professional training of chemists.

LOC 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course

LOC 7 To make a program of scientific research ,justifying its goals and objectives; applying methodological tools in the process of scientific research; working with various sources of scientific and

practical information; to develop research stages; analyzes the results, justifying recommendations and suggestions.

LOC 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.

Post requisites: no

Component of choice 3

Course: **Experimental tasks for the Chemistry Olympiad**

Intensity of the Course: 6 academic credits

Module Code: **MDC 502/2**

Module Name: **The main directions of modern chemistry**

Prerequisites: Solving complex problems in chemistry

Purpose: To teach to solve problems of a complex level

Short Description: Calculations based on chemical formulas and equations of chemical reactions. Problems with equations of parallel reactions. Physico-chemical calculations. Obtaining formulas of chemical compounds in various ways. The derivation of the formula of the substance based on the mass fraction of the elements. The derivation of the molecular formula of a substance by the relative density of its vapors and by mass, volume or quantity of combustion products. The derivation of the formula of a substance based on the general formula of a homological series of organic compounds. A method for solving mixed problems. Certain numeric parameters. Comparison of quantitative data from several processes

Learning Outcomes:

Learning Outcomes in EP (LOP)

LOP 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOP 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course.

Learning Outcomes in Course (LOC)

LOC 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOC 2 To explain the methods of management and evaluation of professional qualities of the individual ,the system of relations of subjects of the organization of education; to present the results of research in a foreign language.

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LOC 4 To know the fundamentals of physical and colloid chemistry, the thermodynamic bases of chemical processes.

LOC 5 To know the main stages and patterns of development of chemical science, an understanding of the objective necessity for the emergence of new trends, knowledge about the system of fundamental chemical concepts and methodological aspects of chemistry, forms and methods of scientific knowledge, its role in the general educational professional training of chemists.

LOC 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course

LOC 7 To make a program of scientific research ,justifying its goals and objectives; applying methodological tools in the process of scientific research; working with various sources of scientific and practical information; to develop research stages; analyzes the results, justifying recommendations and suggestions.

LOC 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.

Post requisites: no

Component of choice 4

Course: **Modern methodological foundations of teaching physical and colloidal chemistry**

Intensity of the Course: 5 academic credits

Module Code: **MDCh-503/**

Module Name: **The main directions of modern chemistry**

Prerequisites: MTCh 5206.1 Methods for Teaching Chemistry.

Purpose: To acquaint undergraduates with scientific, technical, pedagogical information systems, to teach them to independently search for the necessary information using new information technologies.

Short Description: Introduction. Chemical thermodynamics. Elements of statistical thermodynamics. Phase equilibrium and physical-chemical analysis. Solutions of nonelectrolytes. Electrolyte solution. Chemical kinetics. Catalysis. Homogeneous, heterogeneous catalysis. Theories of heterogeneous catalysis. Structural and mechanical properties of disperse systems. Colloidal surfactants. The nature and some properties of solutions of the HMS.*Learning Outcomes:*

Learning Outcomes in EP (LOP)

Learning Outcomes in EP (LOP)

LOP 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOP 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course.

Learning Outcomes in Course (LOC)

LOC 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOC 2 To explain the methods of management and evaluation of professional qualities of the individual ,the system of relations of subjects of the organization of education; to present the results of research in a foreign language.

LOC 3 To know and have the skills to apply knowledge in the field of pedagogy, psychology, be ready to ensure the protection of the life and health of students in the educational process and extracurricular activities.

LOC 4 To know the fundamentals of physical and colloid chemistry, the thermodynamic bases of chemical processes.

LOC 5 To know the main stages and patterns of development of chemical science, an understanding of the objective necessity for the emergence of new trends, knowledge about the system of fundamental chemical concepts and methodological aspects of chemistry, forms and methods of scientific knowledge, its role in the general educational professional training of chemists.

LOC 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course

LOC 7 To make a program of scientific research ,justifying its goals and objectives; applying methodological tools in the process of scientific research; working with various sources of scientific and practical information; to develop research stages; analyzes the results, justifying recommendations and suggestions.

LOC 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.

Component of choice 4

Course: **Methods of teaching physical and colloidal chemistry**

Intensity of the Course: 5 academic credits

Module Code: **MDC -503/2**

Module Name: **The main directions of modern chemistry**

Prerequisites: MTCh 5206.1 Methods for Teaching Chemistry.

Purpose: To acquaint undergraduates with scientific, technical, pedagogical information systems, to teach them to independently search for the necessary information using new information technologies.

Short Description: Chemical thermodynamics. Elements of statistical thermodynamics. Phase equilibrium and physical-chemical analysis. Solutions of nonelectrolytes. Electrolyte solution. Chemical kinetics. Catalysis. Homogeneous, heterogeneous catalysis. Theories of heterogeneous catalysis. Structural and mechanical properties of disperse systems. Colloidal surfactants. The nature and some properties of solutions of the HMS.*Learning Outcomes:*

Learning Outcomes in EP (LOP)

Learning Outcomes in EP (LOP)

LOP 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOP 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course.

Learning Outcomes in Course (LOC)

LOC 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOC 2 To explain the methods of management and evaluation of professional qualities of the individual ,the system of relations of subjects of the organization of education; to present the results of research in a foreign language.

LOC 3 To know and have the skills to apply knowledge in the field of pedagogy, psychology, be ready to ensure the protection of the life and health of students in the educational process and extracurricular activities.

LOC 4 To know the fundamentals of physical and colloid chemistry, the thermodynamic bases of chemical processes.

LOC 5 To know the main stages and patterns of development of chemical science, an understanding of the objective necessity for the emergence of new trends, knowledge about the system of fundamental chemical concepts and methodological aspects of chemistry, forms and methods of scientific knowledge, its role in the general educational professional training of chemists.

LOC 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course

LOC 7 To make a program of scientific research ,justifying its goals and objectives; applying methodological tools in the process of scientific research; working with various sources of scientific and practical information; to develop research stages; analyzes the results, justifying recommendations and suggestions.

LOC 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.

Post requisites: no

Component of choice 5

Course: **Methods for using interactive methods of teaching chemistry at the university**

Intensity of the Course: 6 academic credits

Module Code: **MDCh-504/1**

Module Name: **The main directions of modern chemistry**

Prerequisites: MMETGICh 5301 Methodology and modern educational technologies of General and Inorganic chemistry

Purpose: is to familiarize students with the scientific and technical, pedagogical information system, to teach them how to find the necessary information with the help of new information technologies.To acquaint undergraduates with scientific, technical, pedagogical information systems, to teach them to independently search for the necessary information using new information technologies.

Short Description: Basic forms and methods of interactive learning. Interactive approach. Principles and methods of building an interactive type of educational process at the University. Individualization. Flexibility. Electivity. Contextual approach. Modern interactive teaching methods. Problem-situational teaching methods. Round table, discussion, debate. Brainstorming, brainstorming, brainstorming. Business and role play. Case-study (analysis of specific situations, situational analysis). Master class. Videoconference.

Learning Outcomes:

Learning Outcomes in EP (LOP)

LOP 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOP 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course

Learning Outcomes in Course (LOC)

LOC 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

LOC 2 To explain the methods of management and evaluation of professional qualities of the individual ,the system of relations of subjects of the organization of education; to present the results of research in a foreign language.

LOC 3 To know and have the skills to apply knowledge in the field of pedagogy, psychology, be ready to ensure the protection of the life and health of students in the educational process and extracurricular activities.

LOC 4 To know the fundamentals of physical and colloid chemistry, the thermodynamic bases of chemical processes.

LOC 5 To know the main stages and patterns of development of chemical science, an understanding of the objective necessity for the emergence of new trends, knowledge about the system of fundamental chemical concepts and methodological aspects of chemistry, forms and methods of scientific knowledge, its role in the general educational professional training of chemists.

LOC 6 To be able to compile thematic plans of elective courses in chemistry for specialized education in accordance with the curriculum of educational institutions, to develop the content and methodological equipment for this course

LOC 7 To make a program of scientific research ,justifying its goals and objectives; applying methodological tools in the process of scientific research; working with various sources of scientific and practical information; to develop research stages; analyzes the results, justifying recommendations and suggestions.

LOC 8 To interpret and compare experimental data obtained using innovative forms of teaching chemistry, to be able to show the role of these forms in the formation of the competence of future specialists.

Post requisites: General chemistry and teaching methods

Component of choice 5

Course: **General chemistry and teaching methods**
Intensity of the Course: 6 academic credits
Module Code: **MDC-504/2**
Module Name: **The main directions of modern chemistry**
Prerequisites: MTCh 5206.1 Methods for Teaching Chemistry.

Purpose: To acquaint undergraduates with scientific, technical, pedagogical information systems, to teach them to independently search for the necessary information using new information technologies.

Short Description: The subject and objectives of the course. Modern problems of teaching and learning. Training system: goals, content, methods, organizational forms, means, control of assimilation and diagnostics of the formed knowledge. The principles of teaching. Methods of teaching chemistry. Organizational forms of teaching chemistry. Means of teaching chemistry. Assessment and diagnostics of chemical knowledge qualities. Methods of studying the most important topics of General chemistry.

Learning Outcomes:
Learning Outcomes in EP (LOP)
Learning Outcomes in EP (LOP)

LOP 1 To present theoretical and methodological foundations of philosophy, management and management of personality psychology; theory and practice of speech professional communication in a foreign language.

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Post requisites: no

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Catalog of elective disciplines

Component of choice 6

Course: **Methodological aspects of teaching the course "Physical Research Methods"**

Intensity of the Course: 5 academic credits

Module Code: **MDCh-505/1**

Module Name: **The main directions of modern chemistry**

Prerequisites: MMETGICh 5301 Methodology and modern educational technologies of General andInorganic chemistry

Purpose: is to familiarize students with the scientific and technical, pedagogical information system, to teach them how to find the necessary information with the help of new information technologies. To acquaint undergraduates with scientific, technical, pedagogical information systems, to teach them to independently search for the necessary information using new information technologies.

Short Description: Methodology and methods of scientific research. Characteristics and classification of physical and chemical methods of analysis. Organization of the research process. Methods of studying the topic: "Chromatographic and spectroscopic methods of analysis". Methods of qualitative chromatographic analysis. Sampling and sample preparation. Methodological aspects of the study: optical methods

Learning Outcomes:

Learning Outcomes in EP (LOP)

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Component of choice 6

Course: **Kinetics of Electronic Processes**

Intensity of the Course: 5 academic credits

Module Code: MDC -505/2

Module Name: **The main directions of modern chemistry**

Prerequisites: MMPhChA 5302 Modem methods of physical and chemical analyzes

Purpose: To acquaint undergraduates with scientific, technical, pedagogical information systems, to teach them to independently search for the necessary information using new information technologies.

Short Description: Polarization and overvoltage. Double electric layer. Electrocapillary phenomena. Diffusion kinetics. Slow-discharge theory. Kinetics of complex electrochemical reactions. Electrochemical reactions with consecutive transfer of electrons. Kinetics of electrode processes involving metal complexes. Oxidation-reduction as an electronic process. Electrochemical processes in a slow chemical reaction

Learning Outcomes:

Learning Outcomes in EP (LOP)

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Post requisites: no

Component of choice 7

Course: **Methodology and technology of scientific research**
Intensity of the Course: 6 academic credits
Module Code: **BSR-501**
Module Name: **Fundamentals of scientific research methodology**
Prerequisites: MTCh 5206.1 Methods for Teaching Chemistry.
Purpose: To acquaint undergraduates with scientific, technical, pedagogical information systems,to teach them to independently search for the necessary information using new information technologies.
Short Description: The meaning and essence of scientific research. The classification of the Sciences. Relationship of the course with other disciplines. Differentiation and integration of science. Accelerated development of science. Methodological basis for determining the level of science in different countries. Level of development and main directions of scientific research in different countriesof the world. Organization of science in Kazakhstan. Legislative and regulatory acts regulating the basis of research activities. Methodology and methodology of scientific research. The essence of the research methodology. Principles and problem of research.
Learning Outcomes:
Learning Outcomes in EP (LOP)
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