Ministry of Science and Higher Education of the Republic of Kazakhstan
Karaganda University of the name of academician E.A. Buketov

«APPROVED BY»
The decision of the Administration of
NLC «Karaganda University of the name of academician E.A. Buketov»

Protocol № 8 29.05.24

prof. N.O. Dulatbekov

«APPROVED BY»
The decision of the Directory Board of
NLC «Karaganda University of the name of academician E.A. Buketov»

Protocol № 5 21.06.2024

EDUCATIONAL PROGRAM

7M05401 – Mathematics

Level: Magistracy

Karaganda,
2024

APPROVAL SHEET

EDUCATIONAL PROGRAM "7M05401 – Mathematics"

"AGREED"

Dean of Mechanics and mathematics faculty
of the NLC «Eurasian National University
named after L.N. Gumilyov»

_____ D.Kh. Kozybaev

" 10 " 04   2024y.

"AGREED"

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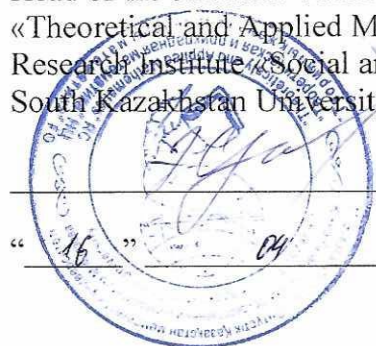named after Abylkas Saginov»

_____ B.Sh. Askarov

" 12 " 04   2024y.

"AGREED"

Head of the scientific center
«Theoretical and Applied Mathematics»
Research Institute «Social and Humanitarian Sciences»
South Kazakhstan University named after. M. Auezova

_____ A. Sarsenbi

" 16 " 04   2024y.

The educational program "7M05401-Mathematics " was developed on the basis of:

- the Law of the Republic of Kazakhstan of July 27, 2007 No. 319-III "About education"

- the Law of the Republic of Kazakhstan of July 11, 1997 No. 151-I. "About languages in the Republic of Kazakhstan" ,

- the State Compulsory Standard of Postgraduate Education of August 31, 2018 No. 604

– a national frame of qualifications of March 16, 2016 the Republican tripartite commission on social partnership and regulation of the social and labor relations.

- Order of the Ministry of Education and Science of the Republic of Kazakhstan "On approval of the Rules for the organization of the educational process on credit technology of education" dated October 2, 2018 No. 152

– the classifier of areas of training with higher and postgraduate education from October 13, 2018. No. 569.

- professional standard "Teacher" (Addendum 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)

Recommended by the decision of the Academic Council of the University for entry into force on September 1, 2020.

Content:

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

1. Code and name of the educational program: "7M05401-Mathematics"
2. Code and classification of the field of education, areas of training: 7M05 Natural Sciences, Mathematics and Statistics, 7M054 Mathematics and Statistics
3. Group of educational programs: M092 Mathematics and Statistics
4. Volume of loans:120 ECTS
5.: Form of study full-time
6. Language of instruction: Kazakh, Russian
7. Degree awarded: "Master of Natural Sciences" in the educational program "7M05401-Mathematics"
8. Type of OP: current
9. ISCED level (International Standard Classification of Education) – Level 7;
10. Level of NQF (National Qualifications Framework) – Level 7;
11. OORC level (Industry Qualifications Framework) – Level 7.
12. Distinctive features of OP:no
13. Number of the appendix to the license training direction: LICENSYKZ83LAA00018495, AppendixNo. 016, date of issue 28.07.2020
14. The name of the accreditation body and the validity period of the accreditation of the OP: Certificate of institutional accreditation of NAOKO IA No. 0086 dated 02.04.2018 - 31.03.2023.
15. The purpose of the OP: The purpose of the educational program is to prepare, taking into account the development prospects of the country, competitive specialists of a new formation with fundamental knowledge, innovative approaches, research skills for carrying out scientific, pedagogical, professional and practical activities in higher educational institutions, educational authorities, educational institutions, research centers.
16. Qualification characteristics of the graduate in the OP "7M05401-Mathematics"
a)List of graduate positions:
     - university lecturer,
     - researcher,
     - statistical analyst,
     -mathematician-programmer
b)The sphere of professional activity of graduates of the educational program "7M05401- Mathematics" are:
     - higher educational institutions,
     - research institutes,

- design, technological and design organizations,
- bodies of the state administrative management system.
The objects of professional activity of undergraduates under the educational program "7M05401- Mathematics" are:
- pedagogical process of universities,
- methodical and administrative work in educational institutions;
- research work in areas related to the use of mathematics.
c) Types of professional activity of the graduate:
Undergraduates of education under the educational program "7M05401-Mathematics" can perform the following types of professional activities:
- research;
- administrative and managerial (analyst, strategist in the field of science, education and high technologies);
- expert advisory (examination of scientific articles and projects, scientific management of master's theses, application of elements of innovation in the scientific and technical field).
d) Functions of professional activity of the graduate:
Undergraduates of education under the educational program "7M05401-Mathematics" can perform the following functions:
- scientific research,
- educational (pedagogical)
- production and technological
-organizational and managerial

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)	**LO5**	Demonstrates current knowledge of modern history and philosophy of science, applied natural science disciplines that contribute to the implementation of the main directions of modernization of public consciousness. He is able to form and solve problems that arise in the pedagogical process and require in-depth pedagogical knowledge; analyze and comprehend the realities of modern theory and practice of higher education.
Professional competencies: (Hardskills)	**LO6**	Knows how to use numerical methods to solve differential equations and problems of mathematical physics. Demonstrates up-to-date knowledge about loaded differential equations and their classification, connection with inverse problems, reduction of boundary value problems to singular integral equations, characteristic integral equations.
	LO7	Demonstrates the ability to abstract thinking, analysis, synthesis; uses skills in management activities, strives for objectivity, attentiveness and tolerance in solving controversial, conflict situations. Applies methodological and methodical knowledge in conducting scientific research, pedagogical and educational work. Investigates the methods of planning the activities of the educational organization in accordance with the requirements of curricula, regulatory documents, taking into account the individual and special educational needs of students.
	LO8	Recognizes the representation of the language of manifolds and external differential forms, integration problems on manifolds and their applications. Provides definitions with fundamental knowledge of stochastic analysis. Uses the methodology of describing random processes and phenomena for optimal results in solving applied problems using mathematical tools.
	LO2	Has knowledge of the basic concepts and methods of the theory of topological spaces and their most important example - metric spaces. He is able to solve problems of the theory of metric and topological spaces, is able to independently search for relevant information necessary both in the process of studying this discipline and in the study and writing of a master's thesis. Has the skills of geometric interpretation of abstract results.
	LO12	Knows the properties of the approximation module, continuity, direct and inverse theorems of approximation theory. Applies methods for determining the best approximations of various spatial elements, methods for calculating the modulus of continuity of a function, theorems of approximation theory. He is able to analyze studies related to approximation theory, determine the differential properties of a function, and draw conclusions about the relationship of functional spaces.
	LO9	Analyzes information and phenomena; correctly uses socially marked linguistic units of the target language. Able to communicate freely, accessible and convincingly in verbal and non-verbal form in three languages to solve the problems of professional activity.
	LO10	Analyzes the structural and constructive properties of functions, uses in the analysis of advanced scientific literature in scientific research.
	LO1	Knows the theoretical foundations of the subjects studied in the learning process and their application in research activities in the development of mathematical models, algorithms for solving the problem set in the master's thesis, tasks. Owns the methods of searching and selecting sources of information; using the basic techniques of research activities, conducting an experiment. Knows the general scientific methodology, logic and technology of research work.
	LO3	Knows the peculiarities of presenting the results of scientific activity in oral and written form when working in national and international research teams. He is able to identify and systematize the main ideas in scientific texts; critically evaluate any incoming information, regardless of the source; avoid the automatic application of standard formulas and techniques when solving problems, conduct scientific discussion, demonstrate the ability of public speaking. Has the skills of working with bibliographic reference books, compiling scientific bibliographic lists, using bibliographic descriptions in scientific papers, designing and carrying out complex research, knowledge of modern methods and principles of developing scientific problems on the topic of scientific qualification work. He is able to develop models, algorithms for solving a

		specific problem, task; find a solution, get results and interpret them; systematize the necessary materials of a master's thesis.
	LO11	Knows the basic concepts and results of model theory regarding types, categorical theories, saturated and simple models Can formulate and prove mathematically correct theorems describing the behavior of countable models of complete theories. Has skills in applying the semantic properties of theories to study their classes of models.
Digital competencies: (Digitalskills):	**LO4**	Distinguishes the basic methods and models of commercialization of innovative technologies. Applies in practice modern methods of analysis of innovative solutions to applied problems of scientific and scientific-technical developments. Owns the technology of commercialization of the results of scientific research and innovative developments in the IT field. He is able to use pedagogical approaches, educational materials in accordance with the latest innovations in mathematics and education. Possesses modern didactic and methodological tools to achieve successful learning outcomes.

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)
LO5, LO7, LO 1, LO3, LO4	World view bases and pedagogics	History and science philosophy	4
		Higher school pedagogy	4
		Psychology of management	4
		Pedagogical practice	4
LO 8, LO9, LO10, LO3	Professional languages	Foreign language (professional)	4
		Professional foreign terminology in mathematics Technical literature in mathematics in a foreign language	5
LO 5, LO7, LO2, LO1, LO4	Modern questions of science and technique	High-tech innovative entrepreneurship Commercialization of results of scientific and scientific and technical activity	5
		Innovatika in mathematics Distance learning technologies in teaching mathematics in higher education	5
LO 6, LO8, LO2, LO9, LO10, LO1, LO11	Fundamental mathematics	Mathematical analysis on varieties and the stochastic analysis	4
		Differential equalizations, mathematical physics and numeral methods of their decisions	4
		Theories and their classes of models (in English language)	4
LO 5, LO6, LO7, LO8, LO2, LO12, LO9, LO10, LO11, LO4	Quality questions of analysis, geometry and differential equalizations	Technique of teaching mathematical subjects mathematics inhigher school Theory and methods of teaching mathematics	4
		Introduction to the theory of approaching Embedding theory of function spaces	4
		Functional-differential equations Loaded differential equalizations	5
		Selected issues of Group Theory (in English language) Ring and modules (in English)	6
		Structural and structural properties of functions Function approximation theory	5
		Boundary value problems of heat conduction in degenerating domains (in English language) Singular integral equations for heat boundary value problems	5
LO7, LO10, LO1, LO3, LO4	Research work	Research practice	12
LO5, LO7, LO10, LO1, LO3, LO 4		Undergraduate research work, including internship and master thesis (URWIIMT)	24
LO5, LO10, LO1, LO3, LO4	Final examination	Registration and defence of master	8

19. Matrix of achievability of learning outcomes

NN п/п	Name of the disciplin	Brief description of the discipline (30-40 words)	Number of 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
D1	History and science philosophy	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	As a result of mastering the program of the course "Psychology of Management", magicians should know: basic concepts, theoretical positions and actual problems of management psychology; theoretical features of management psychology; personal characteristics of the head; the peculiarities of communication between the head and subordinates in the organization; be able to: determine the main aspects of management psychology.	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.	5			+					+	+	+		
D5	Professional foreign terminology in mathematics	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.	5			+					+	+	+		
	Technical literature in mathematics in a foreign language	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 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	Commercialization	It is studied in order to form skills for the commercial application of intellectual activi-	5	+	+		+	+		+					

Code	Discipline	Purpose	Credits													
	results of scientific and technical activities	ty 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.														
	Science-intensive innovative entrepreneurship	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.														
D7	Innovatika in mathematics	The purpose of the course is to study the following sections: the use of modern technologies in mathematics lessons, pedagogical innovation processes, theoretical foundations of use of information technologies in the educational process, new technologies of teaching in mathematics lessons.	5	+	+		+	+		+						
	Distance learning technologies in teaching mathematics in higher education	The purpose of the course is to study the concept of distance learning in the school education system, as well as technical requirements for the organization of distance learning and ways to organize the educational process online and offline.														
D8	Mathematical analysis on varieties and the stochastic analysis	The main goal of this discipline is a deeper understanding of mathematical structures and the application of analytical methods to real systems. These tools allow to model and predict the behavior of systems and find effective solutions in different areas.	4	+	+			+		+	+	+	+		
D9	Differential equalizations, mathematical physics and numeral methods of their decisions	The purpose of the course is to develop the necessary intuition among undergraduates to find effective algorithms for solving problems of mathematical physics, as well as to introduce students to analytical and numerical methods.	4	+	+			+		+	+	+	+		
D10	Theories and their classes of models (in English language)	The purpose of studying the discipline is the development of theoretical fundamental assumptions with Model Theory, the solution of practical and applied problems, the expansion and deepening of theoretical knowledge and practical skills of theoretical models, the ability to apply their knowledge to solve mathematical problems, and mastery of mathematical culture.	4	+	+			+		+	+	+	+		
D11	Technique of teaching mathematical subjects mathematics inhigher school	The purpose of discipline is to provide effective and high-quality teaching of mathematics to students. To achieve goal, the methodology includes the study of modern teaching methods, the development of curricula and materials, the use of innovative technologies in teaching.	4		+		+	+	+	+	+	+	+	+	+
	Theory and methods of teaching mathematics	The purpose of the course: to form a correct general idea of what mathematics and mathematical models are, what a mathematical approach to the study of real world phenomena is, how it can be used and what it is capable of. The choice of the volume and content of mathematics courses, the definition of learning objectives, the right balance of breadth and depth of narrative, rigor and clarity, i.e. the choice of the most effective and rational ways of teaching, and all this research, taking into account the limited time allotted for the study of mathematics.														

D12	Introduction to the theory of approaching	The purpose of the course: the study of sections of analysis, which considers the approximation of a given function by functions that have the best properties and an estimate of the resulting error.	4		+		+	+	+	+	+	+	+	+	+	+
	Embedding theory of function spaces	The purpose of the discipline: exposition of the fundamentals of the theory of Sobolev spaces. It contains embedding theorems of different metrics and different dimensions for whole-order Sobolev spaces in the case of bounded and unbounded domains														
D13	Loaded differential equalizations	The purpose of the course is to study the concepts of loaded differential equations and their classification, connection with inverse problems, reduction of BVP to singular integral equations, numerical methods for solving differential equations and problems of mathematical physics \	5		+		+	+	+	+	+	+	+	+	+	+
	Functional-differential equations	The purpose of discipline is to study the spectrum of operators, a task with a variable speed of movement of the load point. The second BVP for a "substantially" loaded parabolic equation. The Cauchy problem with a time load.														
D14	Selected issues of Group Theory (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.	6		+		+	+	+	+	+	+	+	+	+	+
	Rings and modules	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.														
D15	Structural and structural properties of functions	The purpose of the discipline: consideration of the relationship of structural properties (differentiability, smoothness) of functions with constructive ones (the nature of the approximation in one way or another) by studying the Lebesgue space, the Dirichlet kernel and its norm.	5		+		+	+	+	+	+	+	+	+	+	+
	Function approximation theory	The purpose of the discipline is to study general theorems of the existence and uniqueness of the element of the best approximation. The criterion of the element of the best approximation in the Lebesgue space. Bernstein"s inequality.														
D16	Boundary value problems of heat conduction in degenerating domains (in English language)	The purpose of the discipline is to study the first BVP for the heat conduction equation in degenerate domains: the formulation of the problem, its reduction to the singular Volterra integral equation of the second kind using thermal potentials.	5		+		+	+	+	+	+	+	+	+	+	+
	Singular integral equations for heat boundary value problems	The purpose of the course: formulation of direct and conjugate boundary value problems for the heat equation in weighted functional classes; reduction of the formulated BVP to a singular integral Volterra equation of the second kind and its study.														

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
LO5	Demonstrates current knowledge of modern history and philosophy of science, applied natural science disciplines that contribute to the implementation of the main directions of modernization of public consciousness. He is able to form and solve problems that arise in the pedagogical process and require in-depth pedagogical knowledge; analyze and comprehend the realities of modern theory and practice of higher education.	Lecture Practice Analysis and problem solving Exercises	Test control Written control Colloquium Express survey
LO6	He is able to use numerical methods to solve differential equations and problems of mathematical physics. Demonstrates current knowledge about loaded differential equations and their classification, connection with inverse problems, reduction of boundary value problems to special integral equations, characteristic integral equations. Has the skills of reducing boundary value problems to special integral equations, applying the regularization method.	Lecture Practice Analysis and problem solving Exercises	Test control Written control Colloquium Express -survey
LO7	Capable of abstract thinking, analysis, synthesis; the ability to use in management activities, strives for objectivity, tolerance, attentiveness and tolerance in solving controversial, conflict situations. Applies methodological and methodical knowledge in conducting scientific research, pedagogical and educational work. Owns the methods and methods of planning the activities of the organization of education in accordance with the requirements of curricula, regulatory documents, taking into account the individual and special educational needs of students. Has the skills of designing and analyzing the management of the holistic pedagogical process of educational organizations.	Discussion Round table Interactive lecture Oral presentation	Testing Oral interview Preparation of the abstract Writing an essay
LO8	Has a clear understanding of the language of manifolds and external differential forms, integration problems on manifolds and their applications. Has fundamental knowledge of stochastic analysis. Uses the methodology of describing random processes and phenomena for optimal results in solving applied problems using mathematical tools.	Interactive lecture Practical work Analysis and problem solving Exercises	Test control Written control Colloquium Calculation and graphic task
LO2	He knows the basic concepts and methods of the theory of topological spaces and their most important example – metric spaces. He is able to solve problems of the theory of metric and topological spaces, is able to independently search for relevant information necessary both in the process of studying this discipline and in the study and writing of a master's thesis. Has the skills of geometric interpretation of abstract results.	Interactive lecture Practical work Analysis and problem solving Exercises	Test control Written control Colloquium Calculation and graphic task
LO12	Knows the properties of the approximation module, continuity, direct and inverse theorems of approximation theory. Applies methods for determining the best approximations of various spatial elements, methods for calculating the modulus of continuity of a function, theorems of approximation theory. He is able to analyze studies related to approximation theory, determine the differential properties of a function, and draw conclusions about the relationship of functional spaces.	Interactive lecture Practical work Analysis and problem solving Exercises	Test control Written control Colloquium Presentation
LO9	Analyzes, processes, generalizes and reproduces information and phenomena; correctly uses socially marked linguistic units of the language being studied. He is able to communicate freely, easily and convincingly in verbal and non-verbal form in three languages to solve the tasks of professional activity. Knows and understands the functional features of oral and written professionally-oriented texts, including scientific and technical ones. Uses foreign terminology for reading, speaking, listening, writing in professional communication. Owns the technique of translating professionally-oriented text. He is able to solve boundary value problems for the heat equation in regions degenerating into a point at the initial or final moment of time; to solve singular Volterra integral equations of the second kind; to investigate the issues of their solvability. Has the skills of modeling physical processes of boundary value problems for the heat equation, owns the methods of research and analysis of installation problems.	Discussion Round table Interactive lecture Oral presentation	Testing Oral interview Preparation of the abstract Writing an essay
LO10	Knows the basic concepts of structural and constructive properties of mastered functions. It is able to	Discussion	Testing

	analyze the structural and constructive properties of functions, to use in the analysis of advanced scientific literature in scientific research.	Round table Interactive lecture Oral presentation	Oral interview Preparation of the abstract Writing an essay
LO1	Knows the theoretical foundations of the subjects studied in the learning process and their application in research activities in the development of mathematical models, algorithms for solving the problem set in the master's thesis, tasks. Owns the methods of searching and selecting sources of information; using the basic techniques of research activities, conducting an experiment. Knows the general scientific methodology, logic and technology of research work.	Interactive lecture Practical work Analysis and problem solving Exercises	Тестовый контLOль Письменный контLOль Коллоквиум Презентация
LO3	Knows the peculiarities of presenting the results of scientific activity in oral and written form when working in national and international research teams. He is able to identify and systematize the main ideas in scientific texts; critically evaluate any incoming information, regardless of the source; avoid the automatic application of standard formulas and techniques when solving problems, conduct scientific discussion, demonstrate the ability of public speaking. Has the skills of working with bibliographic reference books, compiling scientific bibliographic lists, using bibliographic descriptions in scientific papers, designing and carrying out complex research, knowledge of modern methods and principles of developing scientific problems on the topic of scientific qualification work. He is able to develop models, algorithms for solving a specific problem, task; find a solution, get results and interpret them; systematize the necessary materials of a master's thesis.	Lecture Practice Analysis and problem solving Exercises	Test control Written control Colloquium Express survey
LO11	Knows the basic concepts and results of model theory concerning types, categorical theories, saturated and simple models, is able to formulate mathematically correctly and prove theorems describing the behavior of countable models of complete theories.. Has the skills of applying the semantic properties of theories to study their model classes. He is able to prove basic theorems and solve typical problems of group theory. Has skills of working with finite and finitely generated Abelian groups; professional thinking necessary to use methods of group theory.	Discussion Round table Interactive lecture Oral presentation	Testing Oral interview Preparation of the abstract Writing an essay
LO4	Knows the basic methods and models of commercialization of innovative technologies. Applies in practice modern methods of analysis of innovative solutions to applied problems of scientific and scientific-technical developments. Owns the technology of commercialization of the results of scientific research and innovative developments in the IT field. He is able to use pedagogical approaches, educational materials in accordance with the latest innovations in mathematics and education. Possesses modern didactic and methodological tools to achieve successful learning outcomes.	Interactive lecture Practical work Analysis and problem solving Exercises	Test control Written control Colloquium Presentation

21. Criteria for assessing the achievability of learning outcomes

CodesofLO	Criteria
LO5	Knows: conceptual and theoretical foundations of mathematics, their place in the general system of sciences and values, the history of development and the current state
	Can: apply knowledge of fundamental and applied mathematics to solve mathematical problems, to interpret phenomena and processes in nature
	Owns: basic mathematical concepts, definitions, theorems and methods of their proofs, methods, techniques, algorithms and ways of applying modern mathematical apparatus.
LO6	Knows: basic mathematical concepts, definitions, theorems and methods of their proofs, methods, techniques, algorithms and ways of applying modern mathematical apparatus.
	Can: He is able to use the acquired knowledge for independent analysis of boundary and extreme problems, to build mathematical models of boundary and extreme problems based on analytical methods
	Owns: the basic concepts of the theory of partial differential equations of the second order; methods of finding solutions to differential equations, differential and integral calculus in the study of functions and convergence of series, in solving boundary and extreme problems in various fields of modern natural science
LO7	Knows the basic definitions and theorems of the theory of functional and real analysis, the theory of functions of a complex variable, algebra, geometry and number theory, the theory of differential and integral equations, the theories of differentiable manifolds and partial differential equations
	Can: he is able to apply algebraic and geometric apparatus, apparatus of functional and real analysis, analytical methods for solving problems, acquired knowledge in production practice for solving and researching problems, proof of the results obtained
	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
LO8	Knows the conceptual and theoretical foundations of model theory, probability theory and mathematical statistics, their place in the general system of sciences and values, the history of development and the current state
	Can: how to use modern probabilistic and statistical tools to solve applied problems
	Owns: a system of knowledge about fundamental mathematical laws and theories in the field of model theory, probability theory and mathematical statistics
LO2	He knows the main types of algebraic structures, both classical and constructions of modern universal algebra, the most important theorems related to specific classes of algebras and universal algebras
	Can:he is able to use knowledge of the basics of algebra and number theory to translate information from natural language into the language of mathematics and vice versa; apply knowledge of the basics of algebra and number theory in describing processes and phenomena in various fields of knowledge, formulate and prove the main results related to algebraic systems, use the language of mathematical logic to formulate typical statements related to classes algebras and algebraic systems
	Owns:concepts and methods of algebra and number theory at a level that allows to formulate and solve model-theoretic problems and problems related to various algebraic systems; skills of formalization of theoretical and applied practical problems, basic constructions available in the apparatus of general algebra
LO12	Knows fundamental physical laws and theories, physical essences of phenomena and processes in nature and technology formulation and mathematical expression of physical laws; principles of operation of physical devices and mechanisms
	Can appeal to data from experimental and theoretical physics, fundamental and applied physics, and mathematical modeling of physical processes; use the laws of physics to explain various phenomena in nature and technology
	Owns: has the following skills: apply theoretical knowledge of physics in practical activities and everyday life
LO9	He knows the laws of mechanics, molecular physics, electricity and magnetism, optics, atomic physics and physical phenomena; experimental and theoretical mechanics, the influence of physics as a science on the development of technology; the connection of physics with other sciences
	Can solve typical problems based on the laws studied and using well-known formulas; assemble an installation; can make tables of the dependence of quantities and build graphs
	Owns:has the skills to conduct observations, plan and perform experiments, put forward hypotheses and build models, apply the knowledge gained in physics to

	explain a variety of physical phenomena and properties of substances; practical use of physical knowledge; evaluate the reliability of natural scientific information
LO10	Knows the essence and features of pedagogy as a science, its methodological foundations and pedagogical approaches; the essence and main characteristics of modern teaching methods and technologies
	Can :is able to apply the methods of pedagogical research in the analysis of real reality from a pedagogical perspective; use the criterion-based assessment system to achieve the learning goals of the updated curriculum.
	Owns: has the following skills: substantiate the legitimacy of implementing various educational paradigms in pedagogical practice (knowledge — based and humanistic; technocratic — cultural; societal — human — oriented; pedocentric-child-centered)
LO1	Knows modern approaches to modeling scientific and pedagogical activities; the basics of teaching and methodical work in higher education
	Can he is able to analyze the difficulties that arise in pedagogical activity and develop an action plan to resolve them; present subject material on the interrelationships between research and educational processes in higher education, including the possibility of attracting his own scientific research as a means of improving the educational process.
	Owns: the technique of using technical training tools when conducting classes in academic disciplines; methods of self-analysis and self-assessment of the results and effectiveness of classroom classes of various types
LO3	Knows methods of numerical data analysis, multimedia tools, computer graphics and animation, computer modeling
	Can apply modern application software packages and Internet technologies to develop Web applications
	Owns: the methods of designing and developing Web applications and processing two-dimensional and three-dimensional graphic objects, video and audio information, using specialized software, proficient in software tools for analyzing, interpreting and visualizing the results of computer modeling, and applies numerical methods and application software packages to solve applied problems
LO11	Knows foreign terminology and terminology in Kazakh in mathematics, compositional and semantic organization of scientific text
	Can compose various elementary expressions and tasks using Kazakh foreign terminology, formulate the topic, define the language means of organizing the text and use them to generate your own texts on the topic
	Owns the language of business communication and professional vocabulary(terminology), the language system and ways of its use in cross-cultural and communicative activities; the speech system and communication as a willingness and ability to carry out when reading texts that differ in content and structure
LO4	Knows important stages of the modern history of Kazakhstan, the basics of philosophy, applied economic, legal, natural science disciplines
	Can :he is able to apply knowledge about society as an integral system and a person, the legal interests of the parties in the field of protecting the rights of individuals and legal entities, the economic and social conditions of doing business, the impact of harmful and dangerous factors on humans and the natural environment.
	Owns: He has knowledge of society as an integral system and a person, the role of spiritual processes in modern society, the legal interests of the parties in the field of protecting the rights of individuals and legal entities, the economic and social conditions of entrepreneurial activity.

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

Independence in the search for professional and personal development opportunities

Communication skills

Tolerance and good manners

Academic integrity

Willingness to participate in solving state tasks and strategies of Kazakhstan

Types of competencies	Description of competencies
Behavioral skills and personal qualities (Softskills)	Demonstrates current knowledge of modern history and philosophy of science, applied natural science disciplines that contribute to the implementation of the main directions of modernization of public consciousness. Is able to formulate and solve problems arising in the pedagogical process and requiring in-depth pedagogical knowledge; analyze and comprehend the realities of modern theory and practice of higher education.
Professional competencies (Hardskills)	He is able to use numerical methods to solve differential equations and problems of mathematical physics. Demonstrates current knowledge about loaded differential equations and their classification, connection with inverse problems, reduction of boundary value problems to special integral equations, characteristic integral equations. Has the skills of reducing boundary value problems to special integral equations, applying the regularization method. Capable of abstract thinking, analysis, synthesis; the ability to use in management activities, strives for objectivity, tolerance, attentiveness and tolerance in solving controversial, conflict situations. Applies methodological and methodological knowledge in conducting scientific research, pedagogical and educational work. Owns the methods and methods of planning the activities of the organization of education in accordance with the requirements of curricula, regulatory documents, taking into account the individual and special educational needs of students. Has the skills of designing and analyzing the management of the holistic pedagogical process of educational organizations. Has a clear understanding of the language of manifolds and external differential forms, integration problems on manifolds and their applications. Has fundamental knowledge of stochastic analysis. Uses the methodology of describing random processes and phenomena for optimal results in solving applied problems using mathematical tools. Knows the basic concepts and methods of the theory of topological spaces and their most important example – metric spaces. He is able to solve problems of the theory of metric and topological spaces, is able to independently search for relevant information necessary both in the process of studying this discipline and in the study and writing of a master's thesis. Has the skills of geometric interpretation of abstract results. Knows the properties of the approximation module, continuity, direct and inverse theorems of approximation theory. Applies methods for determining the best approximations of various spatial elements, methods for calculating the modulus of continuity of a function, theorems of approximation theory. He is able to analyze studies related to approximation theory, determine the differential properties of a function, and draw conclusions about the relationship of functional spaces. Analyzes, processes, generalizes and reproduces information and phenomena; correctly uses socially marked linguistic units of the language being studied. He is able to communicate freely, easily and convincingly in verbal and non-verbal form in three languages to solve the tasks of professional activity. Knows and understands the functional features of oral and written professionally-oriented texts, including scientific and technical ones. Uses foreign terminology for reading, speaking, listening, writing in professional communication. Owns the technique of translating professionally-oriented text. He is able to solve boundary value problems for the heat equation in regions degenerating into a point at the initial or final moment of time; to solve singular Volterra integral equations of the second kind; to investigate the issues of their solvability. Has the skills of modeling physical processes of boundary value problems for the heat equation, owns the methods of research and analysis of installation

	problems.
	Knows the basic concepts of structural and constructive properties of mastered functions. It is able to analyze the structural and constructive properties of functions, to use in the analysis of advanced scientific literature in scientific research.
	Knows the theoretical foundations of the subjects studied in the learning process and their application in research activities in the development of mathematical models, algorithms for solving the problem set in the master's thesis, tasks. Owns the methods of searching and selecting sources of information; using the basic techniques of research activities, conducting an experiment. Knows the general scientific methodology, logic and technology of research work.
	Knows the peculiarities of presenting the results of scientific activity in oral and written form when working in domestic and international research teams. He is able to identify and systematize the main ideas in scientific texts; critically evaluate any incoming information, regardless of the source; avoid the automatic application of standard formulas and techniques when solving problems, conduct a scientific discussion, demonstrate the ability of public speaking. Has the skills of working with bibliographic reference books, compiling scientific bibliographic lists, using bibliographic descriptions in scientific papers, designing and carrying out complex research, knowledge of modern methods and principles of developing scientific problems on the topic of scientific qualification work. He is able to develop models, algorithms for solving a specific problem, task; find a solution, get results and interpret them; systematize the necessary materials of a master's thesis.
	Knows the basic concepts and results of model theory concerning types, categorical theories, saturated and simple models, is able to formulate mathematically correctly and prove theorems describing the behavior of countable models of complete theories. Has the skills of applying the semantic properties of theories to study their model classes. He is able to prove basic theorems and solve typical problems of group theory. Has skills of working with finite and finitely generated abelian groups; professional thinking necessary for using methods of group theory.

Digital competencies (Digital skills):	Knows the basic methods and models of commercialization of innovative technologies. Applies in practice modern methods of analysis of innovative solutions to applied problems of scientific and scientific-technical developments. Owns the technology of commercialization of the results of scientific research and innovative developments in the IT field. He is able to use pedagogical approaches, educational materials in accordance with the latest innovations in mathematics and education. Owns modern didactic and methodological tools to achieve successful learning outcomes.

Compilers:

Members of the working group:

Head of Department MAandDE   T.D. Tokmagambetova

Professor of the Department MAaDE   N.T. Orumbayeva

Assistant Professor of the Department MAandDE   M.Zh. Turgumbayev

Dean of the Faculty of Transport and Roads of the
NLC «Karaganda Technical University named after Abylkas Saginov»   B.Sh. Askarov

Master's student   A.A. Agatayeva

The educational program was reviewed by the Faculty Council _____19.04.24_____ Protocol № 7

The educational program was considered at a meeting of the Academic Council from ___29.04.24___ Protocol № 5

The educational program was reviewed and approved at a meeting of the University Board _24.05.24_ Protocol № 8

Member of the Board, Vice-Rector for Academic Affairs   **M.M. Umurkulova**

Director of the Department for Academic Work   **T.M Khassenova**

Dean of the Faculty of Mathematics and Information tehnology   **A.O. Tanin**

EDUCATION PROGRAM DEVELOPMENT PLAN
«7M05401-Mathematics»

The purpose of the Plan is to promote the improvement of the quality of conditions for the implementation of the educational program, taking into account the current requirements of the labor market and the achievements of modern science.

Target indicators

№	Indicators	Ед. изм.	2024-2025	2025-2026	2026-2027	2027-2028
1	**Human resources development**					
1.1	Increase in the number of teachers with advanced degrees	Number of people	1	1	1	1
1.2	Advanced training in the teaching profile	Number of people	3	3	3	3
2	**Promotion of EP in ratings**					
2.1	IQAA	Position	2	2	2	2
2.2	YAAR	Position	3	3	3	3
2.3	Atameken	Position	1	1	1	1
3.	**Development of educational and scientific-methodical literature, electronic resources**					
3.1	Traning manuals	Number		1		1
3.2	Methodological recommendations/instructions	Number		1		1
3.3	Electronictextbook	Number	1	1	1	1
3.4	Video/audio lectures	Number	-	1	1	1
3.5	Видео/аудиолекции	Number	2	1	1	1
3.6	Multimediapresentations	Number	2	1	3	3
3.7	Electroniclectures	Number	2	2	3	3
4.	**Development of educational and laboratory facilities**					
4.1	Purchase ofsoftwareproducts	Number				
4.2	Purchaseofequipment	Number	5	3	3	3
5.	**Updating the content of the OP**					
5.1	Updating the learning outcomes and the list of	Year	+	-	-	-

	disciplines taking into account the requirements of the labor market, scientific achievements, and professional standards					
5.2	Introduction to the EP academic disciplines in foreign languages*	Year	-	+	-	-
5.3	Introduction of new teaching methods	Year				
5.4	Opening of a joint/two-degree program on the basis of the EP	Year	-	+	-	-

Head of the Department of Mathematical Analysis and Differential Equations_____ T.D. Tokmagambetova