**MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN**
**KARAGANDA BUKETOV UNIVERSITY**

«AGREED »
Dean of the Faculty of Transport and Roads
"Karaganda Technical University
named after Abylkas Saginov"

_____ B.K. Kurmashev
«19» 04 2023.

«AGREED»
Director NIS of Chemistry and Biology
directions of Karaganda

_____ Yakupov R.M.
«21» 04 2023.

«APPROVED»
Chairman of the Board - Rector

_____ N.O.Dulatbekov
«30» 05 2023.

# EDUCATIONAL PROGRAM
7M01502- Mathematics

Level: Magistracy

Karagandy
2023

**Educational program 7M01502 - Mathematics was developed on the basis of:**

- Law of the Republic of Kazakhstan dated July 27, 2007 No. 319-III "On Education"
- Law of the Republic of Kazakhstan dated July 11, 1997 No. 151-1. "On languages in the Republic of Kazakhstan"
- State obligatory standard of postgraduate education dated August 31, 2018 No. 604
- National Qualifications Framework dated March 16, 2016 by the Republican Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations.
-Order of the Ministry of Education and Science of the Republic of Kazakhstan "On approval of the Rules for organizing the educational process on credit technology" dated October 2, 2018 No. 152
- Classifier of areas for training personnel with higher and postgraduate education dated October 13, 2018. No. 569.
- State obligatory standard of primary education. Approved by the Decree of the Government of the Republic of Kazakhstan dated August 23, 2012 No. 1080. Decree of the Government of the Republic of Kazakhstan dated August 15, 2017 No. 484.
- Professional standard "Teacher" (Appendix to the order of the Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated June 8, 2017 No. 133)

## Content:

**Passport of the educational program: «7M05401-Математика»**

**1. Code and name of the educational program:** "7M01502 - Mathematics"
**2. Code and classification of the field of education, areas of study:**7M01 Pedagogical sciences, 7M015 Training of teachers in natural sciences
**3.Group of educational programs:**M010 - Training of teachers of mathematics
**4. Volume of loans:**120ESTS.
**5. Form of study:** full-time
**6. Language of instruction:** Kazakh, Russian.
**7. Awarded degree:"**Master of Pedagogical Sciences" in the educational program "7M01502-Mathematics"
**8. Type of OP:** current
**9. ISCED level** (International Standard Classification of Education) - level 7;
**10. NQF level** (National Qualifications Framework) - Level 7;
**11. Level according to the SQF** (Industry Qualifications Framework) - level 7;
**12. Distinctive features of the EP**:No
**13. Number of the application to the license for the direction of personnel training:** License KZ83LAA00018495, Appendix No. 016, date of issue 07/28/2020
**14. Name of the accreditation body and the period of validity of the EP accreditation:** Independent Agency for Quality Assurance in Education NAOKO, SA-A No. 0156/4 dated May 27, 2019 Validity of the certificate: from May 27, 2019. - May 24, 2024
**15. Purpose of the OP:** The purpose of the educational program is to prepare the prospects for the country's development of competitive specialists of new formation with fundamental knowledge, innovative approaches, research skills to undertake research, teaching, professional practice in higher educational institutions, colleges, governing bodies of education, educational institutions, research centers.
**16. Qualification characteristics of a graduate in EP"7M01502-Mathematics"**
**a) List of graduate positions:**
Graduates of the educational program can work as teachers, lecturers college, university professors and researchers.
**b) The scope and objects of professional activity of the graduate:**
- secondary special educational institutions,
- higher education institutions,
- research organizations,
-state and non-state institutions of science and education (pedagogical schools, gymnasiums, lyceums, colleges, specialized schools of mathematics, etc.).

The objects of professional activity of undergraduates in the educational program "7M01502- Mathematics" in scientific and pedagogical training are:

- pedagogical processing colleges,
- pedagogical process in universities,
- methodological and administrative work in educational institutions;
- research work in areas related to the use of mathematics.

**c) Types of professional activity of the graduate:**

- pedagogical activity;
- research;
- administrative and managerial;
- expert advisory.

**d) Functions of the professional activity of the graduate:**

- educational,
- educating
- methodical,
- research,
- social and communicative.

## 17. Formulation of learning outcomes based on competencies

| Type of competencies | Learning result code | Learning result (according to Bloom's taxonomy) |
|---|---|---|
| Behavioral skills and personal qualities: (Softskills) | LO1 | Improves his intellectual and general cultural level; communicates on professional topics in the scientific community, freely uses Kazakh, Russian and English as a means of business communication; is able to adapt to new situations, uses accumulated experience, analyzes his capabilities. |
| | LO2 | Expands and deepens his scientific worldview; uses in-depth knowledge of legal and ethical norms when assessing the consequences of his professional activity, when developing and implementing socially significant projects. |
| | LO3 | Develops his creative abilities to achieve the chosen goals; strives for the development and growth of personal qualities; tolerably solves controversial, conflict situations; responsibly and actively participates in professional and social life; shows interest and love for pedagogical activity. |
| Digital competencies:<br><br>(Digitalskills): | LO4 | Possesses digital literacy in the use of digital technologies and tools for working with information, has awareness of the latest technologies and knowledge of innovative methods of work in the field of digital technologies; demonstrates readiness to implement information and communication and digital technologies in educational, professional and scientific activities. |
| | LO5 | Studies programming, creates information and software using standard design solutions, develops software systems using modern computer technology. |
| | LO6 | Applies the studied digital technologies, tools for working with information, standard programs, acquired knowledge and programming skills to conduct scientific research and solve professional problems using computer tools, constantly studies modern innovative methods of working in the field of digital technologies and uses them in practice, is aware of the needs of implementation digital technologies in scientific and professional activities. |
| Professional competencies: (Hardskills) | LO7 | Analyzes and selects a method for solving the problem. |
| | LO8 | Uses mathematical tools to build mathematical models of real processes and situations. |
| | LO9 | Illustrates the skills of orientation in complex problems and finding optimal ways to solve them. |
| | LO10 | Studies and organizes, and later applies modern mathematical programs for quick calculation of cumbersome applied and professional tasks. |
| | LO11 | Compiles educational material with the help of modern teaching technologies and advanced didactic and methodological techniques. |
| | LO12 | Uses a creative approach in professional activities. Develops the content and clarity of speech, its imagery and persuasiveness. |
| | LO13 | Introduces the latest achievements of pedagogical and scientific discoveries into the educational process. |
| | LO14 | Analyzes the curricula of basic and elective courses in various educational institutions. |

## 18. Determination of modules of disciplines in accordance with the results of training

| Learning result code | Name of the module | Name of disciplines | Volume (ECTS) |
|---|---|---|---|
| LO 1, LO3, LO 11, LO12 | World view bases and pedagogy | History and philosophy of science | 4 |
| | | Higher School Pedagogy | 4 |
| | | Psychology of management | 4 |
| | | Teaching practice | 4 |
| LO 1, LO2, LO 3, LO 11 | Professional languages | Foreign language (professional) | 4 |
| | | Professional foreign terminology in mathematics<br>Technical literature in mathematics in a foreign language | 5 |
| LO 4, LO 5, LO 6, LO10, LO13 | Modern questions of science and technique | High-tech innovative entrepreneurship<br>Commercialization of the results of scientific and technical activities | 5 |
| | | Innovatika in mathematics and education<br>Online math teaching methodology | 5 |
| LO 4, LO5, LO6, LO10, LO13<br><br>LO4, LO 5<br>LO 6, LO7, LO10 | Fundamental questions of higher mathematics and methodology | Fundamental questions of algebra and logic | 4 |
| | | Fundamental questions of analysis | 4 |
| | | Interactive methods are in organization of educational process (in English language) | 4 |
| | Selected questions of the theory of models of differential equations and methods | Fundamentals of Group Theory (in English language)<br>Rings and Modules (in English language) | 4 |
| | | Methods of teaching mathematical subjects mathematics at higher school<br>Modern mathematics and methods of teaching it | 4 |
| | | Introduction to Model Theory<br>Countable models of complete theories | 5 |
| | | Equations in partial derivatives and their applications<br>Equations in partial derivatives and their applications | 6 |
| | | Theoretical bases of differential equalizations and calculable mathematics<br>Integral equations and their applications | 5 |
| | | Basic concepts of updated educational content<br>Organization of distance learning in the school system | 5 |
| | | Research practice | 12 |
| LO3, LO5, LO7, LO 10, LO13, LO 14 | Research work | Research work of a master student, including an internship and a master′ s thesis | 24 |
| LO 1, LO 8, LO 9, LO10, LO 12 | Final examination | Writing and defending a thesis, graduation project or preparing and passing a comprehensive exam | 8 |

## 19. Achievability matrix of learning outcomes

| NN p/n | Name of the disciplines | Brief description of the discipline (30-50 words) | Qty Credits | Generated learning outcomes (codes) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | LO 1 | LO 2 | LO 3 | LO 4 | LO 5 | LO 6 | LO 7 | LO 8 | LO 9 | LO10 | LO11 | LO12 | LO13 | LO14 |
| D1 | History and philosophy of science | It is studied with the aim of forming knowledge about the significance of scientific knowledge in its tendency to development and sociocultural profile. Questions about the philosophy, methodology of science, science as a cognitive activity and tradition are considered. | 4 | + | + | + | | | | | | | | + | + | | |
| D2 | Higher School Pedagogy | Studied to form ideas about the modern paradigm of higher education and the theory of scientific activity in higher education. The issues of pedagogy, education of professionals-specialists, professional skills of teaching in educational organizations, pedagogical control and evaluation of knowledge in higher education are considered. | 4 | + | + | + | | | | | | | | + | + | | |
| D3 | Psychology of management | It is studied with the aim of forming knowledge about the psychological laws of managerial activity, skills in analysis of socio-psychological principles, the characteristics of the psychology of management, the personal characteristics of the leader. | 4 | + | + | + | | | | | | | | + | + | | |
| D4 | Foreign language (professional) | The course is taken for developing intercultural and communicative competence in the process of foreign language education at the level of basic sufficiency of Common European competence. The course is de-signed to study vocabulary and foreign language features; formation of the ability for intercultural communication, skills of argumentation in a foreign language and understanding of linguistic and cultural characteristics of their target language country. | 4 | + | + | + | | | | | | | | + | | | |
| Cycle of basic disciplines Selectable Component | | | | | | | | | | | | | | | | | |
| D5 | Professional foreign terminology in mathematics<br><br>Technical literature in mathematics in a foreign language | The purpose of studying the discipline is to obtain fundamental knowledge on professional foreign terminology in mathematics and on the main aspects of scientific and technical translation of mathematical texts; the development of skills of analysis and use of terminology in scientific and technical style and characteristics of scientific and technical language when reading and translating specialized literature in mathematics; the formation of communicative competence in the process of foreign language interaction in the professional sphere.<br><br>The purpose of studying the discipline is to gain knowledge about the basics, principles, grammatical phenomena and difficulties of reading and translating technical literature in mathematics, the development of skills | 5 | + | + | + | | | | | | | | + | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | to use the acquired knowledge when reading and translating technical texts in mathematics, the formation of competence to apply technical style in mathematics, taking into account oral and written forms in foreign language professional activity. | | | | | | | | | | | | | | | | |
| D6 | Science-intensive innovative entrepreneurship<br><br>Commercialization of the results of scientific and technical activities | The purpose of the subject is the formation of professional knowledge and practical skills of independent research, the use of quantitative and qualitative methods for conducting applied research; models for assessing the market value of business enterprises requiring science; sources of financing of investment projects and the main methods for evaluating the effectiveness of investments; conducting feasibility studies of design solutions.<br><br>It is studied in order to form skills for the commercial application of intellectual activity results and the introduction of scientific developments and technologies into production, the preparation of scientific projects for funding, as well as for interaction in the knowledge-intensive high-tech sector. | 5 | | | | + | + | + | | | | + | | | + | | |
| D7 | Online math teaching methodology<br><br>Innovatika in mathematics and education | The curriculum presented the goals, means and methods of distance learning of mathematics in a general secondary school. On the basis of educational standards, the issues of determining the principles of formalization and presentation of educational material in distance learning, learning characteristics, combining the goals of learning and educational training using various platforms have been updated.<br><br>This course teaches students to study the proven results of real scientific research, explains to teachers how to improve the pedagogical process using modern teaching aids and new methods of teaching with examples. The features of the organization of the educational process are described, ways of improving the methods are included, the significance is characterized. | 5 | | | | + | + | + | | | | + | | | + | | |
| | | Cycle of major disciplines<br>University Component | | | | | | | | | | | | | | | | |
| D8 | Fundamental questions of algebra and logic | The purpose of studying the discipline is to master the basic concepts and methods of modern algebra and logic, to form the skills to use the acquired knowledge in solving theoretical and practical problems, to develop an understanding of the principles of scientific research in the field of algebra and logic, to develop the skills of mathematical research of applied issues. | 4 | | | | + | + | + | | | | + | | | + | | |
| D9 | Fundamental questions of analysis | The purpose of the fundamental subject is to study such mathematical concepts as: metric spaces, completeness, the principle of compressive maps, compactness in metric space, linear, Euclidean spaces, continuous linear functionals. | 4 | | | | + | + | + | | | | + | | | + | | |
| D10 | Interactive methods are in organization of edu- | This discipline explains the main essence of interactive learning, that is, achieving results in learning and ways to achieve in continuous interac- | 4 | | | | + | + | + | | | | + | | | + | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | cational process (in English language) | tion, dialogue, communication, reflection and ways of organizing the educational process. A special form of the organization of cognitive activity is given, in which the traditional typology of methods is implemented, where the leading role is played by developing activities of students. | | | | | | | | | | | | | | | | |
| Cycle of major disciplines Selectable Component | | | | | | | | | | | | | | | | | | |
| D11 | Fundamentals of Group Theory (in English language)<br><br>Rings and Modules (in English language) | The purpose of studying the discipline is to develop the theory of fundamental regularities within the framework of group theory, the ability to solve practical and applied mathematical problems, the expansion and deepening of theoretical knowledge and practical skills in group theory, the ability to apply the acquired knowledge to solve mathematical problems, mastering mathematical culture.<br><br>The purpose of studying the discipline is to form a solid set of knowledge in the discipline, to increase the general level of mathematical culture, to learn how to solve practical and applied problems in rings and modules, the ability to form the creative abilities of future specialists in solving mathematical problems, the ability to work independently with educational and scientific literature. | 4 | | | | + | + | + | + | + | | | + | | | | |
| D12 | Methods of teaching mathematical subjects mathematics at higher school<br><br>Modern mathematics and methods of teaching it | The purpose of mastering the discipline is to master the fundamental concepts of teaching series theory in higher educational institutions, to reveal the main subtleties of this subject, as well as some theorems of the course of mathematical analysis.<br><br>It is studied in order to form knowledge about goals of the methodology of teaching mathematical disciplines in higher education. The basics of higher school didactics, psychological and pedagogical foundations of methodological activity of a higher school teacher are revealed. | 4 | | | | + | + | + | + | + | | | + | | | | |
| D13 | Introduction to Model Theory<br><br>Counting models of complete theories | The purpose of studying the discipline is to develop in students a general set-theoretic and logical-algebraic culture, as a scientific-theoretical and ideological-methodological basis for mastering the syntactic and semantic components of the formal languages of classical calculus, the formation of a system of knowledge, skills and abilities to apply methods in logical-mathematical practice , technologies and canonical constructions inherent in modern model theory.<br><br>The purpose of studying the discipline is to master the basic concepts and results of the theory of models related to types, categorical theories, saturated and simple models, the formation of skills to mathematically correctly formulate and prove theorems that describe the behavior of countable models of complete theories, the acquisition of skills in applying the semantic properties of theories to study the properties of the subject areas. | 4 | | | | + | + | + | + | + | | | + | | | | |
| D14 | Mathematical physics | This course is designed to study such topics as the classification of partial | 5 | | | | + | + | + | + | + | | | + | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | equations and thin appendix<br><br>Equations in partial derivatives and their applications | differential equations of the second order, the main problems of mathematical physics, the method of separation of variables, the method of integral transformations.<br><br>The purpose of the discipline is the study of phenomena occurring in thermodynamics, elasticity theory, electrodynamics, etc. In this course, the d"Alembert method for solving the Cauchy problem, the Fourier method for solving boundary problems of equations. | | | | | | | | | | | | | | | |
| D15 | Integral equations and their applications<br><br>Theoretical bases of differential equalizations and calculable mathematics | The purpose of studying the discipline is to study methods for studying equations of the Fredholm type, the theory of symmetric kernels. Applications of the theory of integral equations to some problems of mechanics, mathematical physics and technology are considered.<br><br>The purpose of this course is to study the following sections: mathematical models of physical processes; BVP for differential equations; approximate methods for solving differential equations; elements of functional analysis approximate analytical methods; linear and nonlinear models of mathematical physics. | 4 | + | | | | | + | | | | + | | | | |
| D16 | Organization of distance learning in the school system<br><br>Basic concepts of updated educational content | In the curriculum, the goals, means and methods of distance learning in the general education school were presented. On the basis of educational standards, the issues of determining the principles of formalization and presentation of educational material during distance education, characteristics of education, combination of educational goals and educational preparation with the help of various platforms are updated.<br><br>In the discipline, various aspects of pedagogy are considered, teaching methods are analyzed. The issues of determining the principles of designing and presenting educational material on the basis of updated educational standards, profiling training, integrating educational and upbringing learning goals from the standpoint of national and cultural values have been updated. | 4 | | | | + | + | + | + | + | | | + | | | |

## 20. Coordination of the planned learning outcomes with the methods of teaching and evaluation within the module

| Learning outcomes | Planned learning outcomes for the module | Teaching methods | Assessment methods |
|---|---|---|---|
| LO1 | Improves his intellectual and general cultural level; communicates on professional topics in the scientific community, freely uses Kazakh, Russian and English as a means of business communication; is able to adapt to new situations, uses accumulated experience, analyzes his capabilities. | Dialog<br>Round table<br>Interactive lecture<br>Project based learning<br>Oral presentation<br>Assessment Methods | Test control oral questioning<br>Abstract preparation<br>Essay writing |
| LO2 | Expands and deepens his scientific worldview; uses in-depth knowledge of legal and ethical norms when assessing the consequences of his professional activity, when developing and implementing socially significant projects. | Discussion<br>Round table<br>Interactive lecture<br>Oral presentation | Testing oral questioning<br>Abstract preparation<br>Essay writing |
| LO3 | Develops his creative abilities to achieve the chosen goals; strives for the development and growth of personal qualities; tolerably solves controversial, conflict situations; responsibly and actively participates in professional and social life; shows interest and love for pedagogical activity. | Lecture<br>Practice<br>Analysis and problem solving<br>Exercises | Test control<br>Written control<br>Colloquium<br>Express survey |
| LO4 | Possesses digital literacy in the use of digital technologies and tools for working with information, has awareness of the latest technologies and knowledge of innovative methods of work in the field of digital technologies; demonstrates readiness to implement information and communication and digital technologies in educational, professional and scientific activities. | Interactive lecture<br>Practical work<br>Analysis and problem solving<br>Exercises | Test control<br>Written control<br>Colloquium<br>Settlement task |
| LO5 | Studies programming, creates information and software using standard design solutions, develops software systems using modern computer technology. | Interactive lecture<br>Practical work<br>Analysis and problem solving<br>Exercises | Test control<br>Written control<br>Colloquium<br>Settlement and graphic task |
| LO6 | Applies the studied digital technologies, tools for working with information, standard programs, acquired knowledge and programming skills to conduct scientific research and solve professional problems using computer tools, constantly studies modern innovative methods of working in the field of digital technologies and uses them in practice, is aware of the needs of implementation digital technologies in scientific and professional activities. | Interactive lecture<br>Practical work<br>Analysis and problem solving<br>Exercises | Test control<br>Written control<br>Colloquium<br>Independent work |
| LO7 | Analyzes and selects a method for solving the problem. | Interactive lecture<br>Practical work<br>Analysis and problem solving<br>Exercises | Test control<br>Written control<br>Colloquium<br>Settlement and graphic task |
| LO8 | Uses mathematical tools to build mathematical models of real processes and situations. | Interactive lecture<br>Practical work<br>Analysis and problem solving<br>Exercises | Test control<br>Written control<br>Colloquium<br>Settlement and graphic task |
| LO9 | Illustrates the skills of orientation in complex problems and finding optimal ways to solve them. | Interactive lecture<br>Practical work<br>Analysis and problem solving<br>Exercises | Test control<br>Written control<br>Colloquium<br>Presentation |
| LO10 | Studies and organizes, and later applies modern mathematical programs for quick calculation of cumber- | Interactive lecture | Test control |

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|---|---|---|---|
| | some applied and professional tasks. | Practical work<br>Analysis and problem solving<br>Exercises | Written control<br>Colloquium<br>Independent work |
| LO11 | Compiles educational material with the help of modern teaching technologies and advanced didactic and methodological techniques. | Interactive lecture<br>Practical work<br>Analysis and problem solving<br>Exercises | Test control<br>Written control<br>Colloquium<br>Settlement task |
| LO12 | Uses a creative approach in professional activities. Develops the content and clarity of speech, its imagery and persuasiveness. | Interactive lecture<br>Practical work<br>Analysis and problem solving<br>Exercises | Test control<br>Written control<br>Colloquium<br>Settlement task |
| LO13 | Introduces the latest achievements of pedagogical and scientific discoveries into the educational process. | Interactive lecture<br>Practical work<br>Analysis and problem solving<br>Exercises | Test control<br>Written control<br>Colloquium<br>Settlement and graphic task |
| LO14 | Analyzes the curricula of basic and elective courses in various educational institutions. | Interactive lecture<br>Practical work<br>Analysis and problem solving<br>Exercises | Test control<br>Written control<br>Colloquium<br>Independent work |

## 21. Criteria for assessing the achievability of learning outcomes

| CodesofLO | Criteria |
|---|---|
| **LO1** | Knows: Kazakhy, Russiany and English at a professional level for business communication. And foreign language to the extent necessary for obtaining professional information from foreign sources and elementary communication at the general and professional level; |
| | Can: use a foreign language in interpersonal communication and professional activities; freely and adequately express their thoughts in conversation and understand the interlocutor's speech in a foreign language; conduct written communication in a foreign language, compose business letters; is capable of active social mobility; andadapts to new situations, re-evaluation of accumulated experience, analysis of their capabilities. |
| | Owns: freely speaks Kazakh, Russian and English. to express their thoughts and opinions in interpersonal, business and professional communication in a foreign language; various speech skills (reading, writing, speaking, listening) in a foreign Language |
| **LO2** | Knows: useoBarb new knowledge and skills in practical activities, including in new areas of knowledge that are not directly related to the development of a foreign language. field of activity |
| | Can: independently expands and deepens their scientific worldview |
| | Possesses: the development and growth of personal qualities; subjectivity, tolerance, attentiveness and tolerance in resolving disputes, conflict situations;sensitivity, responsibility and accuracy in professional and public life; andinterest and love for teaching |
| **LO3** | Knows: its strengthse and weaknessesof the sidesin your of its character; withovershoots the strengths and weaknesses of the sides of its character. and eliminates weakones. |
| | Can: развивать your creative abilities to achieve your chosen goals;<br>developsarpersonal your personale qualities; subjectivity, tolerance, attentiveness and tolerance in resolving disputes and conflicts;sensitivity, responsibility and accuracy in professional and public life; andinterest and love for teaching |
| | Owns:he has the methodological foundations of modern science, is able to adapt natural science knowledge and skills to the goals and objectives of mathematical education, professional and general scientific terminology |
| **LO4** | Knows: about the latest technologies and innovative methods of working in the field of digital technologies |
| | Can: demonstrate information and communication and digital technologies in educational, professional and scientific activities. |
| | Proficient in: digital literacy in the use of digital technologies and tools for working with information |
| **LO5** | Knows: software systems using modern computer technology |
| | Can: create information and software using standard design solutions |
| | Proficient in: programming skills |
| **LO6** | Knows: standard programs, tools for working with information |
| | Can: use the acquired knowledge and programming skills to conduct scientific research and solve professional problems using computer tools |
| | Owns: modern innovative methods of work in the field of digital technologies and uses them in practice |
| **LO7** | Knows: Methods and forms of organization of teaching mathematics in higher education institutions and problem solving |
| | Can: Анализирп andselect the methods for solving the problem |
| | Owns: OCHOBThe basics of pedagogical control in higher education |
| **LO8** | Knows: ncoconstruction of mathematical modelsof real processes |
| | U meet: use the knowledge and methods of modern model theory |
| | Owns: mathematical tools for building mathematical models of real processes and situations |
| **LO9** | Can: find оптимальныор пути solutions to complex problems |
| | Owns: skills of orientation in complex problems and finding optimal ways to solve them |
| **LO10** | Knows: moderne technologies, pedagogical innovation processes, theoretical foundations of the use of information technologies in the educational process |
| | Can: Uses state-of-the-art math programs to quickly calculate cumbersome applied and professional tasks |
| | Owns: Theoreticallymu foundationsamu, RO 11 knows the basics of applying information technologies in the educational process |

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|---|---|
| **LO11** | moderne teaching technologies and advanced didactic and methodological techniques |
| | Can: use moderne teaching technologies, didactic and methodologicale material in the educational process |
| | Owns: навык abilityRO 12 has the following skills in teaching and composing educational material using modern teaching technologies and advanced didactic and methodological techniques |
| **LO12** | I useomart a creative approach in my professional activities. Ready to interact with colleagues in the team |
| | Can: Develops the content and clarity of speech, its imagery and persuasiveness. |
| | Owns: advancedmu knowledgeof legal and ethical norms in assessing the consequences of their professional activities, in the development and implementation of socially significant projects |
| **LO13** | Knows: methods and technologies, features of presenting the results of thelatest достижений scientific achievements |
| | Can: Why do the едрять latest achievements of pedagogical and scientific discoveries contribute to the educational process? |
| | Owns: features of presentation of the results of pedagogicalon and scientific activities in the educational process |
| **LO14** | Knows: study programs of basic and elective courses in various educational institutions |
| | Can: implement thee curriculum of basic and elective courses in various educational institutions |
| | Owns: basica provisionsof the theory and methods of teaching mathematics in specific pedagogical conditions |

**22. The graduate model of the educational program**
**Graduate Attributes:**

- Deep professional knowledge in their field of study
- Interest in mastering trends in education and science
- Ability to collaborate in the professional community
- Autonomy in seeking opportunities for professional and personal development
- Sociability
- Tolerance and good manners
- Academic integrity
- Willingness to participate in solving state tasks and strategies of Kazakhstan

| Types of competencies | Description of competencies |
|---|---|
| 1. Behavioral skills and personal qualities: (Softskills) | Improves and develops its intellectual and general cultural level<br>Fluent in Kazakh, Russian and English as a means of business communication; capable of active social mobility Adapts to new situations, reassessing accumulated experience, analyzing own capabilities<br>Independently acquires with the help of information technology and uses in practice new knowledge and skills, including in new areas of knowledge that are not directly related to the field of activity, expands and deepens his scientific, worldview Uses in-depth knowledge of legal and ethical standards in assessing the consequences of his professional activities, in the development and implementation of socially significant projects<br>Capable of adapting to new situations, reassessing accumulated experience, analyzing own capabilities Aware of his strengths and weaknesses of character. Improves strengths and eliminates weaknesses.<br>Develops his creative abilities to achieve the chosen goals. Strives for the development and growth of personal qualities Objectivity, tolerance, attentiveness and tolerance in resolving controversial, conflict situations Care, responsibility and accuracy in professional and social life. Interest and love for teaching |
| 2. Digital competencies: (Digital skills): | Digital literacy for the use of digital technologies and information tools to meet personal, educational and professional needs, teamwork in a digital environment, taking into account the basics of security, ethical and legal norms<br>Algorithmic thinking and programming: from formalized problem setting and solution algorithm development to the use of modern programming tools.<br>Data analysis and artificial intelligence methods: from using mathematical methods and models to extract knowledge to solving professional problems and developing new approaches.<br>Organizes professional excellence in teaching mathematics and physics using innovative information and communication educational technologies, can design and implement computer systems, use network resources in work. |

| | |
|---|---|
| 3. Professional competencies:<br>(Hardskills) | Analyzes and selects a method for solving the problem.<br>Owns mathematical tools for building mathematical models of real processes and situations. Has the skills to navigate complex problems and find the best ways to solve them<br>Uses modern mathematical programs for fast calculation of cumbersome applied and professional problems. She has skills in compiling educational material using modern teaching technologies and advanced didactic and methodological techniques. Uses a creative approach in professional activities. Develops the content and clarity of speech, its figurativeness and persuasiveness<br>Introduces the latest achievements of pedagogical and scientific discoveries into the educational process. Implements curricula of basic and elective courses in various educational institutions. Ready to interact with colleagues, to work in a team |

**Developers:**

Working group members:

Head of the Department "Mathematical Analysis and Differential Equations" _____ A.O. Tanin

Associated professor of the Department "Mathematical Analysis and Differential Equations" _____ G.Sh.Iskakova

2nd year Master's student _____ M.T.Omarov

The educational program was considered by the faculty council from 25.04.2023 protocol no 7

The educational program was considered at a meeting of the Academic Council from 28.04.2023 protocol no 5

The educational program was reviewed and approved at a meeting of the University Board from 30.05.2023 protocol no 12

Member of the Board - Vice-Rector for Academic Affairs _____ T.Z. Zhusipbek

Acting director of the Department of Academic Affairs _____ S. A. Smailova

Dean of the Faculty _____ D.A. Kazimova