ҚАЗАҚСТАН РЕСПУБЛИКАСЫ ҒЫЛЫМ ЖӘНЕ ЖОҒАРЫ БІЛІМ МИНИСТРЛІГІ

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РЕСПУБЛИКИ КАЗАХСТАН

THE MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN

ОҢТҮСТІК ҚАЗАҚСТАН МЕМЛЕКЕТТІК ПЕДАГОГИКАЛЫҚ УНИВЕРСИТЕТІ

ЮЖНО-КАЗАХСТАНСКИЙ ГОСУДАРСТВЕННЫЙ ПЕДАГОГИЧЕСКИЙ УНИВЕРСИТЕТ

SOUTH KAZAKHSTAN STATE PEDAGOGICAL UNIVERSITY

Университетінің Ғылыми кеңесінде бекітілген, кеңес төрағасы Оңтүстік Қазақстан мемлекеттік педагогикалық университетінің Басқарма төрағасы-Ректор, т.ғ.к., доцент

Утверждено на Ученом совете университета, председатель совета председатель Правления-Ректор Южно- Казахстанского государственного педагогического университета, к.и.н., доцент

Approved by the University Academic Council, Chairma of the Board-Rector of the So Kazakhstan State Pedagogic University, Candidate of Historical Sciences, Associat Professor

_____Г.Д.Сугирбаева

Хаттама № ___ «_____» 2022 ж. **Протокол № ____ «_____» 2022г.** **Protocol № ____ «_____» 202**

БІЛІМ БЕРУ БАҒДАРЛАМАСЫ

7М01504 ХИМИЯ ПЕДАГОГІН ДАЯРЛАУ

ОБРАЗОВАТЕЛЬНАЯ ПРОГРАММА

7М01504 ПОДГОТОВКА ПЕДАГОГА ПО ХИМИИ

EDUCATIONAL PROGRAM

7М01504 TEACHER TRAINING OF CHEMISTRY

Шымкент 2022

EDUCATIONAL PROGRAM 7M01504
TEACHER TRAINING OF CHEMISTRY

Code and classification of the field of education:	**7M01 Pedagogical Sciences**
Code and classification of training course:	**7M01504 Training of teachers in natural science subjects**
Awarded degree:	**Master of pedagogical sciences in the educational program 7M01504-"Teacher training in chemistry"**
Type of program:	**Magistracy, 7 level NQF/SQF/ISCE**
Total amount of credits:	**120 Academic credits**

The educational program was reviewed at the meeting of the council of the Natural Sciences Faculty and recommended for approval by the Academic Council of the University.

Protokol №_____ "_____" 2022 y.

The educational program was approved by the decision of the Academic Council of the University and put action.

Protokol №_____ "_____" 2022 y.

Agreed:

Member of the Board-Vice-Rector for Academic Affairs _____ Kudysheva A.A.

Member of the Management Board - Acting
Vice-Rector for Research and Innovation _____ Ualikhanov B.S.

Head of the Department of Academic Affairs,
Ph.D. _____ Berdaliev D.T.

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Dean of the Faculty of Natural Sciences _____ Saulembayev A.T

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M. Auezov South Kazakhstan University,
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Vice-Rector for Academic Affairs of the Central
Asian Innovation University Ph.D. Associate Professor _____ Duisenov N.Zh.

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" Zhas Galym – zhastar " _____ Toltebay A. Zh .

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Abbreviations:
NQF - National Qualifications Framework
IQF - Industry Qualifications Framework
ISCE - International Standard Classification of Education
EP - Educational Program
WC - Working curriculum
PED - Product elective disciplines
KC - Key competencies
LO - Learning Outcomes
ICT - Information and communication technologies
LC - Landmark control
CC – Current control
FG - The final grade
GED - General educational disciplines
BD - Basic disciplines
SD - Specialized disciplines

CONTENT

INTRODUCTION

The educational program (hereinafter - EP) of postgraduate vocational education EP7M01504 “Preparing Chemistry Teachers” is a normative document of a conceptual nature, based on the goals and values of university education. It contains general information about the professional activity of the student; the goals and objectives of the EP; graduate competency model; expected learning outcomes and their evaluation policies; methods and ways of organizing the educational process; content modules and disciplines.

Thedeveloped on the basis of the request of employers study program wasin accordance with the Klas-Sifikator of specialties of postgraduate education (magistracy), Teacher's Professional Standard, Dublin Descriptors Level 2, agreed with the 2nd cycle of the Qualification Framework of the European Higher Education Area (A Framework for Qualificationso fthe European Higher Education Area), the 7th level of the European Qualifications Framework for Lifelong Education (The European Qualifications Framework for Lifelong Learning) and the 7th level of the National Qualifications Framework of the Republic of Kazakhstan, taking into account the requirements regional labor market.

The main directions of the educational program:

- implementation of the educational policy of the university;
- high-quality training of highly qualified masters in demand on the international and national labor market;
- conducting fundamental research in the field of Russian linguistics and literary criticism;
- The introduction of a trilingual education at the university; expanding fluency in Russian and English to participate in international conferences, continuing education on academic mobility;
- the formation of the world of undergraduates, the development of their creativity, communication, critical thinking, research and information skills.

EP is the basis for the development of the following documents:

- catalog of elective disciplines (CED);
- academic calendar of the educational process;
- the individual curriculum (IC);
- working curriculum (WC);
- working curriculum discipline (syllabus);
- educational and methodical complexes of disciplines (EMCD);
- expected learning outcomes in the disciplines;
- criteria for evaluating the results of training in the disciplines;
- The organization of all kinds of professional practice, as well as other documents necessary for the organization of the educational process.

1 PASSPORT OF THE EDUCATIONAL PROGRAM

1.1 *The sphere of professional activity of graduate*

7M01504 "Preparing teachers of chemistry" carries out its professional activities:

- in organizations of secondary, higher and additional professional education, research, design organizations and production activities;
- research activities in the field of advanced training in accordance with the specialization , in manufacturing and in the field of education
-in the field of administrative activities in accordance with a master's qualification imii.

1.2 *Objects of the graduate's professional activity:*

- technical and vocational education organizations;
- organizations of higher and postgraduate education;
- pedagogical research institutions;
- Institutes of advanced training and retraining of education workers;

- governing bodies, authorized and local executive bodies, including education;
- state and non-state institutions related to the preparation of graduates of the scientific and pedagogical direction.

1.3 ***Types of graduate professional activity:***

- educational;
- research;
- organizational and managerial;
- educational;
- social and pedagogical.

1.4 ***The tasks of the graduate's professional activity***

In the field of educational activity:

- development and deepening of the theoretical and practical training of undergraduates, taking into account the updated educational programs;
- effective using modern methodologies professional training, design and management of the pedagogical process;
- diagnostics, correction and forecasting of the results of pedagogical activity, planning professional development;
- use of the latest educational IT-technologies;
- performing the functions of a teacher (specialist teacher) in organizations of technical, professional higher and postgraduate education.

In the field of research activities:

- study the level of assimilation of the content of education, directions and prospects for the development of pedagogical science;
- study of the achievements of world and Kazakhstan science in the professional field, analysis and synthesis of advanced teaching experience in the field of science and education;
- implementation of methodological support of theoretical disciplines;
- integration of knowledge gained in the framework of mastering special disciplines for solving research problems in new conditions;
- development of students' research skills, motivating them for educational, cognitive and design and research activities;
- conducting a pedagogical experiment, introducing its results into the educational process;
- generate their own new scientific ideas, transfer their knowledge and ideas to the scientific community, expanding the boundaries of scientific knowledge.

In the field of organizational and management activities:

- content planning and defining methods for organizing and implementing the educational process at different levels;
- possession of the basics of strategic human resource management, innovation management, theories of leadership and team management;
- analysis evaluation of the effectiveness of the educational process through LOitoring studies;
- the implementation of industrial relations with various organizations, including the bodies of state service;
- application in practice of legislation Republic of Kazakhstan at fields of education and science.

In the field of educational activities:

- active in the organization of the educational process in a professional environment in accordance with the laws, laws, principles, educational mechanisms of the pedagogical process;
- solving specific educational tasks using various forms and means of organizing a developing environment at different levels of education;
- organization of educational work on the basis of Kazakhstan patriotism and civil responsibility;
- Creation of favorable conditions for the provision of pedagogical support and the development of full-fledged life activity, education of students.

In the field of social and educational activities:

- the interaction with the professional community and all interested parties in education;
- the formation of a polycultural personality;
- observance of the pedagogical and scientific ethics of the research scientist;
- establishing relationships with student groups, partners, the scientific community based on the principles of respect, openness, mutual understanding.

2 FEATURES OF THE EDUCATIONAL PROGRAM

The program of postgraduate education 7M01504 “Preparing Chemistry Teachers” defines the purpose and objectives, expected results, conditions and technologies of the educational process, ways of implementation, assessment of the quality of graduate training in this area, the content of the working curriculum.

The implementation of the EP is provided by free access to international information networks, library collections and databases, computer technologies, scientific, educational and methodical manuals, developments on the modules taught and the implementation of a master's thesis.

3 GOAL AND VALUES OF THE EDUCATIONAL PROGRAM

3.1 *The purpose and objectives of the educational program*

The purpose of the educational program is to prepare competitive scientific and pedagogical personnel in the field ofteaching chemistry, possessing general cultural and professional competences in accordance with the requirements of the labor market.

Objectives of the educational program:

- the formation of key competencies necessary for the effective implementation of the professional activities of students;
- bringing the quality of postgraduate education in line with the requirements of national and international standards;
- providing fundamental theoretical and methodical training of highly educated specialists;
- the formation of professional knowledge and practical skills with the implementation of the tasks of the updated content of education;
- motivation for professional development, promoting the development of independence, self-actualization of creative potential, active participation in the modernization of Kazakhstan society.

3.2 *Values of the educational program*

Values defined in the content of postgraduate study EP:

- Kazakhstan patriotism and civil liability;
- respect for national values;
- universal and social personality traits;
- awareness of the social significance of the future profession;
- motivation for personal, professional self-development;
- cooperation, openness, multiculturalism.

4 GRADUATE MODEL

1. subject knowledge: deep and complete understanding of the subject area, application of knowledge in professional activity.

2. organizational and methodological skills: uses innovative technologies in planning, organization and management of professional activities, shows critical thinking and creativity in solving complex problems.

3. research skills: conducts scientific and methodological research work, instills students in research work.

4. leadership and entrepreneurial skills: the team can also work, be active in the renewal of society.

5. cultural competence: has the ability to become a cultural and tolerant citizen of his country.

6. the ability to learn throughout life: coordinating their talents and interests with the needs of society.

7. information skills: understands the essence of the information society, uses ICT in professional activities.

5 EXPECTED LEARNING RESULTS FOR THE EDUCATIONAL PROGRAM

As a result of the successful completion of the educational program 7M01504 "Preparing Chemistry Teachers" the graduate must become a graduate specialist in demand in the modern labor market.

The results of training in the educational program:

LO1: to know and apply developing knowledge and understanding in the field of chemistry teaching in the development and application of ideas in the context of research, as well as research methods and academic writing in the field being studied;

LO2: apply the knowledge, understanding and ability to be creative in new, non-standard professional situations in a wider interdisciplinary context;

LO3: ability to deLOstrate team work skills and a culture of academic integrity, foreign language proficiency to form your own opinion taking into account social, ethical and scientific ideas;

LO4: organize clear and precise public communication of ideas, conclusions, and solving problems of your research work;

LO5: integrate cross-disciplinary knowledge for independent continuation of further education in the field ofteaching chemistry.

DUBLIN DESCRIPTORS SYSTEM IN THE EDUCATIONAL PROGRAM

Dublin Descriptors	Learning Outcomes	Competences
1. Knowledge and understanding	DeLOstrate developing knowledge and understanding of research methods in the field of chemistry teaching, ensuring a constant expansion of the boundaries of scientific knowledge.	Expansion of knowledge
2. Application of knowledge and understanding	Apply the knowledge, understanding and ability of a creative approach in new non-standard professional situations in a wider interdisciplinary context.	Increased knowledge
3. Expression of judgments	DeLOstrate an information culture, knowledge of a foreign language to form one's judgments taking into account social, ethical and scientific considerations.	Systemic

4. Communicative abilities	Organize a clear and precise public communication of ideas, conclusions and solving problems of their research work.	Communicative
5.abilities Learning	Integrate intersubject knowledge for independent continuation of further education in the field of chemistry teaching	Systemic

6 POLICY EVALUATION OF ACADEMIC ACHIEVEMENTS

The technology of criteria-based assessment is used for all types of students' educational achievements control (everyday, midterm and final). The assessment is carried out according to the letter-point system showed at the table below

Students' educational achievements point-rating and letter evaluating system, their conversion into the traditional grading scale, ECTS

Evluation by letter system	Digital equivalent	Points (% content)	Evaluation according to the traditional system
A	4,0	95-100	
A-	3,67	90-94	excellent
B+	3,33	85-89	excellent
B	3,0	80-84	
B-	2,67	75-79	
C+	2,33	70-74	
C	2,0	65-69	satisfactory
C-	1,67	60-64	
D+	1,33	55-59	
D-	1,0	50-54	
FX	0,5	25-49	unsatisfactory
F	0	0-24	

The semester long students' educational achievements evaluation is carried out 3 times during one semester every 5 weeks. In each period of the current control, the teaching staff evaluates students at practical, laboratory, seminar, SSW (SSWT/SSW) and other classes, the total score of each final week of the current control is automatically displayed in the Univer system

The final ranking score for the semester is the sum of 20% of the total sum of the three final weeks of control. It makes up 60% of the final assessment of the student, and he gains the remaining 40% on the exam.

The student will be admitted to the exam only if he scores at least 30 points (passing point 0.2 * (CC1 + CC2 + CC3) ≥ 30 points) from the current control

The result of the interm attestation is calculated by the following formula:

the current control 1 (**CC1**)≤100
the current control 2 (**CC2**))≤100
the current control 3(**CC3**)≤100
Exam (**E**))≤100

Final assessment (FA) = 0,2*(CC1+CC2+CC3)+0,4*E

The conformity of the learning outcomes and assessment methods

Learning outcome	Evaluation method
ON 2, 3	Personal assignment
ON 4, 5	Portfolio
ON 1,2,3,4,5	Practice report
ON 1,2,3,4,5	Boundary control
ON 1,2,3,4,5	Final certification

7 METHODS AND METHODS OF ORGANIZING THE EDUCATIONAL PROCESS

The organization of the educational process is carried out according to the credit technology on the basis of the electiveness of the disciplines and the order of mastering the modules, carrying out the independent work of the undergraduate, teaching and research practice, preparation and defense of the master's thesis.

Objectives of the organization of the educational process:

- unification of the volume of knowledge;
- creation of conditions for maximum individualization of training;
- strengthening the role and effectiveness of independent work of students;
- identification of educational achievements of a student on the basis of an effective and transparent procedure for LOitoring their scientific and educational activities.

Opportunities for training on credit technology:

- the introduction of a system of academic credits to assess the labor costs of students and teachers in each discipline;
- participation in the formation of an individual curriculum;
- the choice of a component of the module in the catalog of elective disciplines;
- Freedom of choice for a teacher;
- choice of educational trajectory with the help of an adviser;
- use of interactive teaching methods;
- academic freedom in the formation of educational programs;
- providing the learning process with the necessary EMCS;
- The use of effective methods of LOitoring student achievement;
- the use of a point-rating system for evaluating educational achievements in each discipline and other types of independent work.

Applied teaching methods and technologies.

Mastering EP provided by pedagogical *technologies*:

- *Acmeological* (technology to achieve success, high results);
- *psychotechnology* (development of skills for constructive creative actions based on critical, associative, abstract thinking);
- *informational* (implemented on the basis of the AIS "UNIVER 2.0" when using training resources, presentations, conducting automated testing; NER on the Bilim Media Group portal);
- *ttechnology interactive learning*.

The followingare used as components of these technologies *methods*:

- *reflexive*;
- *research* (learning through discovery);
- *training*;
- *project*;
- *Case study* and others.

Types of used methods and technologies of training are chosen by the teacher independently.

The system of internal quality assurance of the educational activity of a graduate student is determined by:

- a quality policy;
- development and approval of educational programs being implemented;
- student-centered learning, teaching and assessment;
- admission of students, performance, recognition and certification;
- teaching staff;
- learning resources and student support system;
- information management;
- public information;
- continuous LOitoring and periodic evaluation of programs;
- periodic external quality assurance.

Professional practice

Mandatory component of EP 7M01504 "Preparing Chemistry Teachers" is the practical training of undergraduates, providing for *teaching* (in the amount of not less than 5 credits) and *research* (in the amount of not less than 10 credits) practice, as well as professional (scientific) *internship*.

The purpose of pedagogical practice is the acquisition of practical skills of the professional and pedagogical activity, the strengthening of the motivation for pedagogical work in an educational institution (including higher education).

Requirements for competences (*pedagogical practice*):

1) specialist:

- on the main methods of psychological and pedagogical research;
- to have an idea about the theoretical foundations of the design and conduct of psychological and pedagogical research;

2) specialist:

- apply the basics of teaching on educational programs and advise the most experienced colleagues;
- know the principles of organization of independent work of students and methods of organization of research activities;

3) specialist:

- be able to make personal choices in specific professional situations;
- to carry out teaching activities on educational programs, advising the most experienced colleagues;
- to be able to determine the educational goals, types of classes, to use different types of organization of educational activities of students; to assess the effectiveness of educational activities, to choose forms of control and use diagnostics;

4) specialist:

- methods and technologies of organization and evaluation of the results of research activities;
- skills of realization of educational programs;
- fundamentals of scientific-methodical and educational-methodical work: structuring skills and psychologically competent transformation of scientific knowledge into educational material, systematization of educational and educational tasks ;
- to possess methods and methods of drawing up tasks, exercises, TES-tov on various subjects, oral and written presentation of subject materials, various educational technologies.

Report on the results of pedagogical practice

Certification of the results of pedagogical practice is carried out on the basis of a written report, diary and comment on the internship, drawn up in accordance with the established requirements, compiled by the practice head. In a review, the manager assesses the development of skills in pedagogical activity, attitudes towards work performed, and practice (degree of

responsibility, independence, creativity, interest in work, etc.). The report on pedagogical practice should contain information on the specific work performed during the internship period.

The research practice of the undergraduate is conducted in order to study the latest theoretical, methodological and technological achievements of domestic and foreign science, as well as consolidate practical skills, apply modern methods of scientific research, process and interpret experimental data in the dissertation research. The content of research practice is determined by the theme of the dissertation (project) research.

During the period of research practice the undergraduate must prepare independently 4-5 abstracts (each of not less than 50 pages) with their own conclusions and conclusion: on the latest theoretical achievements of domestic and foreign science; on the latest methodological achievements of domestic and foreign science; on technological (innovative) achievements of domestic and foreign science; on the application of modern methods of scientific research, processing and interpretation of experimental data using computer technology.

Requirements for competences (*research practice*):

1) have an idea about the possibilities of advanced scientific methods and their use at the level required in the study of pedagogical problems; about research, innovation activities in the field of vocational training;

2) know the wording of the initial prerequisites, the initial concept, the rationale for the choice of the topic, purpose and main objectives of the study; methods of literary search, generalization and systematization of data published on the subject under study, as well as their note-taking, summarization and discussion of the problem with the supervisor; the current state and prospects of development of educational processes, features of the activities of a vocational training institution; research methods of pedagogical processes; achievements of science and technology of education, advanced domestic and foreign experience in the field of vocational education.

3) to be able to formulate and solve problems arising in the course of research and educational activities and requiring in-depth professional knowledge; select the necessary research methods, modify existing and develop new methods, based on the objectives of a specific study; process the obtained experimental results, analyze and interpret them taking into account the available literature data; to conduct bibliographic work with the involvement of modern information technologies; present the results of the work done in the form of reports, abstracts, articles, designed in accordance with the existing requirements, with the involvement of modern editing and printing tools; to make educational and methodical complexes of disciplines; rationally organize the conduct of all types of training sessions;

4) have the skills to plan and conduct research; use of foreign languages in the amount necessary for the implementation of research activities;

5) to be competent in matters of organization, planning, conducting scientific activities.

Report on the results of research practice The

certification on the results of the practice is carried out on the basis of a written report, diary and review of the internship prepared in accordance with the established requirements by the supervisor. At the initial stage, the supervisor assesses the formation of research skills, attitudes towards work, practice (degree of responsibility, autonomy, creativity, interest in work, etc.), which he sets out in the recall.

Attestation on the results of practice

According to the results of professional practices at the department (scientific seminar), reports are being protected with the participation of all undergraduates of one specialty or one direction.

The results of professional practices are evaluated by the results of protection. The head of the practice, on the basis of a review of its results and the report of the undergraduate, makes a conclusion about the quality of the undergraduate's practice and gives a mark in the form of a differentiated test. Evaluation of the practice is recorded in the examination sheet and IPK "Univer 2.0", is equal to the estimates of theoretical training and is taken into account when summing up the

overall academic performance of undergraduates and assignment to a scholarship in the relevant semester.

Criteria for assessing the quality of the practice carried out by the undergraduate trainee:

1. The overall assessment of the practice performed is derived based on the arithmetic average of the scores for all assessment indicators of the practice.

2. Evaluation criteria (average score) for all positions:

3.5 - the practice carried out does not meet the modern requirements of the organization of the educational process at the university;

3.6-3.9 - general conclusion: the practice carried out meets the modern requirements of the organization of the educational process at the university;

4.0-4.5 - a general conclusion: the practice carried out fully meets the modern requirements of the organization of the educational process at the university;

4.6-5.0 - general conclusion: the practice is qualifying and meets the modern requirements of the organization of the educational process at the university.

8 RESEARCH WORK OF THE MASTER

The educational program 7M01504 “Preparing Chemistry Teachers” contains a research paper, including the implementation of a master's thesis, which should:

1) correspond to the main problems of the specialty for which the master's thesis is defended;

2) be relevant, contain scientific novelty and practical significance;

3) to be based on modern theoretical, methodological and technological achievements of science and practice;

4) performed using modern research methods;

5) contain research (methodological, practical) sections on the main protected provisions;

6) based on international best practices in the relevant field of knowledge.

The results of research work at the end of each period of their passage are recorded by a graduate student in the form of a report. According to the results of the research and development work carried out at the department (scientific seminar), reports are being protected with the participation of all undergraduates of one specialty or one direction.

Within the framework of the research and development work, the individual work plan of the undergraduate to get acquainted with innovative technologies and new types of production provides for the mandatory *scientific internship* in scientific organizations and / or organizations of relevant industries or fields of activity.

The final result of the research work of the undergraduate is a master's thesis (master's project).

9 CONTENTS EDUCATIONAL PROGRAM

9.1 *Compliance of the educational results with the educational program to the formed competencies*

The learning outcomes defined in the EP form the competencies acquired by the undergraduate after the completion of the program.

Matrix of correlation of learning outcomes of the educational program as a whole with the formed competencies

LO / FC	LO 1	LO 2	LO 3	LO 4	LO 5
FC 1				+	
FC 2			+		
FC 3		+			
FC 4	+				
FC 5	+				
FC 6					+

9.2 Module Information

№	Naim, availability of module	components Module	Briefdescription module	Module learning outcomes	Cycle	Number of credits	Formed competencies (Code)
1	Professional and Humanities disciplines (PHD 01)	History and philosophy of science Foreign language (professional) Pedagogical and psychological education (Higher School Pedagogy / Management Psychology) Pedagogical practice	The module examines the prerequisites for the development of scientific knowledge, philosophical-methodological, anthropological aspects of scientific research; place of psychology in the system of educational sciences; psychological issues of professional activity; fundamentals of management psychology; general issues of higher education pedagogy, theoretical and methodological foundations of educating students. The purpose of the pedagogical practice	LO 1 - demonstrate knowledge in the field of history and philosophy of science; LO 2- apply a foreign language in oral and written forms to solve problems of professional activity; LO 3- to analyze various non-standard situations in the field of higher education pedagogy; LO 4- assess the quality of psychological management in education; LO 5- interpret scientific methods and research techniques in the context of the interaction of the disciplines of the module.	BD/ EC	15	KC1, KC2, KC5

			of undergraduates is the acquisition of practical skills and competencies of professional and pedagogical activity, strengthening of motivation for pedagogical work in an educational institution, including in higher education.				
2	Modern methods of teaching chemical sciences (MMTCS 02)	1. Theoretical aspects of modern inorganic chemistry 2. Basics of applied chemistry 1. Current aspects of teaching chemistry at the university 2. Technology for solving experimental problems in chemistry 1. Methods of implementation of green chemistry processes and out-of-laboratory analysis 2. Toxicology and environmental chemistry	The main stages of the development of modern inorganic chemistry over the past hundred years, new priorities for the development of chemical processes, modern topical problems of chemistry, fundamental laws of chemistry, scientific foundations of the chemical industry, modern scientific content of education, methods, ways of creating experimental problems, basic methods of designing "green" chemical processes, modern scientific principles of chemical processes are considered, ensuring the reduction and elimination of negative impact on the environment. The analysis of theoretical conclusions, collection of experimental results, proof, application in practice, integration of interdisciplinary knowledge, methods of using ICT capabilities in the	LO 1- DeLOstrates knowledge and understanding of theoretical aspects of modern inorganic chemistry and fundamentals of applied chemistry; LO 2- Analyzes the sequence of stages of an experiment in chemistry LO 3- generates reports in different ways. LO 4- uses professional communication skills and the ability to work in a team. LO 5- systematizes and evaluates the results obtained. LO 6- analyzes the technology and experimental methods for the production of chemicals from the point of view of their safety for the environment and humans;	BD	15	

			formation of knowledge, skills and abilities in teaching chemistry are described.				
3	Theoretical foundations of modern chemistry (TFMC 03)	Methodology and modern technologies of teaching general and inorganic chemistry 1. Theoretical foundations of modern analytical chemistry 2. Chemistry of organoelement compounds 1. Actual problems of modern physical chemistry 2. Kinetics and thermodynamics of chemical processes 1. Theoretical foundations of modern organic chemistry 2. Theoretical and applied aspects of chemical technology	The features of the content of the formation of theoretical foundations in general and inorganic chemistry, the practical formation of a scientific worldview, elements of ecological culture, modern methodological methods, structural and logical connection of educational material with a known sequence, synthesis of research methods of modern analytical chemistry, chemistry of organoelement compounds, determination of their structure and reactivity, reaction mechanisms, determination of the mechanism and structures of compounds in organic chemistry methods, problematic issues of stereochemistry, basic laws of chemical processes. The article describes communication skills in the implementation of project work, ways of applying theoretical data in practice, collecting, analyzing and evaluating the results of the experiment and research.	LO1-uses innovative methods and technologies in the process of teaching general and inorganic chemistry. LO2-develops skills of conscious application of knowledge. LO3-uses modern information technologies in solving practical tasks for the implementation of chemical processes; LO4-masters the skills of quantitative and qualitative analysis, systematizes and evaluates the results obtained. LO5-analyzes the essence of chemical experiments and physico-chemical research methods, solving comproblems. LO 6-collects the results of experiments and research to differentiate the characteristic features of chemical processes. LO7-explains the chemistry of chemical bonds and reactivity used in organic chemistry.	BD	22	

	Problems of modern research and modern chemical science (PMRMCS04)	Research methods and Academic Writing 1. Methods of investigation of organic compounds 2. Modern physico-chemical research methods 1. Actual problems of modern colloidal chemistry 2. Chemistry and thermochemistry of solutions	The purpose of studying the discipline "methods of scientific research and academic writing" is to form students' skills of structural presentation of their ideas, mastering the techniques of working with various scientific and informational texts, taking into account the specifics of academic discourse. The discipline forms the written culture, critical thinking skills and linguistic and pragmatic competencies of undergraduates, improves the culture of writing through the language they speak, gives an idea of the principles and culture of academic integrity. The research studies the technologies of the	LO 3-understands the laws of written speech, defines the features of written scientific communication. LO 4-uses knowledge and understanding at a professional level, solves current problems of the industry and explains the opinion in a reasoned manner. LO 5-uses theoretical and practical knowledge, research methods to solve educational, practical and professional tasks of the industry. LO 6- generalizes and interprets information in order to form judgments taking into account socio-ethical and scientific forecasts: LO 7- develops knowledge by acquiring the skills necessary to continue the independent development of the industry in the future;	BD	27	

			application of modern information technologies and the organization of research work. Analysis and identification of methods for the study of organic compounds, the study of current problems of electrokinetic phenomena and colloidal chemistry in modern colloidal chemistry, thermochemistry of solutions – the thermal effect of chemical reactions and the dependence of elements during the reaction on physico-chemical parameters. The ways of applying knowledge in practice, analyzing the solution of the problem, integrating interdisciplinary knowledge based on a critical approach to creating reasoned arguments about theoretical conclusions are described.	6. conducts scientific and expert evaluation of the text, adhering to the culture of academic honesty.			
5	research work of the Master (RWM 05)	The research work of the undergraduate, including the implementation of the master's thesis	The content of the research work of the Master should correspond to the problems of the specialty, be relevant, have a scientific novelty and practical significance; be based on theoretical,	- subject to critical analysis, verification of theoretical, practical judgments of opponents; - to argue conclusions based on their own observations at various stages of the study; - interpret and objectively evaluate	RWM	24	KC1, KC4, KC6

			methodological and technological achievements of science and practice; include modern methods of processing and interpreting data using information and computer technologies; contain research (methodological, theoretical, practical) sections on the main protected provisions.	scientific information; - to rank the research, analytical and pedagogical work of the undergraduate; - practice the experimental activities of a researcher who owns modern tools of science.			

9.3 Information about the disciplines

№	Name of the discipline	Brief course of the discipline	Cycle / component	Number of credits	Formed learning outcomes (Code)				
					ER 1	ER 2	ER 3	ER 4	ER 5
CYCLE OF BASE DISCIPLINES University Component									
1	History and philosophy of science	Discipline studies the development processes of philosophical thoughts of various times of humanity. We consider the philosophical concepts and theories from ancient times to our time, their influence on modern science. The basis of the study of the subject of the history of philosophy and science lies in the philosophical understanding of the scientific picture of the world, which ensures a constant renewal of the boundaries of scientific knowledge.	BD/ EC	4		+			+
2	Foreign language (professional)	The course is aimed at expanding the boundaries of scientific knowledge through the formation of intercultural, communicative and functional competencies of undergraduates; Improving the skills of interpreting the results of our own research work by foreign language resources for the development of the latest trends in chemistry and the recognition of scientific achievements in both the national and international educational space.	BD/ EC	5			+		+

3	Pedagogical and psychological education (Higher School Pedagogy / Management Psychology)	Discipline examines the direction, the structure of the study of pedagogy of higher education, the system of general epistemological studies; New methods and empirical base for the development of pedagogy through the use of tools of professional-pedagogical dialogue; directions and principles of modern psychological management, the choice of strategies for cooperation with social partners; the formation of personality at the stages of ontogenesis, special patterns of pedagogical and psychological education.	BD/ EC	6		+			+
4	1. Theoretical aspects of modern inorganic chemistry	Considers the main stages of development of modern inorganic chemistry in the last century, the emergence of priorities of chemical processes, the analysis of the solution of actual modern problems of chemistry, new aspects of chemical reactions, real possibilities in various spheres of production and consumption. Improves knowledge by organizing public coverage of research results and problem solving;	BD/ EC	5	+			+	+
	2. Basics of applied chemistry	Examines the laws of fundamental chemistry, chemical methods and methods of using chemicals in industry, agriculture, as well as in everyday life. Improves knowledge by organizing public coverage of research results and problem solving;							
5	1. Actual aspects of teaching chemistry in high school	Topical aspects of the theory, methodology and practice of chemical education are considered. In the context of modern requirements, special attention is paid to the didactic, methodological and technological bases of teaching chemistry. To solve professional problems in non-standard conditions, it implies a creative approach to the analysis and public publication of problematic solutions to ideas.	BD/ EC	5	+	+		+	+
	2. Technology of solving experimental problems in chemistry	In the process of studying the discipline develops the creative potential of the individual, the solution of creative tasks, intellectual abilities of undergraduates in chemical science, forms the skills to solve chemical experimental problems, improves the methods of constructing tasks of varying complexity. Defines							

		ways of preparing and submitting chemical projects for publication.							
6	1. Methods for the implementation of green chemistry and off-laboratory analysis	The fundamental educational system, which provides the possibility of choosing and drawing up the conditions for carrying out chemical processes, involves the study of the basic methods of constructing chemical reactions, processes, chemical processes that ensure the reduction and elimination of negative environmental impacts. Characterized by modern scientific principles, ways of public presentation of solutions to environmental problems of experimental, technological approaches. Interdisciplinary knowledge integrated.	BD/ EC	5	+			+	+
	2. Toxicology and environmental chemistry	The issues of preventing chemical processes contained in the atmosphere, water, soil, chemical pollution, cleaning emissions of waste gases, wastewater, the negative effects of organic, inorganic, organoelement toxicants on human health are considered. Characterized by modern scientific principles, ways of public presentation of solutions to environmental problems of experimental, technological approaches. Interdisciplinary knowledge integrated.							
7	Methodology and modern technologies of teaching general and inorganic chemistry	The use of NER in general and inorganic chemistry provides for the peculiarities of the content of education, the scientific world outlook, the practical formation of an environmental, information culture, modern methodological methods, and the structural and logical connection of educational material in a certain sequence. Methods and methods of teaching are analyzed, professional knowledge and creative abilities are improved. The organizational forms of learning and the mechanisms for the implementation of results-based education are analyzed.	BD/ EC	6	+	+	+		+
8	1. Theoretical foundations of modern analytical chemistry	We consider the methods of scientific research of modern analytical chemistry, the improvement of existing methods, the design of new devices, the synthesis of new reagents. Ways of integrating interdisciplinary knowledge and using ICT with modern equipment to form their own opinions on methods of analysis are described.	BD/ EC	5	+		+		+

	2. Chemistry of organoelement compounds	The structure of the synthesis of chemistry of organoelement compounds, reactivity, the fundamentals of physical methods for studying reactions, and the structure of molecules in organoelement compounds when interpreting experimental results when determining reaction mechanisms are considered. Ways of integrating interdisciplinary knowledge and using ICT with modern equipment to form their own opinions on methods of analysis are described.							
9	1. Actual problems of modern physical chemistry	Directivity, flow, speed of modern chemical processes, nature of the environment, impurities, radiation, etc. b. the basic laws of the definition of the reaction products. In non-standard situations, professional knowledge, ideas and creative abilities are applied in practice. The ways of integration of interdisciplinary knowledge, critical analysis of problem solutions are being implemented.	BD/ EC	6	+	+			+
	2. Kinetics and thermodynamics of chemical processes	The kinetics of chemical processes, the main kinetic methods for the analysis of chemical, phase transformations in macroscopic systems are considered. Based on the applied knowledge, the method of constructing a kinetic model of processes in multicomponent, multiphase systems, professional knowledge, concepts and creative abilities in non-standard situations is used. The ways of integration of interdisciplinary knowledge, critical analysis of problem solutions are being implemented.							
10	1. Theoretical foundations of modern organic chemistry	Examines the mechanism and methods of reactions in organic chemistry, the problematic issues of the stereochemistry of organic compounds, the laws of electronic bias, methods of protection and regeneration of functional groups in organic reactions. Able to use knowledge, creative abilities to solve theoretical and synthetic problems of modern organic chemistry, integrate interdisciplinary knowledge, characterize ways of presenting information culture.	BD/ EC	4		+	+		+
	2. Theoretical and applied aspects of	We consider the laws of applied aspects of the development of basic chemical-technological processes, methods of organizing processes, information about							

	chemical technology	the raw materials of the chemical industry, sources of water, air and energy. To solve professional problems in the production of basic products of inorganic, organic synthesis, it is able to use knowledge and creative abilities, interdisciplinary knowledge is integrated, and ways of presenting information culture are characterized.							
11	Research methods and Academic Letter	The purpose of studying the discipline " Research methods and Academic Letter" is to train students in the structural presentation of their own ideas, to master ways of working with various scientific and information texts taking into account the specifics of academic discourse. The discipline forms the culture of writing, critical thinking skills and linguistic-pragmatic competences in the master 's degrees, improves the written language culture through the language of which it is the medium, and provides insight into the principles and culture of academic integrity.	BD/ EC	5	+	+			+
	1. Research Methods of Organic Compounds	Examines the fundamental knowledge of the basic methods for the study of organic compounds, the actual problems of studying the chemical analysis of organic compounds, the characteristics of organic compounds and the principles of operation of the devices. In the modern study of organic compounds, the problems of physicochemical methods and chemical analysis are solved, the results are presented for publication and interdisciplinary knowledge is integrated.							
12	1. Methods of investigation of organic compounds	research of organic compounds, actual problems of research of chemical analysis of organic compounds, characteristics of organic compounds and principles of operation of devices. In the modern study of organic compounds, the issues of physico-chemical methods and chemical analysis are solved, the results are submitted for publication and interdisciplinary knowledge is integrated.	BD/ EC	6	+			+	+
	2. Modern physico-chemical research methods	The essence of modern physico-chemical methods, modes of operation of devices, circuits, apparatuses, the law of light absorption, chromatography method, IR, NMR spectroscopy, photoelectrocolorimeter, scheme,							

		characteristics and principles of operation of devices, methods of constructing graded graphs are considered. Modern research provides ways to integrate physico-chemical methods, solve problems of chemical analysis, formalize results and interdisciplinary knowledge.							
13	1. Actual problems of modern colloid chemistry	In modern colloid chemistry, the actual problems of electrokinetic phenomena and colloid chemistry, various properties and surface phenomena of highly dispersed systems are considered. Practical knowledge is being applied to solve professional problems in various branches of the production of colloid chemistry, problem analysis, and ways of integrating interdisciplinary knowledge.	BD/ EC	6	+	+			+
	2. Chemistry and thermoche mistry of solutions	Thermochemistry of solutions provides the thermal effect of chemical reactions and dependence on the physicochemical parameters of elements in walking, phase transitions of heat, dissolution, compounds and other processes, heat capacity, enthalpy and entropy of substances. To solve professional problems, the ways of practical application of knowledge, analysis of problem solving, integration of interdisciplinary knowledge are being implemented.							

9.4 The working curriculum of the educational program