

**EDUCATIONAL PROGRAM  
6B01508 TEACHER TRAINING OF  
MATHEMATICS-PHYSICS**

<b>Code and Classification of the field of education:</b>	6B01 Pedagogical Sciences
<b>Code and classification of training course:</b>	6B015 Teacher training of in natural sciences subjects
<b>Awarded degree:</b>	Bachelor of Education in the educational program 6B01508 Teacher training of Mathematics-Physics
<b>Type of program:</b>	Bachelor, the 6 <sup>th</sup> level NQF/ SQF / ISCE
<b>Total amount of credits:</b>	240 Academic credits / 240 ECTS

The educational program was reviewed at the Council of the Physics and Mathematics Faculty and recommended for approval by the Academic Council of the University.

Protocol No 09 « 26.04 » 2023

The educational program was reviewed by the Academic Council of the University and recommended for approval by the Board

Protocol No 11 « 26.04 » 2023

The educational program was approved by the decision of the Board and put into effect.

Protocol No 12 « 22.05 » 2023

**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*

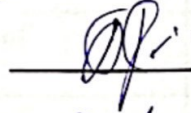
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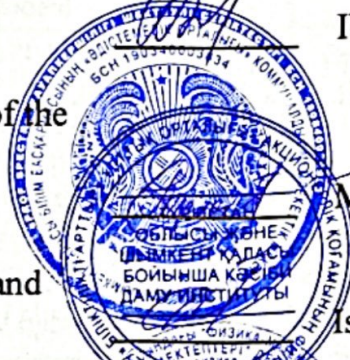
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## INTRODUCTION

This educational program (hereinafter - EP) is a normative document of a conceptual nature, based on the goals and values of university education, containing general information about the professional activities of graduates, aims and objectives of EP of competence graduate model, the expected learning outcomes and policies of their evaluation of methods and methods of organization of educational process on the content of the program.

The main directions of EP:

- implementation of the educational policy of the University;
- implementation of trilingual education through the organization of educational process in the Kazakh, Russian and English languages;
- improving the quality of the learning process on the basis of competence approach;
- the willingness of students to educate themselves throughout their lives;
- formation of the outlook of students, develop their creativity, communication, critical thinking, research and information capabilities.

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

- Catalog elective subjects (CES);
- Academic calendar of the educational process;
- Individual educational plan (IEP);
- Working curriculum (WC);
- Working curriculum subjects (SYLLABUS);
- Teaching materials disciplines (TMD);
- expected results in the disciplines of learning;
- criteria for assessing the results of training in the disciplines;
- organizing all kinds of professional practice, as well as other documents necessary for the educational process.

## 1 PASSPORT OF THE EDUCATIONAL PROGRAM

### 1.1 Scope of professional activity of graduates

Bachelor of Education OP 6B01508- « Teacher training of mathematics-physics» carries out his professional activities in the field of education.

### 1.2 The objects of professional activity of graduates:

- basic and specialized schools;
- specialized schools;
- the organization of technical and vocational post-secondary education.

### 1.3 Types of professional activity of graduates:

- training;
- educative;
- methodical;
- research;
- social and communicative.

### 1.4 Objectives of professional activity of graduates

#### *Training:*

- training and development of students;
- the organization of educational process in professional activities;
- design and management of the pedagogical process;
- diagnosis, correction and prediction of the results of educational activities.

#### *Educative:*

- the involvement of students in the system of social values;
- implementation of educational work in accordance with the laws, the laws, the principles of the educational process, educational mechanisms;
- planning extracurricular educational work;
- addressing specific educational objectives;
- the use of various forms and methods of training and education of students in extracurricular activities;
- liaising with groups of students, subject teachers and parents.

#### *Methodical:*

- implementation of methodological support of the educational process;
- planning the content of education at different levels;
- identification of methods for the organization and implementation of the educational process;
- the use of new educational technologies in the learning process.

#### *Research:*

- the study of the level of assimilation of the content of education, the study of the educational environment;
- the development of scientific and methodical literature;
- analysis and generalization of the advanced pedagogical experience in the field of education;
- conducting of pedagogical experiment, the introduction of its results in the educational process.

#### *Social and communicative:*

- the implementation of cooperation with the professional community and all interested education stakeholders;
- the formation of a multicultural identity;
- creation of favorable conditions for education and development of students and provide them with educational support.

## 2 FEATURES OF THE EDUCATIONAL PROGRAM

Subdivision of higher education 6B01508- « Teacher training of mathematics-physics» was developed in accordance with the European Qualifications Framework, National Qualifications Framework, the Dublin descriptors, Industry frame of qualifications, professional teacher standards to meet the requirements of the regional labor market and employers.

OP determines goals, expected results, conditions and techniques of the educational process, the realization of quality assessment preparation graduate in this area, the contents of the working curriculum.

Features of OP: Presentation of the graduate's competence model taking into account the competence approach based on the modern educational paradigm. The competence model corresponds to three main goals defined in accordance with the strategic development plan and the mission of the University. As a result of the development of the educational program aimed at the formation of General cultural, professional and special competencies of the graduate, the expected results of training are determined. In the content of the OP, on the basis of the updated educational program, the share of methodical disciplines is increased.

## 3 PURPOSE AND VALUES EDUCATION PROGRAM

### 3.1 The purpose and objectives of the educational program

The main objective of OP is defined in accordance with the objectives of the Strategic Plan and the development of the University's mission.

**Purpose of the Educational Program:** Preparation of the teacher of mathematics and physics in accordance with the requirements of the labor market and the National qualification system.

#### **Tasks of the educational program:**

- formation of core competencies needed for effective implementation of the professional activities of students;
- the formation of social responsibility training based on interpersonal values and professional ethics;
- bringing the level of quality of education in line with the requirements of national and international standards on the basis of motivation of training to professional development, self-realization;
- the formation of students' professional knowledge and practical skills based on the updated content of education;
- providing training of highly educated professionals who are actively involved in the modernization of society on the basis of language trinity, functional literacy, healthy lifestyle.

### 3.2 Values of the Educational Program

The core values defined in the contents of EP:

- Kazakhstan patriotism and civic responsibility;
- Honesty;
- respect;
- cooperation;
- openness.

## 4 GRADUATE MODEL

1. **Subject knowledge:** wide and deep understanding of their subject area, applies the knowledge in their professional activities.
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 work, attracts students to research work.



4. **Leadership and entrepreneurial skills:** able to work in a team, is active in the renewal of society
5. **Cultural competence:** has the ability to be a cultural and tolerant citizen of his country.
6. **The ability to learn throughout life:** coordinating their talents and interests in accordance with the needs of society.
7. **Information skills:** understands the essence of the information society, uses ICT in professional activities.

## 5 EXPECTED RESULTS TRAINING ON EDUCATIONAL PROGRAMS

**Learning outcomes of OP:** Upon successful completion of this OP student must:

- ✓ **LO1** – demonstrate subject knowledge and understanding based on advanced knowledge in teaching subject;
- ✓ **LO2** – apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of teaching subject;
- ✓ **LO3** – know and understand facts, theories, and dependencies between them in teaching subject;
- ✓ **LO4** – argue the role and place of the subject in real life and in the system of sciences and understand the significance of the principles and culture of academic honesty;
- ✓ **LO5** – apply pedagogical knowledge and understanding at the professional level, formulate arguments and solve problems of educational activity;
- ✓ **LO6** – apply innovative technologies, ICT, methods and techniques of criteria assessment and diagnostics in teaching subject;
- ✓ **LO7** – know the methods of scientific research and academic writing and apply them in teaching subject, in interpersonal communication and in teamwork;
- ✓ **LO8** – collect and interpret information for the formation of judgments, taking into account social, ethical and scientific considerations;
- ✓ **LO9** – demonstrate the learning skills necessary for independent continuation of further education in the field of teaching subject and in the formation of personal qualities of students;
- ✓ **LO10** – assess creativity in solving problems arising in the practice of technology and inclusive education, in conflict situations.

## 6 POLICY ASSESSMENT OF EDUCATIONAL ACHIEVEMENT

In order to verify the learning achievements of students, the university provides for the following types of knowledge assessment control (formation of expected learning outcomes):

- current control;
- midterm control;
- intermediate examination;
- final examination.

For all types of control of students' learning achievements (current control, midterm control, interim and final examination) the technology of criterion evaluation is used. Assessment is carried out according to the table on the letter-rating system.

**Assessment of students' learning achievements on the traditional scale and point-rating letter system (ECTS)**

Letter grade	Digital equivalent of points	Points (% content)	Traditional assessment system
A	4,0	95-100	excellent
A-	3,67	90-94	
B+	3,33	85-89	good

B	3,0	80-84	satisfactory
B-	2,67	75-79	
C+	2,33	70-74	
C	2,0	65-69	
C-	1,67	60-64	
D+	1,33	55-59	
D-	1,0	50-54	unsatisfactory
FX	0,5	25-49	
F	0	0-24	

Current control - a systematic check of students' knowledge in accordance with the curriculum, conducted by the teacher in classroom and out-of-classroom classes during the academic period.

Midterm control – control of students' learning achievements at the end of a major section (module) of one academic discipline.

During one academic period there are two midterm controls.

The end-of-term control is posted in the electronic journal on a 100-point scale according to the academic calendar, on weeks 7 and 15.

Each discipline is taught during one academic period and ends with intermediate examination (control).

During the period of current control the teaching staff evaluates the students in practical, laboratory, seminar, studio, IWS (IWS/IWS, IWMT/IWM, IWDT/IWD), and other classes on a 100-point scale exhibiting in the electronic journal. The final score of the current control is calculated taking into account the weight share of points by types of classes. The weight share of points by types of classes is approved by the Academic Council of the University

Types of classes	Weight share
Lecture (L)	$K_1$
Practical (Seminar) (P)	$K_2$
Laboratory (Z)	$K_3$
Studio (S)	$K_4$
IWS (B)	$K_5$

$$CC1(CC2) = K_1 \cdot L_{op} + K_2 \cdot P_{op} + K_3 \cdot Z_{op} + K_4 \cdot S_{op} + K_5 \cdot B_{op}$$

Average grades in  $L_{op}$ -lectures, in  $P_{op}$ -practical, in  $Z_{op}$ -laboratory classes,  $S_{op}$  – studio classes, in IWS –  $B_{op}$

The final ranking score for weeks 7 and 15 is calculated as follows:

$$R1(P2) = 0,6 * CC1(CC2) + 0,4 * EC1(EC2)$$

R1 - the first rating, R2 - the second rating.

Calculation of the admission rating (AR) of the exam:

$$AR = \frac{R1 + R2}{2}$$

The exam admission rating must be  $AR \geq 50$ .

Current and midterm controls make up 60% of the student's final score, and the student gains the remaining 40% of the points in the exam.

The results of the intermediate examination are calculated using the formula given below:

$$\text{Final assessment (FA)} = 0,6 * \text{AR} + 0,4 * \text{E}$$

#### Appropriateness of learning outcomes and assessment methods

Learning outcomes	Assessment methods
LO 1,2,3, 5,6,7,8,10	Activity in classroom training
LO 2,3, 7, 10	Essay
LO 2,3,4, 8	Group presentations
LO 2, 3, 6,7, 8	Project preparation (group work)
LO 1, 3, 5	Individual assignment
LO 6, 7, 10	Flipped Classroom Technology
LO 1,4,7,10	Case study
LO 1, 2, 3, 4	Scientific research
LO 8,10	Gamification
LO 2,5	Portfolio
LO 5, 6,7,9, 10	Practice report
LO 1-10	Final intermediate control
LO 1-10	Final examination

## 7 METHODS AND TECHNIQUES FOR THE IMPLEMENTATION OF THE ORGANIZATION OF EDUCATIONAL PROCESS

Organization of educational process is carried out on credit technology based on the choice of studying the discipline, order the development of disciplines and modules.

### *Tasks of the organization of educational process:*

- unification of knowledge;
- creation of conditions for maximum individualization of instruction;
- strengthening the role and effectiveness of independent work of students;
- Identification of educational achievements of students on the basis of an efficient and transparent procedures for their control.

### *Training opportunities on credit technology:*

- the introduction of academic credits system to assess the labor costs of students and teachers in each discipline;

- participate in the formation of the individual curriculum;
- the choice of subjects and modules in the catalog of elective courses;
- the freedom to choose teacher training;
- the choice of an educational path with the help of student advisors;
- the use of interactive teaching methods;
- academic freedom in the formation of educational programs;
- providing of training necessary teaching and learning materials;
- the use of effective methods of control of educational achievements of students;
- the use of score-rating system of evaluation of educational achievements of each discipline, and other forms of self-study.

### *The methods and technologies of training:*

- reflexive techniques considered as a central object of study;
- competence-based approach to learning;
- role-playing games;
- educational discussions;
- Case Study;
- Gamification;
- design methods.

Types of methods and technologies of training to choose the teachers themselves.

Integrated learning makes it possible to conduct classes with a wide use of interdisciplinary connections. An integrated approach in teaching chemistry is necessary for the formation of a holistic worldview and worldview, the unification and mutual influence of students' educational and research practices.

Research practice is aimed at expanding and consolidating the theoretical and practical knowledge gained by students in the learning process, acquiring and improving practical skills.

Tasks for the development of research skills of students:

- ability to see problems
- ability to put forward hypotheses
- the ability to ask questions
- the ability to define concepts
- ability to classify

Adaptive technologies used for students with special educational needs (SEN).

For students with special educational needs (SEN), the following forms of organization of the educational process and knowledge control are provided:

*for the visually impaired* there is an opportunity:

- the use of training and handouts printed in large print;
- the use of reference notes for recording lectures;

Opportunities for the deaf and hard of hearing:

- to take a comfortable place in the audience;
- the use of visual reference diagrams in lectures to facilitate understanding of the material;

- preferential performance of educational tasks in writing;
- increasing the time for the analysis of educational material.

The main form of organization of the educational process in groups with SEN is integrated learning, i.e. all students study in mixed groups for adaptation in society. For students with special educational needs, it is planned to provide educational and methodological aids in printed and electronic forms in agreement with the lecturer conducting the classes.

For students in groups with special educational needs are given the opportunity of distance learning, in case of deterioration of their health status, which has the conclusion of a medical advisory commission.

Methods for achieving learning outcomes	Learning outcomes									
	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10
Lecture	+		+	+		+			+	
Practical method	+	+	+		+	+			+	
Seminar				+				+		+
Laboratory method		+			+	+		+	+	
Interactive lecture	+		+		+					
Project method			+	+	+					
Case study	+	+	+					+	+	
Educational discussions			+	+		+		+	+	
Group work					+	+	+	+	+	+
Problem-based learning	+	+	+							
Reflexive learning	+	+				+			+	+
Dialog learning		+						+	+	
Critical learning					+			+	+	+
Gamification	+		+			+			+	

**internal quality assurance system** educational activities aimed at improving the quality of educational services is determined by:

- policy in the field of quality assurance;
- development and approval of ongoing educational programs;
- student-oriented learning, teaching and assessment;
- admission of students, academic performance, recognition and certification;
- teaching staff;
- training resources and support training systems;
- information management;
- informing the public;
- continuous monitoring and periodic program evaluation;
- periodic external quality assurance.

#### **Professional practice**

Professional practice is a required component of study the student.

In accordance with the specific OP organizes the following practices:

- training;
- language;
- teaching;
- Production; Elements  
the model of a graduate
- pre-diploma.

**The purpose of the training practice** - the acquisition of primary professional competences, including the consolidation and deepening of theoretical knowledge acquired during the training, laying the foundations of research, paperwork and working with business correspondence, acquisition of practical skills and work skills.

Teaching practice is organized for all students, is conducted in accordance with the characteristics and direction of the OP, is considered at a meeting of the department and is reflected in the program of practice.

**The purpose of language practice** is the formation of students' skills of interpretation and translation, business communication skills and networking, including native speakers.

Language practice is conducted for students engaged in training with knowledge of languages, in English and of multilingual groups.

**The purpose of teaching practice** - consolidation and deepening of knowledge of general scientific, cultural, psychological and pedagogical, methodical and special disciplines, as well as the formation on the basis of theoretical knowledge of pedagogical skills and competences.

**Internship** held in institutions, organizations and enterprises, relevant profile training of students.

**Undergraduate practice** carried out on senior year for students who perform graduate work. Manual pre-diploma practical exercises supervisor of the thesis

## 8 CONTENT OF THE EDUCATIONAL PROGRAM

### 8.1 Correspondence of the results of training in the educational program of the graduate model

The learning outcomes of the educational program are determined in accordance with the graduate model

**Correlation matrix of learning outcomes for EP as a whole generated competencies**

	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10
1	+	+	+	+	+	+	+			
2			+		+	+	+	+		+
3			+	+		+		+	+	
4								+	+	
5			+					+	+	+
6	+	+	+	+				+	+	+
7		+			+			+		

8.2 Information about the modules

№	Name of module	Learning outcomes of the module (LOM)	Constituents of module	Short description module	Cycle	Number of credits	Formed competencies (codes)
1	General education disciplines	<p>LOM1 - assesses the environmental reality on the basis of philosophical principles.                      LOM2 - shows citizenship.                      LOM3 - Use methods of scientific knowledge.                      LOM4- assesses the situation of social and professional interpersonal communication.                      LOM5 - solves the problems that arise in professional communication.                      LOM6 - interpret using language means their thoughts in speech and writing                      LOM7 - use of ICT in their professional activities.                      LOM8 - apply the methods and means of physical culture as the foundation of a healthy lifestyle.</p>	<p>History of Kazakhstan                      Philosophy                      Socio-political knowledge (Sociology, Political Science, Cultural Studies, Psychology)                      Legal, economic and ecological knowledge (Fundamentals of law and anti-corruption culture, economics and business, Ecology and Safety)                      Kazakh (Russian) language                      Foreign Language                      Information and communication technologies (in English Language)                      Physical education</p>	<p>The module is aimed at:</p> <ul style="list-style-type: none"> <li>- formation of ideological, civil and moral positions of the future specialist;</li> <li>- improving its competitiveness through the mastery of information and communication technologies;</li> <li>- development of communication skills in the state, Russian and foreign languages;</li> <li>- promotion of healthy lifestyles, self-improvement and professional success;</li> <li>- development of competencies in the field of Economics and law, the basics of anti-corruption culture, ecology and life safety, entrepreneurship skills, leadership, susceptibility to innovation.</li> </ul>	GE D	56	4,5,6,7

2	Pedagogical, psychological training	<p><b>LOM1</b> - selects pedagogical analysis methodology.  <b>LOM2</b> - summarizes the results of the study.  <b>LOM3</b> - uses psychological and pedagogical knowledge in new conditions.  <b>LOM4</b> - to use national and international experience of educational work  <b>LOM5</b> - Use professional and communicative and teamwork skills  <b>LOM6</b> - solves the problems associated with age-related disabilities enrolled  <b>LOM7</b> - apply in practice methods of training and education of children with special educational needs.</p>	<p>Physiological development of students</p> <p>Pedagogy and methods of educational work</p> <p>Pedagogy and methodology of educational work</p> <p>Special pedagogical technologies in inclusive education ( organization and design of Inclusive Education, pedagogical and psychological support of children with special educational needs in the context of Inclusive Education, ICT in Inclusive Education)</p> <p>Psychology of adolescence</p>	<p>The module considers:</p> <ul style="list-style-type: none"> <li>- the essence of anatomical, physiological, psychological characteristics of children and adolescents, aspects of personality formation based on the preservation and promotion of health;</li> <li>- actual problems of methodology, stages of development of pedagogical science, concept about integral pedagogical process;</li> <li>- methods, forms, means of educational work in modern pedagogy;</li> <li>- the specifics of the organization and design of inclusive education, psychological and pedagogical support of children with special educational needs (SEN), especially the use of information and communication technologies (ICT) in inclusive education.</li> </ul>	BD	17	2,3,4,6
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3	Fundamental training in mathematics	<p><b>LOM1</b> – demonstrates knowledge and understanding in mathematics, based on the metasubject ideas in this area;</p> <p><b>LOM2</b> - applies knowledge in practice in solving problems, conclusions and proofs of mathematical statements;</p> <p><b>LOM3</b> – analyzes ways of solving problems in cognitive scientific research;</p> <p><b>LOM4</b>- argues the place and role of the subject in the system of sciences;</p> <p><b>LOM5</b> –is able to integrate subject and interdisciplinary knowledge in the formation of personal qualities of the student, in learning throughout life.</p>	<p>Elementary mathematics</p> <p>Algebra and number theory / Digital system</p> <p>Analytical and projective geometry/ Analytical geometry and image methods</p> <p>Mathematical analysis 1</p> <p>Mathematical analysis 2</p> <p>Multiple integrals and field theory / Harmonic analysis</p> <p>Differential equations / Ordinary differential equations and partial differential equations</p> <p>Mathematical logic and discrete mathematics/ Discrete mathematics and algorithm theory</p> <p>Probability theory and mathematical statistics/ Combinatorics and probability theory</p>	<p>The module is aimed at the formation of the future specialist fundamental knowledge of mathematics based on the analysis of the content of elementary mathematics from the point of view of higher mathematics, mastering the basics of algebra and geometry, the principles of the theory of mathematical structures, elements of mathematical and functional analysis, elements of mathematical logic and discrete mathematics, elements of probability theory and combinatorial analysis, the history of mathematics.</p> <p>In the subjects included in the module, the basic concepts, theorems and conclusions, proofs and methods of solving problems are considered. The role and place of the subject in solving applied problems associated with problems arising in such fields of science as physics, chemistry, biology, mechanics, problem analysis based on the use of modeling, ways of integrating interdisciplinary knowledge are described.</p>	<p>PD</p> <p>46</p> <p>1,3,6,7</p>	
4	Fundamental training in physics	<p><b>LOM1</b> – demonstrates physical knowledge and ideas based on metaphysical ideas</p>	<p>Mechanics /Selected chapters of mechanics</p>	<p>The module is aimed at the formation of the future specialist fundamental knowledge of physics</p>	<p>PD</p> <p>32</p> <p>1,3,6,7</p>	

		<p>of physics;  <b>LOM2</b> – applies in practice knowledge of physical laws at the decision of tasks, conclusions, carrying out experiments;  <b>LOM3</b> – analyzes solutions of problems in cognitive scientific research.;  <b>LOM4</b> – argues the place and role of the subject in the system of sciences;  <b>LOM5</b> – is able to integrate subject and interdisciplinary knowledge in the formation of personal qualities of the student, in learning throughout life</p>	<p>Molecular physics  Electricity and magnetism  Optics  Atom and atomic nucleus physics / Selected chapters of atom and atomic nucleus physics  Classical mechanics  Quantum physics  Astronomy /Basics of astrophysics</p>	<p>based on the study of the basic concepts, laws and laws contained in the sections of General physics and theoretical physics.  In the disciplines of the module contained in the subject area of physics, the basic concepts, laws, principles and concepts, methods of laboratory experiment, as well as methods for solving problems and proof.  The role and place of the subject in solving applied problems related to problems that have arisen in such areas of science as mathematics, chemistry, biology, mechanics, problem analysis based on the application of modeling and ways of integrating subject knowledge are described.</p>		
5	Methodical training	<p><b>LOM1</b> – demonstrates methodological training;  <b>LOM2</b> – uses ICT in teaching mathematics;  <b>LOM3</b> – applies innovative technologies in accordance with the goals and objectives of training;  <b>LOM4</b> – uses the technology of criteria-based assessment, diagnosis, development of short-term curricula;  <b>LOM5</b> – demonstrates</p>	<p>Methods of teaching mathematics  Methods of teaching physics  Innovative technologies of teaching mathematics /  Computer methods in physics  Workshop on solving mathematical problems /  Workshop on solving non-standard mathematical problems  Workshop on solving physical problems / Workshop on solving non-standard physical problems</p>	<p>The module is aimed at the formation of the future specialist's readiness for future professional activity on the basis of the development of the components of the system of teaching mathematics and physics at school, the links between them and the development of methods of teaching mathematics, physics and innovative learning technologies.  The ways of solving standard and non-standard problems in school</p>	BD PD	21 1,2,3,6,7

	<p>communication in interpersonal communication, teamwork skills and information culture;  <b>LOM6</b> – is able to integrate subject and interdisciplinary knowledge in the formation of personal qualities of the student;  <b>LOM7</b> – evaluates the creativity of solving problems arising in the practice of applying technologies and inclusive education;  <b>LOM8</b> - students will be able to evaluate the creativity of solving problems that arise in the use of technologies and the practice of inclusive education.</p>	<p>Methods of Scientific Research and Academic Writing  Educational practice</p> <p>Pedagogical and psychological practice</p>	<p>mathematics and physics, their use in the teaching of mathematics as didactic materials and the study of problems of teaching students to solve problems, the use of DER in teaching, the organization of the educational process based on ICT, demonstration of communication, information culture in the implementation of project work and the integration of interdisciplinary knowledge are described.</p>	8	
Pedagogical practice				8	
Pre-diploma practice				4	
<b>Final attestation</b>				12	
<b>Total</b>				240	

### 8.3 Information about the disciplines

№	Name of the discipline	Brief description of the discipline (30-50 words)	Amount	Expected learning outcomes (codes)										
				L01	L02	L03	L04	L05	L06	L07	L08	L09	L010	
<b>THE CYCLE OF GENERAL STUDIES</b> optionally component														
1	<b>Scientific research methods</b>	The purpose of mastering the discipline is to develop in students the skills of a structural presentation of their own ideas, mastering the ways of working with various scientific and scientific information sources, taking into account the specifics of academic discourse. The discipline forms students' writing and critical thinking skills and linguistic and pragmatic competencies, improves the culture of written speech through the language they follow, gives an idea of the culture and principles of academic honesty.	5				+						+	
2	<b>Fundamentals of law and anti-corruption culture</b>	The basic concepts and connections between them are considered, concerning the legal system and legislation of the Republic of Kazakhstan, state-legal and constitutional development, the foundations of an anti-corruption culture, the principles of academic honesty.	5										+	
3	<b>Ecology and life safety</b>	The discipline provides knowledge about observing, evaluating and predicting changes in environmental conditions. Examines the causes of changes in natural sustainability, the unity and structure of the natural system and environmental protection measures. He gets acquainted with the work of the civil defense organization, the features of the lesion and poisonous substances. It is characterized by the substantiation of the place and role of the discipline in real life, the integration of interdisciplinary knowledge.	5									+		+
4	<b>Economy and business</b>	The basic concepts related to the sectors of the economy and business, and the relationship between them are considered. The methods and techniques of analysis and application of legislative and conceptual documents in the process of mastering entrepreneurial, leadership and	5										+	+



		communication technologies in education and training in accordance with age characteristics, consider the basics of school education and management and self-esteem from the point of view of critical thinking.																	
<b>THE CYCLE OF Professional discipline</b>																			
<b>The university component</b>																			
11	<b>Methods of teaching mathematics</b>	The subject of the methodology of teaching mathematics, the goals and objectives of teaching mathematics at school, provisions, methods, forms and content, the formation of concepts, proof of theorems, teaching calculations, organizing and conducting lessons and extracurricular activities, full-time teaching is taken into account, and the application of knowledge in practice.	5	+															
12	<b>Methods of teaching physics</b>	The system of training teachers of physics, the issues of ensuring a high level of teaching physics at the university, ways to increase students' enthusiasm and interest in understanding the world at each lesson based on the principles of minimax, consistency, variability, and creativity are considered. The ways of creating a lesson plan, integrating subject knowledge and assessing creativity in inclusive education are described.	5	+															
13	<b>Innovative and computer technologies for teaching mathematics</b>	The updated program-oriented content, approaches, methods and means of teaching mathematics, innovative teaching and assessment technologies, and approaches to creative evaluation of the effectiveness of their application are considered. Criteria-based assessment of educational achievements, diagnostics, creation of SMR and training cases, establishing feedback through ICT, integration of subject knowledge in the implementation of projects.	4																
14	<b>Innovative and computer technologies for teaching physics</b>	The updated program-oriented content, approaches, methods and means of teaching physics, innovative teaching and assessment technologies, and approaches to creative evaluation of the effectiveness of their application are considered. Criteria-based assessment of educational achievements, diagnostics, creation of SMR and training cases, establishing feedback through ICT, integration of subject knowledge in the implementation of projects.	4																
15	<b>Elementary</b>	Numbers, expressions, functions, equations and inequalities in school	3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

	<b>mathematics</b>	<p>mathematics and their systems are analyzed from a higher mathematical point of view, the basic concepts of mathematics contained in the sections of elements of mathematical analysis, methods of calculation, their practical application, and criteria for evaluating the calculation are considered. Methods of analysis and application of theoretical and practical literature, ways of integrating subject knowledge while mastering computational skills are described.</p>																		
16	<b>Algebra and number theory</b>	<p>The basic concepts of mathematics, theorems, assertions and proofs of classical algebra contained in the headings of matrices, determinants, vector algebra, linear systems of equations, linear operators, sections of the theory of polynomials, theory of divisibility of numbers, numerical functions, comparisons and their properties, indices and primary roots are considered. . The ways of analyzing the problems of compiling assignments, arguing the place of the subject in science, and integrating subject knowledge are described.</p>	5	+	+	+	+	+	+	+										
17	<b>Analytic and projective geometry</b>	<p>Based on the theory of lines and surfaces on a plane and in space, methods and techniques for constructing equations of lines and surfaces using elements of a coordinate system and vector algebra and studying their properties and solving problems, projection elements, and practical applications are considered. The ways of analyzing the problems of compiling applied tasks, substantiating the place of the discipline in science, and integrating interdisciplinary knowledge are described.</p>	5	+	+	+	+	+	+											
18	<b>Mathematical analysis 1</b>	<p>Basic concepts, theorems and statements, proofs and methods of calculation and practical applications are considered in the sections of functions of one variable, limit, derivative, differential, derivatives of higher orders, area, calculation of volume, indefinite and definite integrals. The analysis of methods for studying dependencies between quantities from the point of view of quantitative relations, determining the place of a subject in science, and ways of integrating subject knowledge are described.</p>	6	+	+	+	+	+	+											
19	<b>Mathematical Analysis 2</b>	<p>The theory of functions of many variables, integrals and methods of integration, theory of approximations and series, basic concepts,</p>	6	+	+	+	+	+	+											

		theorems and conclusions, methods of proofs and calculations, and practical applications are considered. The role of the subject in solving classical and non-classical problems of differential equations and mathematical physics, analysis of problem solving methods, methods of integrating subject knowledge are described.																		
20	<b>Differential Equations</b>	The logical formulation of classical problems of solving simple linear differential equations and systems of equations, known methods for their solution and their practical applications are considered. Numerical methods, optimal control, their role in solving complex problems in the field of calculus of variations, analysis of problems based on the use of simulation, methods of integrating subject knowledge are described.	6	+	+	+	+	+	+											
21	<b>Mathematical logic and discrete mathematics</b>	Logical algebra, discrete functions, graphs, basic concepts related to the synthesis of control systems, theorems and assertions, proofs and calculation methods are considered. Various transmissions of the mathematical language, methods of proving the inconsistency, independence and completeness of the theory, analysis of the solution of the problem, the place and role of the subject in real life, methods of integrating subject knowledge are described.	4	+	+	+	+	+												
22	<b>Theory of Probability and Mathematical Statistics</b>	The algebra of events of probability theory, random variables, laws of large numbers, laws of types of forecasting, basic and basic theories of mathematical statistics are considered. The ways of finding a set of solutions to the problem and the practical application of combinatorial analysis, modeling in cognitive and scientific research, analysis of problem solving, the place and role of the subject in real life, methods of integrating subject knowledge are described.	4	+	+	+	+	+												
23	<b>The practice of solving mathematical problems</b>	Compilation of simple and complex problems, modeling in the form of drawings, pictures, brief notes, analysis of the basic scheme for solving problems, solving problems in different ways, arithmetic and algebraic methods are considered. It is focused on the application of mathematical knowledge in practice, the integration of subjects, the development of critical thinking, positive thinking, the organization of the educational process using ICT.	6	+	+	+	+													



24	<b>Mechanics</b>	Kinematics, dynamics, basic laws of statics, Galileo's principle of relativity, AST, solid mechanics, the law of universal gravitation, hydrodynamics, oscillatory motion, waves, methods for solving problems using the basic laws of mechanics, practical applications, laboratory research methods. The analysis of the relativistic error sent in laboratory work, tracking the role of the subject in science, methods of integrating subject knowledge are described.	5	+	+	+	+	+	+									
25	<b>Molecular physics</b>	The structure of bodies in the state of aggregation, their changes as a result of external influences, Maxwell and Boltzmann distributions, the molecular-kinetic theory of gases, isoprocesses, the laws of thermodynamics, phase equilibrium, transient processes, the crisis state of substances, surface phenomena are considered when the boundaries of separation of various phases are considered. Methods of calculation, laboratory work, collection of results, practical application, tracking the role of the subject in science, integration of subject knowledge are described.	6	+	+	+	+	+	+									
26	<b>Electricity and magnetism</b>	Laws of electrostatics, electric field, Coulomb's law, superposition principle, laws of direct and alternating current, Ohm's law, Kirchhoff's laws, physical foundations of Ampère, Joule, Lenz's law, electric current in gas, electrolyte, magnetic properties considered matter, magnetic field, solution methods tasks, methods for measuring the main parameters in laboratory work, their place in real life, methods for collecting scientific data, integrating knowledge.	6	+	+	+	+	+	+									
27	<b>Optics</b>	The nature of light, its interaction with matter, the main phenomena observed during its propagation, the laws of light refraction, the laws of reflection, the properties of lenses, the application of knowledge obtained from geometric and wave optics in society, technology, life, and medicine are considered. , methods for solving problems, methods for measuring the main parameters in laboratory work, determine the place of the subject in real life and describe ways to integrate subject knowledge.	5	+	+	+	+	+	+									
28	<b>Physics of the atom and atomic nucleus</b>	The structure of the atom, its planetary model, Bohr's theory and its problems, models of the atomic nucleus, radioactivity and its properties, elementary particle physics, methods for solving problems	5	+	+	+	+	+	+									

		in the discipline, methods for measuring the main parameters in laboratory work are considered. The ways of analyzing the phenomena of the physics of the atomic nucleus and elementary particles, substantiating the place of the subject in the system of sciences, and integrating subject knowledge are described.																			
29	<b>The practice of solving physical problems</b>	The concepts considered in the school textbook of physics, and methods for solving problems, methods for calculating and evaluating criteria and their use as didactic materials in practice are considered. The ways of using CBR in problem solving, communication in project work, presentation of information culture and integration of subject knowledge are described.	6	+	+																
<b>THE CYCLE OF PROFESSIONAL DISCIPLINE</b>																					
<b>optionally component</b>																					
30	<b>Math word problems and their applications</b>	Identifying and understanding the role of word problems in the development of students' logical thinking; reading, analysis, interpretation of digital information presented in various forms; free use of mathematical knowledge in solving various problems encountered in life situations; make reasoned mathematical judgments; search for effective ways to solve word problems, their implementation, self-control, connection with life; ways of mastering the methods of developing students' functional literacy and discovering interdisciplinary connections are considered.	6	+	+	+															
31	<b>Geometric structures on the plane and in space.</b>	Ensure mastery of the theoretical foundations and methods of solving problems of geometric construction on a plane and in space. Opening the way to understanding the didactic possibilities and methodological features of teaching constructive geometry at school.	6	+	+	+															
32	<b>Compilation of Olympic problems in mathematics</b>	The practical application of theoretical information and methods for solving complex and non-standard problems in school mathematics is considered. The technology of professional training for the development of logical thinking, creative abilities of students, as well as the methodology for developing elective courses to prepare talented students for writing Olympic problems, communication in team work, information culture and integration of interdisciplinary knowledge are	6	+	+	+															

33	<b>Theoretical Physics 1</b>	described. Classical mechanics describes the motion of planets, stars, galaxies, etc. in space. describes the movement of astronomical objects, as well as projectiles and machine parts. The subject of electrodynamics describes the relationship between electrical and magnetic phenomena, electromagnetic radiation, electric current and its interaction with an electromagnetic field.	6	+	+	+	+	+	+									
34	<b>Theoretical Physics 2</b>	Quantum mechanics - defines the laws of motion of microparticles (elementary particles, atoms, molecules, atomic nuclei) and quantum systems (for example, crystals) and describes the relationship of physical quantities characterizing particles and quantum systems with quantities directly measured in macroscopic experience. Statistical and thermodynamic - physical processes in macroscopic systems are taught to use two complementary methods - statistical (molecular-kinetic) and thermodynamic methods in solving real problems, the physical meaning of processes in macroscopic systems is described.	6	+	+	+	+	+	+									
35	<b>Astronomy</b>	General ideas about the structure, movement and development of celestial bodies are considered. Following the place of the evolving model of the universe in the development of science, considering the movement, structure and appearance of celestial bodies, their systems, the celestial model, digital knowledge resources are used in processing the results of the experiment, joint work with the group, ways of subject integration are described.	6	+	+	+	+	+	+									







№	FESHP 4337	Practice solving physical problems	PD	OC	6	E	180	60	60	240	420	105	405	1170	13	11	12	12	9	9	6	12	0		
																								Educational trajectory-18 credits (the student chooses one of the trajectories)	
<b>Educational path 1: Mathematician-researcher</b>																									
Module Математик	MMEOK 3338	Math word problems and their applications	PD	UC	6	E	180	60	30	30	30	30	90								6				
	ZHKS 4339	Geometric structures on the plane and in space	PD	UC	6	E	180	60	30	30	30	30	90									6			
	MOESh 4340	Compiling Olympic problems in mathematics	PD	UC	6	E	180	60	30	30	30	30	90									6			
<b>All along the trajectory</b>																									
<b>Educational path 2: Theoretical physics</b>																									
Многича теоретическа физика 18	TF1 3338	Theoretical Physics 1	PD	UC	6	E	180	60	30	30	30	90									6				
	TF2 4339	Theoretical Physics 2	PD	UC	6	E	180	60	30	30	30	90										6			
	As 4340	Astronomy	PD	UC	6	E	180	60	15	15	15	30	90									6			
<b>All along the trajectory</b>																									
<b>Minor variative modules-15 credits</b>																									
Minor		1-object	BD	UC	5	E	150	45	15	30	30	75									5				
		2-object	BD	UC	5	E	150	45	15	30	30	75										5			
		3-object	BD	UC	5	E	150	45	15	30	30	75											5		
<b>Total</b>																									
<b>Total for the GED</b>																									
<b>Total for the BD</b>																									
<b>Total for the PD</b>																									
<b>Final certification</b>																									
<b>Total</b>																									
240 240 7200 2790 720 1950 120 1105 3305 30 30 30 30 30 30 30 30 30 30 30 37 23																									

Summary table on the volume of the educational program

Training course	Semester	Number of modules to be mastered	Number of subjects			Number of credits KZ				Total hours		Number	
			MC	US	OC	Theoretical training	Professional practice	Final attestation	Total	Total	Examination	Diffests	
1	1		4		3	30			30	900	5	1	
	2		4		3	28	2		30	900	5	1	
2	3		3			30			30	900	6	1	
	4	1	2	5	28	2		30	900	5	1		
3	5	1		5	24	6		30	900	4			
	6			4	30			30	900	5			
4	7	4		6	30	5		37	1110	6			
	8							23	690				
Total		6	13	1	26	200	15	8	240	7200	36	4	
								0	0				