CATALOG OF ELECTIVE DISCIPLINES

6B01 - Pedagogical sciences
(Code and classification of the field of education)

6B015 - Training of teachers in Natural science subjects
(Code and classification of the direction of training)

0114
(Code in the International Standard Classification of Education)

B009 - Math teacher training
(Code and classification of the educational program group)

6B01513 - Mathematics (IP)
(Code and name of the educational program)

bachelor
(Level of preparation)

set of 2024

Semey 2024

Developed

By the Academic Committee of the EP
Head of AC Ospanova D.
EP Manager Sakibayeva S.

Reviewed

At a meeting of the Academic Quality Commission of the Faculty Natural and Mathematical of the
Protocol No.3 "9" of January 2024
at the meeting of the Commission on Academic Quality
Recommended for approval by the Academic Council of the University
Protocol No. 6, dated June 6, 2024.

Approved

at a meeting of the University Academic Council by protocol No. 3 of January 16, 2024.

at a meeting of the University Academic Council by protocol No. 6 of June 18, 2024.

Single variable differential calculus of functions

Discipline cycle	Basic disciplines
Course	1
Credits count	6
Knowledge control form	Examination

Short description of discipline

The course builds pre- service teachers' holistic view of the mathematical analysis and comprehension of the relationship of the mathematical concepts and their practical significance. Pre- service teachers develop their skills in verbal formulation and symbolic recording of the mathematical statements and their negation. Pre-service teachers investigate a chain of topics and build their abilities to select necessary knowledge to prove mathematical statements or to solve problems. They also develop their skills in transforming and visualizing information.

Purpose of studying of the discipline

The purpose of this course is to enhance the following areas of pedagogical competence:
• The area of competence for fundamental mathematical knowledge
• The area of competence of research skills and interdisciplinary interactions
• The area of competence of practical skills

Learning Outcomes

ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies

Learning outcomes by discipline

to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
Future teachers demonstrating competence can:
• critically evaluate information and draw an analogy between different definitions of the same concept;
• understand the representations of static and dynamic systems and the rate of change;
• understand the need for theoretical knowledge to solve practical problems in everyday life;
• read mathematical notation, design written works using mathematical language;
• use computer mathematics systems and dynamic algebra systems to study the properties of mathematical concepts and their geometric interpretation.

Prerequisites

School course

Postrequisites

Single variable integral calculus of functions

Elementary mathematics (algebra)

Discipline cycle	Basic disciplines
Course	1
Credits count	4
Knowledge control form	Examination

Short description of discipline

The course is the basis for the study of both mathematical disciplines in the further education programme and related disciplines. The content covers the main sections of the school algebra course, which develop students`` knowledge and skills in solving algebraic problems in different ways, the ability to judge and select the necessary information to solve the problem, the mathematical thinking, and the ability to state their thoughts.

Purpose of studying of the discipline

The purpose of this course is to enhance the following areas of pedagogical competence:
• The area of competence of practical skills
• The area of competence of research skills and interdisciplinary interactions

Learning Outcomes

ON 8 to understand the features and properties of solving mathematical problems and choose the best methods and approaches to its training
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

– understand the features and properties of solving mathematical problems and choose the best methods and approaches to teaching it;
– to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results.
Students:
** master the skills of solving problems of the school algebra course in different ways;*
** applies skills in applying basic methods and algorithms for solving mathematical problems at school;*
** uses the basic methods and algorithms of elementary mathematics in solving applied problems.*

Prerequisites

School course

Postrequisites

Basic and profile disciplines of the EP

Linear algebra and analytic geometry

Discipline cycle	Basic disciplines
Course	1
Credits count	6
Knowledge control form	Examination

Short description of discipline
During the course, pre-service teachers develop an understanding of the relationship between mathematical disciplines. They also develop their mathematical thinking through a study of the fundamental concepts and methods of linear algebra and analytical geometry for a particular professional problem, imparting skills of translation of geometric objects into analytical form and their research using analytical methods, and the use of mathematical apparatus in professional activity.

Purpose of studying of the discipline
The purpose of studying the discipline is to form students` scientific and practical understanding of mathematical methods for describing and solving practical problems in engineering, technology, and economics.

Learning Outcomes
ON 3 critically select theoretical knowledge based on advanced concepts of pedagogical education using various information and communication technologies and use the knowledge to improve the skills of teaching mathematics and their own professional growth
ON 5 to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education
ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking

Learning outcomes by discipline
– critically select theoretical knowledge based on advanced concepts of teacher education using various information and communication technologies and use the knowledge to improve math teaching skills and their own professional growth;
– to recognize and understand fundamental scientific concepts of fundamental methodological and theoretical importance for understanding and mastering natural and mathematical sciences, to argue for their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education;
– apply IT to expand one`s own worldview of modern society and develop demonstration experiments and practical work, use CLIL technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking;
the application of knowledge and skills in the formulation of applied practical problems by mathematical methods, as well as the use of well-known methods to solve formulated problems.

Prerequisites
School course

Postrequisites
Problem solving practicum: Geometry

Elementary mathematics (geometry)

Discipline cycle	Basic disciplines
Course	1
Credits count	4
Knowledge control form	Examination

Short description of discipline
The course is propaedeutic for pre-service teachers of mathematics and aims to align theoretical knowledge and practical skills in solving geometric problems in the school mathematics course. The course develops skills in drawing up algorithms for solving mathematical problems, proving mathematical assertions; it develops logical, spatial thinking.

Purpose of studying of the discipline
1. Understanding basic geometric concepts: Familiarization with basic concepts of geometry such as points, straight lines, planes, angles, polygons, circles and three-dimensional shapes.
2. Investigation of the properties of shapes: The study of the properties of various geometric shapes, their classes, as well as the formulation and proof of theorems related to them.
3. Development of spatial thinking: Formation of visualization skills and representation of geometric objects in space, which contributes to the development of abstract and logical thinking.
4. Development of proof skills: The formation of the ability to reason logically and prove statements, which is an important part of mathematical thinking.

Learning Outcomes
ON 8 to understand the features and properties of solving mathematical problems and choose the best methods and approaches to its training
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline
– understand the features and properties of solving mathematical problems and choose the best methods and approaches to teaching it;
– to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results.
** master the knowledge of the ideas and methods of the school mathematics course, the system of basic mathematical structures;*
** uses basic methods of mathematical reasoning to prove statements and solve mathematical problems;*
** uses symbolic values when writing conditions, statements when proving and solving geometric problems.*

Prerequisites
School course

Postrequisites

Basic and profile disciplines of the EP

Single variable integral calculus of functions

Discipline cycle	Basic disciplines
Course	2
Credits count	3
Knowledge control form	Examination

Short description of discipline

The course focuses on pre-service teachers' understanding of the relationship of the mathematical facts within mathematical disciplines, as well as the relationship of mathematical concepts with concepts from other fields of sciences. They develop their skills in using mathematics to solve interdisciplinary problems, and in analyzing, synthesizing and generalizing mathematical objects and known data, thus acquiring new knowledge. They also build their abilities to formulate mathematical statements based on the certain external features of concepts, and strictly justify them. Pre-service teachers develop their abilities to apply systems of dynamic algebra and systems of computer mathematics to solve problems of integral calculus of functions of one variable.

Purpose of studying of the discipline

The purpose of studying the discipline is to form students` holistic understanding of integral calculus as an important tool for mathematical analysis, as well as to develop their skills and abilities for the successful application of mathematics in real and interdisciplinary contexts.

Learning Outcomes

ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies

Learning outcomes by discipline

to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
** defines interdisciplinary and intrasubject connections of mathematics;*
** determines the possibilities of applying mathematics in solving everyday problems;*
** consistently presents his point of view, arguing his point of view by presenting convincing facts;*
** logically substantiates the application of existing mathematical knowledge in the construction of a school mathematics course;*
It uses computer mathematics systems and dynamic algebra systems to translate analytical reasoning into geometric images and vice versa.

Prerequisites

Single variable differential calculus of functions

Postrequisites

Multivariable differential and integral calculus of functions of series

Theory of probability and mathematical statistics

Discipline cycle	Basic disciplines
Course	2
Credits count	6
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers develop their understanding of the structure of theoretical and probabilistic models of random events, quantities, and processes. They impart skills in solving probabilistic and statistical problems, processing statistical information, and obtaining statistically justified conclusions using standard methods and models. Pre-service teachers develop their skills in building and analyzing mathematical models that reflect the properties, characteristics, and dependencies that exist in real random phenomena and processes.

Purpose of studying of the discipline

The purpose of the discipline is to prepare future teachers for the successful use of probability-theoretic methods and statistical approaches in educational practice, providing them with the necessary knowledge and skills to analyze random phenomena and make informed decisions based on statistically significant information.

Learning Outcomes

ON 3 critically select theoretical knowledge based on advanced concepts of pedagogical education using various information and communication technologies and use the knowledge to improve the skills of teaching mathematics and their own professional growth
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

– critically select theoretical knowledge based on advanced concepts of teacher education using various information and communication technologies and use the knowledge to improve math teaching skills and their own professional growth;
– to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
– to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results.
** creates probabilistic models of random events, random variables and processes;*
** implements in practice methods and technologies for constructing the distribution of discrete and continuous random variables and patterns of action with them;*

** * gets the statistical distribution of samples and finds the empirical distribution function, plots it;*
** uses statistical methods to test statistical hypotheses to analyze empirical data systems and process experimental results.*
** Assesses the level of influence of various factors on the result of the experiment.*

Prerequisites

School course

Postrequisites

Basic and profile disciplines of the EP

Algebra and numbers theory

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre- service teachers build their understanding of the fundamental concepts and methods of higher algebra and number theory. They also develop their abstract and analytical thinking, as well as a general mathematical culture. Pre-service teachers develop their skills in using abstract mathematical apparatus necessary for analyzing and modeling processes and phenomena. They also learn to master methods of processing and analyzing results using algebra and number theory.

Purpose of studying of the discipline

The goal is to master the fundamental concepts and methods of higher algebra and number theory to develop the ability to abstract and analytical thinking. The course is aimed at developing the general mathematical culture of students, as well as at developing skills in using abstract mathematical apparatus for analyzing and modeling processes and phenomena. As a result of the study, students must master the methods of processing and analyzing the results by means of algebra and number theory.

Learning Outcomes

ON 5 to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education
ON 11 to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the knowledge and skills gained in practice
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

– to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue for their own position of applying and integrating knowledge from other fields of science to solve global and local problems of mathematical education;
- to use modern and effective methods for conducting research in the educational process to identify problems in learning material by students and apply the acquired knowledge and skills in practice;
– to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results.
** understands the theories and methods of higher algebra and number theory;*
** discusses the impact of mathematical knowledge on the structure of the world using abstract and analytical thinking skills;*
** Performs everyday tasks using algebraic structures and number theory.*

Prerequisites

Elementary mathematics (algebra) Elementary mathematics (geometry)

Postrequisites

Logics and discrete mathematics

Multivariable differential and integral calculus of functions of series

Discipline cycle	Basic disciplines
Course	2
Credits count	4
Knowledge control form	Examination

Short description of discipline

The course focuses on the building pre-service teachers' abilities to apply differential and integral calculus of many variables and series theory consistently and adequately. They search for ideas of visual and logically constructed proof of mathematical statements. They also develop their abilities in differentiating the general plan of solutions specific to mathematical analysis of certain types of problems, and development of meta-subject content. Pre-service teachers develop their spatial thinking and abilities to represent three-dimensional graphs.

Purpose of studying of the discipline

This course is aimed at developing students skills necessary for successful independent work with mathematical problems and scientific research in the field of multidimensional analysis.

Learning Outcomes

ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

– to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;

– to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results.
-Mastering the basic concepts related to the functional analysis of multidimensional functions, including limit transitions, gradients, partial derivatives and multiple integrals.
-The ability to calculate partial derivatives and gradients of functions of many variables, apply differentiation rules, including the product rule, the division rule and the chain rule.
-The ability to calculate double and triple integrals, as well as to use methods of changing variables, including interpretation in polar, cylindrical and spherical coordinates.

Prerequisites

Single variable integral calculus of functions

Postrequisites

Theory of series Complex analysis

Complex analysis

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course aims to provide pre-service teachers with an understanding of the basic concepts of complex analysis, numerical and functional series, Fourier integral, Fourier and Laplace integral transforms, as well as the relationship between this discipline and other mathematical disciplines. Pre-service teachers are introduced to the current developments in analysis and their use in solving real-world problems.

Purpose of studying of the discipline

Improving competencies in the field of pedagogy and didactics. Students have a holistic understanding of the methodological system of education, can model strategies and technologies for solving specific pedagogical problems, planning, guidance, teaching and evaluation, are able to use knowledge, forms, methods and technologies of teaching in accordance with the conditions of a particular school and the capabilities of students.

Learning Outcomes

ON 3 critically select theoretical knowledge based on advanced concepts of pedagogical education using various information and communication technologies and use the knowledge to improve the skills of teaching mathematics and their own professional growth
ON 5 to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education
ON 11 to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the knowledge and skills gained in practice

Learning outcomes by discipline

– critically select theoretical knowledge based on advanced concepts of teacher education using various information and communication technologies and use the knowledge to improve math teaching skills and their own professional growth;
– to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue for their own position of applying and integrating knowledge from other fields of science to solve global and local problems of mathematical education;
- to use modern and effective methods for conducting research in the educational process to identify problems in learning material by students and apply the acquired knowledge and skills in practice;

Prerequisites

School course

Postrequisites

Basic and profile disciplines of the EP

Phenomena based mathematical disciplines teaching

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers explore the role of interdisciplinary integration in school as a means of developing intellectual creative abilities of students. Pre-service teachers analyze the methods and methodological techniques in a pedagogical process allowing them to form the integrative way of thinking of their students. Pre-service teachers also develop their skills in developing practice-oriented assignments in mathematics for secondary school.

Purpose of studying of the discipline

The purpose of this course is to teach mathematical disciplines based on phenomena with an emphasis on interdisciplinary integration in school education. The main objective of the course is to develop the intellectual and creative abilities of students through the study of methods and methodological techniques in the pedagogical process. This will help to form an integrative way of thinking among schoolchildren and develop skills in developing practice-oriented math assignments for secondary schools. As a result of the training, students will be able to better understand mathematical concepts and apply them in practice, which contributes to their overall development and preparation for future professional activities.

Learning Outcomes

ON 7 to generalize and analyze cause and effect relationships between phenomena and processes occurring in human life to interpret the idea of unity and integrity of science
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern

pedagogical technologies

Learning outcomes by discipline

– to generalize and analyze the cause-and-effect relationships between phenomena and processes occurring in human life in order to interpret the idea of unity and integrity of science;
– to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
** teaches you to analyze the information received, independently put forward hypotheses, and make decisions;*
** provides support to a group of students in the study of this phenomenon;*
** selects/projects interesting and stimulating real-world phenomena for students to study;*
** supports the application of subject knowledge of several subjects in the analysis of this phenomenon.*

Prerequisites

School course

Postrequisites

Basic and profile disciplines of the EP

Programming

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre- service teachers develop their understanding of the fundamental Python programming concepts. They also develop their algorithmic thinking skills as well as coding skills by using commonly used data structures, writing custom functions, and reading and writing results to files.

Purpose of studying of the discipline

is to study the basics of algorithmization of problems, classification of programming languages, data types and classification

Learning Outcomes

ON 3 critically select theoretical knowledge based on advanced concepts of pedagogical education using various information and communication technologies and use the knowledge to improve the skills of teaching mathematics and their own professional growth
ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking

Learning outcomes by discipline

– critically select theoretical knowledge based on advanced concepts of teacher education using various information and communication technologies and use the knowledge to improve math teaching skills and their own professional growth;
– apply IT to expand one`s own worldview of modern society and develop demonstration experiments and practical work, use CLIL technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking;
** Python has knowledge of the syntax and rules of the programming language;*
** sets a simple task and creates an algorithm for solving it using the Python programming language;*
** Uses various tools to develop and write Python programs;*
** Encodes using commonly used data structures, writes user-defined functions.*

Prerequisites

School course

Postrequisites

Basic and profile disciplines of the EP

Research skills in law and anti-corruption culture

Discipline cycle	General educational disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

The main provisions of the Constitution, the current legislation of the Republic of Kazakhstan; the system of government bodies, terms of reference, goals, methods of state regulation of the economy, the role of the public sector in the economy; financial law and finance; the mechanism of interaction between substantive and procedural law; the essence of corruption, the reasons for its origin; measure of moral and legal responsibility for corruption offenses; current anti-corruption legislation.

Purpose of studying of the discipline

formation of students` knowledge about anti-corruption policy, legal mechanisms for combating corruption and issues of improving anti-corruption work in the Republic of Kazakhstan;
- acquisition of the necessary knowledge and skills in analyzing the causes and conditions that contribute to the emergence and growth of corruption, the ability to develop proposals to minimize and eradicate corruption manifestations.

Learning Outcomes

ON 5 to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education
ON 6 o comprehensively and objectively cover the main stages of the history, evolution of the forms of statehood and civilization of the Kazakh people, to know the methods of scientific research and academic writing, to understand the importance of the principles and culture of academic honesty
ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL

technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking

Learning outcomes by discipline

– to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue for their own position of applying and integrating knowledge from other fields of science to solve global and local problems of mathematical education;
– holistically and objectively highlight the main stages of the history, evolution of the forms of statehood and civilization of the Kazakh people, to know the methods of scientific research and academic writing, to understand the importance of the principles and culture of academic integrity;
apply IT to expand one`s own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking;
to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education
- to comprehensively and objectively cover the main stages of the history, evolution of the forms of statehood and civilization of the Kazakh people, to know the methods of scientific research and academic writing, to understand the importance of the principles and culture of academic honesty
- apply IT to expand one`s own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking

Prerequisites

School course

Postrequisites

Basic and profile disciplines of the EP

Economic and Business Research Methods

Discipline cycle	General educational disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

General principles, techniques and methods for collecting, processing and analyzing data, studying patterns and trends in the development of mass economic phenomena and processes. Essence, forms, structure of capital. Production. production costs. Income production in a market economy. Business concept. Types of entrepreneurial activity. The theory of property, social forms of management. Goods, money. Socio-economic system. The emergence of the market. Financial system. The role of the state in business development. Macroeconomics. Resource saving. The cycle of economic development. inflation and unemployment. Kazakhstan in the system of world economic relations.

Purpose of studying of the discipline

familiarizing students with the main objectives of science, its content and methods, mastering scientific research methods, as well as practical skills in conducting scientific research of economic processes.

Learning Outcomes

ON 5 to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education
ON 6 o comprehensively and objectively cover the main stages of the history, evolution of the forms of statehood and civilization of the Kazakh people, to know the methods of scientific research and academic writing, to understand the importance of the principles and culture of academic honesty
ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking

Learning outcomes by discipline

– to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue for their own position of applying and integrating knowledge from other fields of science to solve global and local problems of mathematical education;
– holistically and objectively highlight the main stages of the history, evolution of the forms of statehood and civilization of the Kazakh people, to know the methods of scientific research and academic writing, to understand the importance of the principles and culture of academic integrity;
to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education
- to comprehensively and objectively cover the main stages of the history, evolution of the forms of statehood and civilization of the Kazakh people, to know the methods of scientific research and academic writing, to understand the importance of the principles and culture of academic honesty
- apply IT to expand one`s own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking

Prerequisites

School course

Postrequisites

Basic and profile disciplines of the EP

Fundamentals of research in ecology and safe life

Discipline cycle	General educational disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

The main patterns of functioning of living organisms, ecosystems of various levels of organization, the biosphere as a whole, their stability; the interaction of the components of the biosphere and the environmental consequences of human economic activity, especially in the context of the intensification of nature management; modern ideas about the concepts, strategies and practical tasks of sustainable development in various countries and the Republic of Kazakhstan; problems of ecology, environmental protection, sustainable development. Life safety, its main provisions. Dangers, emergencies. Risk analysis, risk management. Human security systems. Destabilizing factors of the present. Social dangers, protection from them: dangers in the spiritual sphere, politics, protection from them: dangers in the economic sphere, dangers in everyday life, everyday life. The system of bodies for ensuring life safety, and the legal regulation of their activities

Purpose of studying of the discipline

Training in creative activity and self-management, which can continuously deepen and supplement their knowledge, raise their opinions, theoretical and professional level, openly participate in the improvement of scientific and technical progress

Learning Outcomes

ON 1 possess intercultural and communicative competence, apply skills of independent continuation of further education and build professional relationships in pedagogical and social activities purposefully use means and methods that ensure the preservation and strengthening of health in professional activities

ON 5 to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education

ON 6 o comprehensively and objectively cover the main stages of the history, evolution of the forms of statehood and civilization of the Kazakh people, to know the methods of scientific research and academic writing, to understand the importance of the principles and culture of academic honesty

Learning outcomes by discipline

– possess intercultural and communicative competence, apply skills of independent continuation of further education and build professional relationships in pedagogical and social activities; purposefully use means and methods to ensure the preservation and strengthening of health in professional activities

– to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue for their own position of applying and integrating knowledge from other fields of science to solve global and local problems of mathematical education;

– holistically and objectively highlight the main stages of the history, evolution of the forms of statehood and civilization of the Kazakh people, to know the methods of scientific research and academic writing, to understand the importance of the principles and culture of academic integrity;

apply IT to expand one`s own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking;

to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education

- to comprehensively and objectively cover the main stages of the history, evolution of the forms of statehood and civilization of the Kazakh people, to know the methods of scientific research and academic writing, to understand the importance of the principles and culture of academic honesty

- possess intercultural and communicative competence, apply skills of independent continuation of further education and build professional relationships in pedagogical and social activities; purposefully use means and methods that ensure the preservation and strengthening of health in professional activities

Prerequisites

School course

Postrequisites

Basic and profile disciplines of the EP

Differential equations

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course focuses on developing pre-service teachers' understanding of the basic mathematical apparatus for studying the processes and phenomena of the world around by using concrete examples from applied fields of knowledge. Pre-service teachers develop their skills in identifying factors that significantly affect a process or phenomenon in creating its dynamic model, described by ordinary differential equations. They also build their understanding of the relationship between the laws of science applied with the nature of the problem being studied and mathematics connected to it.

Purpose of studying of the discipline

The purpose of this course is to enhance the following areas of pedagogical competence:

• The area of competence for fundamental mathematical knowledge

• The area of competence of research skills and interdisciplinary interactions

• The area of competence of practical skills

Learning Outcomes
ON 7 to generalize and analyze cause and effect relationships between phenomena and processes occurring in human life to interpret the idea of unity and integrity of science
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
Learning outcomes by discipline
– to generalize and analyze the cause-and-effect relationships between phenomena and processes occurring in human life in order to interpret the idea of unity and integrity of science;
– to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
Future teachers demonstrating competence can:
• understand the prospects of using dynamic modeling in the development of science and society;
• describe a differential model of a process or phenomenon for solving an applied problem;
• conduct independent scientific and practical research using the apparatus of differential equations.
Prerequisites
Multivariable differential and integral calculus of functions of series
Postrequisites
Basic and profile disciplines of the EP

Complex analysis

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course aims to provide pre- service teachers with an understanding of the basic concepts of complex analysis, numerical and functional series, Fourier integral, Fourier and Laplace integral transforms, as well as the relationship between this discipline and other mathematical disciplines. Pre-service teachers are introduced to the current developments in analysis and their use in solving real-world problems.
Purpose of studying of the discipline
The purpose of this course is to enhance the following areas of pedagogical competence:
• The area of competence for fundamental mathematical knowledge
• The area of competence of research skills and interdisciplinary interactions
• The area of competence of practical skills
Learning Outcomes
ON 7 to generalize and analyze cause and effect relationships between phenomena and processes occurring in human life to interpret the idea of unity and integrity of science
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
Learning outcomes by discipline
– to generalize and analyze the cause-and-effect relationships between phenomena and processes occurring in human life in order to interpret the idea of unity and integrity of science;
– to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
Future teachers demonstrating competence can:
• produce conformal mappings using basic elementary functions of a complex variable;
• represent elementary functions of a complex variable by Taylor and Laurent series, find their areas of convergence;
• apply residue theory to calculate complex and real integrals;
• have an idea of the current trends in the development of complex analysis and its applications.
Prerequisites
Single variable differential calculus of functions Single variable integral calculus of functions Multivariable differential and integral calculus of functions of series
Postrequisites
Basic and profile disciplines of the EP

Mathematics teaching methods

Discipline cycle	Basic disciplines
Course	3
Credits count	5

Knowledge control form	Examination

Short description of discipline
During the course, pre-service teachers improve their assimilation of mathematics content, methods, techniques of teaching sections of secondary school mathematics. They develop their skills in using constructive learning theory with behavioral and cognitive approaches. They also explore methodological development for conducting mathematics lessons at school and organizing learning activities of students.

Purpose of studying of the discipline
The purpose of the discipline is to form the competencies of students necessary for the professional solution of educational tasks arising in the real process of teaching mathematics.

Learning Outcomes
ON 3 critically select theoretical knowledge based on advanced concepts of pedagogical education using various information and communication technologies and use the knowledge to improve the skills of teaching mathematics and their own professional growth
ON 5 to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies
ON 11 to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the knowledge and skills gained in practice
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline
– critically select theoretical knowledge based on advanced concepts of teacher education using various information and communication technologies and use the knowledge to improve math teaching skills and their own professional growth;
– to recognize and understand fundamental scientific concepts of fundamental methodological and theoretical importance for understanding and mastering natural and mathematical sciences, to argue for their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education;
– to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
– to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the acquired knowledge and skills in practice;
– to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
** explains the different approaches to teaching and learning;*
** Analyzes, compares and evaluates school math textbooks;*
** analyzes and explains the educational material for conducting math lessons;*
** uses constructive methods of teaching mathematics to explain specific problems of the content of the school mathematics course;*
** Uses appropriate methods of teaching mathematics that stimulate students` motivation and interest in learning the subject.*

Prerequisites
Complex analysis

Postrequisites
Basic and profile disciplines of the EP

Mathematical statements proof methods

Discipline cycle	Basic disciplines
Course	3
Credits count	4
Knowledge control form	Examination

Short description of discipline
During the course, pre-service teachers build their skills in deepening students' knowledge and developing their skills of inductive and deductive proof of mathematical statements, as well as to develop their logical thinking and research skills. Pre-service teachers improve their skills in developing students`` understanding of the principles of mathematical reasoning and proof.

Purpose of studying of the discipline
The purpose of this course is to enhance the following areas of pedagogical competence:
• The area of competence for fundamental mathematical knowledge
• The area of competence of practical skills
• The area of competence of research skills and interdisciplinary interactions

Learning Outcomes
ON 7 to generalize and analyze cause and effect relationships between phenomena and processes occurring in human life to interpret the idea of unity and integrity of science
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies
ON 11 to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the knowledge and skills gained in practice

Learning outcomes by discipline
– to generalize and analyze the cause-and-effect relationships between phenomena and processes occurring in human life in order to interpret the idea of unity and integrity of science;
– to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical

education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
– to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the acquired knowledge and skills in practice;
Future teachers demonstrating competence can:
• know the ways and methods of instilling in students the skills of inductive and deductive proof of mathematical statements;
• teach students to understand mathematical reasoning algorithms and use them in solving mathematical problems;
• Analyze and evaluate your learning skills to prove mathematical statements.

Prerequisites
Mathematically based teaching method

Postrequisites
Basic and profile disciplines of the EP

Problem solving practicum: Trigonometry

Discipline cycle	Basic disciplines
Course	3
Credits count	4
Knowledge control form	Examination

Short description of discipline
During the course, pre- service teachers develop their mathematics skills to teach students the transformation of trigonometric expressions solving trigonometric equations and inequalities of different levels of complexity. Pre-service teachers develop their abilities to extract educational information based on a comparative analysis of function graphs. They develop their mathematical thinking, logical and algorithmic culture, and understanding the essence of trigonometric functions. They also develop their skills in proofing mathematical statements in trigonometry, and in evaluation and development of materials for teaching trigonometry at school.

Purpose of studying of the discipline
The purpose of this course is to enhance the following areas of pedagogical competence:
• The area of competence of practical skills
• The area of competence of research skills and interdisciplinary interactions

Learning Outcomes
ON 8 to understand the features and properties of solving mathematical problems and choose the best methods and approaches to its training
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline
– understand the features and properties of solving mathematical problems and choose the best methods and approaches to teaching it;
– to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
Future teachers demonstrating competence can:
• teach how to analyze graphs of trigonometric functions;
• Guide and support students in solving trigonometry problems;
• choose or independently develop didactic materials for solving trigonometry problems.

Prerequisites
Mathematically based teaching method Algebra problem solving practicum Problem solving practicum: Geometry

Postrequisites
Basic and profile disciplines of the EP

Theory of series

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
During the course, pre- service teachers build their understanding of the basics of series theory, and develop their skills in proving mathematical statements of series theory and in solving practical problems using the methodological principles and mathematical apparatus of the course. Pre-service teachers also develop their skills in logical and algorithmic thinking to solve optimization problems by using methods of mathematical programming and application software packages on the computer.

Purpose of studying of the discipline
The purpose of this course is to enhance the following areas of pedagogical competence:
• The area of competence for fundamental mathematical knowledge
• The area of competence of research skills and interdisciplinary interactions
• The area of competence of practical skills

Learning Outcomes
ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

– apply IT to expand one`s own worldview of modern society and develop demonstration experiments and practical work, use CLIL technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking;
– to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
– to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
Future teachers demonstrating competence can:
• make scientifically sound decisions based on mathematical knowledge, analysis and interpretation of information;
• to formulate the problem and perform mathematical experiments to verify the correctness and effectiveness of the solutions obtained;
• solve practical problems by identifying and evaluating interdisciplinary connections of mathematics with applied mechanics, physics, etc., by building mathematical models;
• Use application software packages to perform a mathematical experiment.

Prerequisites
Multivariable differential and integral calculus of functions of series

Postrequisites
Basic and profile disciplines of the EP

Digital technologies in education

Discipline cycle	Profiling discipline
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
During the course, pre-service teachers develop their professional competence as a teacher through the formation of a holistic view of the role of digital technology in the modern educational environment. They develop their abilities to organize pedagogical activities on the basis of the possibilities of digital technology.

Purpose of studying of the discipline
The purpose of this course is to enhance the following areas of pedagogical competence:
• The area of competence of practical skills
• The area of competence of research skills and interdisciplinary interactions

Learning Outcomes
ON 3 critically select theoretical knowledge based on advanced concepts of pedagogical education using various information and communication technologies and use the knowledge to improve the skills of teaching mathematics and their own professional growth
ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking
ON 11 to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the knowledge and skills gained in practice

Learning outcomes by discipline
– critically select theoretical knowledge based on advanced concepts of teacher education using various information and communication technologies and use the knowledge to improve math teaching skills and their own professional growth;
– apply IT to expand one`s own worldview of modern society and develop demonstration experiments and practical work, use CLIL technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking;
– to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the acquired knowledge and skills in practice;
Future teachers demonstrating competence can:
-understand the need to study computer technology as a factor in improving professional competence;
-develop digital educational resources (presentations, video lectures, etc.) using digital technologies;
-organize online and offline training using digital tools;
-create surveys, questionnaires, tests, and provide feedback using cloud technologies.

Prerequisites
School course

Postrequisites
Basic and profile disciplines of the EP

Differential geometry

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course develops pre-service teachers' understanding of the main sections of differential geometry. They go through classical fundamental training in the Euclidean space differential geometry and develop their skills in using the apparatus of differential geometry during the study of other mathematical disciplines. The methods of differential geometry have great potential for application in various mathematical disciplines and contribute to the development of pre-service teachers`` spatial imagination.

Purpose of studying of the discipline
"The message to the student of a known stock of information (definitions, formulas, theorems, connections between them and methods of solving problems) for the development of logical thinking and the achievement of the mathematical culture that is necessary for the

study of other disciplines and subsequent work in the specialty.

Learning Outcomes

ON 7 to generalize and analyze cause and effect relationships between phenomena and processes occurring in human life to interpret the idea of unity and integrity of science

ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies

ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

– to generalize and analyze

the causal relationships between phenomena and processes occurring in human life in order to interpret the idea of unity and integrity of science;

– to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;

– to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

"- be able to clearly formulate theorems, solve theoretical and computational problems, and discover connections with related topics from other branches of mathematics

- to know the basic concepts, problems, methods and results of differential geometry and topology, their fields of application

- possess skills in solving problems in the course of differential geometry and topology, experience in their application.

Prerequisites

Complex analysis

Postrequisites

Basic and profile disciplines of the EP

Mathematically based teaching method

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers evaluate the basic ways and algorithms of teaching students to solve mathematical problems. They develop their methodological skills and their abilities to competently explain algorithms step by step for solving mathematical problems. Pre-service teachers also develop their abilities to form students` understanding of the importance of their skills in solving mathematical problems for their further life.

Purpose of studying of the discipline

To acquaint students with the methodology of teaching mathematics in secondary schools, the peculiarities of the organization of training and to form students` professional competencies necessary in future professional and pedagogical activities."

Learning Outcomes

ON 8 to understand the features and properties of solving mathematical problems and choose the best methods and approaches to its training

ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies

ON 11 to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the knowledge and skills gained in practice

Learning outcomes by discipline

- possess a system of theoretical and practical knowledge necessary to master the competence;

- use modern teaching methods and technologies;

- formulate and solve problems arising in the course of professional activity that require in-depth professional knowledge

- possess a system of theoretical and practical knowledge necessary to master the competence;

- use modern teaching methods and technologies;

-formulate and solve problems arising in the course of professional activity that require in-depth professional knowledge

Prerequisites

Complex analysis

Postrequisites

Basic and profile disciplines of the EP

Mathematical model basis

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers focus on studying up-to-date mathematical models to assess social and economic problems and processes, as well as scientific forecasting of the behavior of various objects through which pre-service teachers develop their functional literacy. Pre-service teachers master theoretical and practical skills of the mathematical modeling, as well as the skills of independent learning of the mathematical modeling literature and the practical use of the information provided to solve applied tasks.

Purpose of studying of the discipline

Learning Outcomes
ON 7 to generalize and analyze cause and effect relationships between phenomena and processes occurring in human life to interpret the idea of unity and integrity of science
ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
Learning outcomes by discipline
Prerequisites
Algebra and numbers theory
Postrequisites
Basic and profile disciplines of the EP

Teaching Planning and Individualization of Learning

Discipline cycle	Basic disciplines
Course	3
Credits count	4
Knowledge control form	Examination

Short description of discipline
Pre-service teachers are familiar with the curriculum in their area of teaching and the guiding pedagogical principles and cross-cutting development themes of a specific level of education, such as entrepreneurship and sustainable development. Pre-service teachers possess the necessary skills of individualization of teaching, considering the diversity of students and their inclusion to the learning process, as well as the use of teaching technologies, based on pedagogical and independent research.
Purpose of studying of the discipline
The purpose of this course is to improve the following areas of pedagogical competence:
-Competencies in the field of pedagogy and didactics (1, 2)
Learning Outcomes
ON 3 critically select theoretical knowledge based on advanced concepts of pedagogical education using various information and communication technologies and use the knowledge to improve the skills of teaching mathematics and their own professional growth
ON 5 to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education
ON 11 to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the knowledge and skills gained in practice
Learning outcomes by discipline
– critically select theoretical knowledge based on advanced concepts of teacher education using various information and communication technologies and use the knowledge to improve math teaching skills and their own professional growth;
– to recognize and understand fundamental scientific concepts of fundamental methodological and theoretical importance for understanding and mastering natural and mathematical sciences, to argue for their own position of applying and integrating knowledge from other fields of science to solve global and local problems of mathematical education;
- to use modern and effective methods for conducting research in the educational process to identify problems in learning material by students and apply the acquired knowledge and skills in practice.
Future teachers who demonstrate competence can:
-understand the basic principles and requirements of the educational program in their field of teaching and apply them in planning and conducting educational activities;
-identify the factors and conditions that affect the learning of students;
-to put into practice the principles of inclusion, individualization of teaching and leadership (adaptation of curricula, development of differentiated lessons), taking into account the needs of students and supporting the development of their personality and self-esteem, including career guidance.
Prerequisites
Complex analysis
Postrequisites
Basic and profile disciplines of the EP

Algebra problem solving practicum

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
During the course, pre-service teachers develop a holistic understanding of the content of the high school algebra course and analyze its sections in the context of its connection with other subjects. They develop their abilities and skills in learning to solve algebra problems by using standard and non-standard methods, and transformation of algebraic and transcendental expressions. Pre-service teachers develop their abilities to develop algebraic problems for different levels of secondary school.
Purpose of studying of the discipline
"To equip the future teacher with specific knowledge in teaching school mathematics, to expand the pedagogical horizons of the student, to help him correctly assimilate the general provisions on the forms and methods of organizing educational mathematical activities of

schoolchildren, on the development of their mathematical thinking

Learning Outcomes

ON 8 to understand the features and properties of solving mathematical problems and choose the best methods and approaches to its training

ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

– understand the features and properties of solving mathematical problems and choose the best methods and approaches to teaching it;
– to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
"- to acquire practical skills in solving mathematical problems of the school course
- be able to solve standard and non-standard tasks
- apply methods and techniques for solving school math problems

Prerequisites

Elementary mathematics (algebra)

Postrequisites

Basic and profile disciplines of the EP Final examination

Problem solving practicum: Geometry

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers form students`` ideas about geometric methods and the possibilities of their application, as well as the importance of studying geometry for their future professional activities and the application of their knowledge in everyday life. Pre-service teachers consolidate and deepen students`` knowledge and skills in solving geometric problems of the school course. During the course, pre-service teachers form students`` logical thinking and their ability to use mathematical symbols in proofs and in solving various geometric problems.

Purpose of studying of the discipline

"The purpose of this course is to develop students` skills and abilities necessary for the implementation of the educational process in lessons and extracurricular activities in mathematics. It is necessary to create the best conditions for students to deeply penetrate into the ideological side of the taught subject, to realize the connection of mathematical science with its foundations reflected in the academic subject, taking into account modern pedagogical science and the experience of schools

Learning Outcomes

ON 8 to understand the features and properties of solving mathematical problems and choose the best methods and approaches to its training

ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

- to understand the features and properties of solving mathematical problems and choose the best methods and approaches to teaching it – to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
- understanding the features and properties of solving mathematical problems and choosing the most effective methods and methods of its teaching;
- systematize and generalize the knowledge gained in mathematics for use in future professional activities, conduct research, experiments and model educational processes to obtain their results.

Prerequisites

Education Science and Key Learning Theories

Postrequisites

Basic and profile disciplines of the EP

Advanced foreign language

Discipline cycle	Basic disciplines
Course	3
Credits count	4
Knowledge control form	Examination

Short description of discipline

Detailed reports on the subject. News and reports. Articles and reports on contemporary issues, modern fiction. Actively participate in a discussion on a familiar problem, explaining and defending your opinion. The statement of all the arguments "for" and "against" on the actual problem. Writing essays, reports, letters highlighting particularly important events and impressions.

Purpose of studying of the discipline

Improving the initial level of foreign language proficiency, the formation of a sufficient level of social and communicative competence of students in the cultural and professional spheres achieved at the previous stage of education

Learning Outcomes

ON 1 possess intercultural and communicative competence, apply skills of independent continuation of further education and build professional relationships in pedagogical and social activities purposefully use means and methods that ensure the preservation and strengthening of health in professional activities

ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking

Learning outcomes by discipline

– possess intercultural and communicative competence, apply skills of independent continuation of further education and build professional relationships in pedagogical and social activities; purposefully use means and methods to ensure the preservation and strengthening of health in professional activities
– apply IT to expand one`s own worldview of modern society and develop demonstration experiments and practical work, use CLIL technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking;
possess intercultural and communicative competence, apply skills of independent continuation of further education and build professional relationships in pedagogical and social activities; purposefully use means and methods that ensure the preservation and strengthening of health in professional activities
2. apply IT to expand one`s own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking

Prerequisites

Foreign language

Postrequisites

Basic and profile disciplines of the EP

Lesson Study and Action Research

Discipline cycle	Profiling discipline
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers develop their research interests as future teachers. They master the theoretical foundations of pedagogical approaches Lesson Study and Action Research as well as plan the processes of teaching mathematics based on their own scientific research. They also provide professional support to colleagues in a pedagogical community setting and develop their abilities for self-improvement.

Purpose of studying of the discipline

deepening of professional knowledge and development of research skills of teachers based on the approaches of "Lesson study" and "Research in action".

Learning Outcomes

Learning outcomes by discipline

– possess intercultural and communicative competence, apply skills of independent continuation of further education and build professional relationships in pedagogical and social activities; purposefully use means and methods to ensure the preservation and strengthening of health in professional activities
- use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the knowledge gained and skills in practice;
Teachers will be able to demonstrate an understanding of the types of pedagogical research;
comprehend and analyze your own experience of using "Research in Action" and "Lesson Study";
to substantiate the problem and formulate a research question;
to select and propose suitable data collection methods based on the analysis results obtained;
develop data collection tools;
independently study and analyze literature, master strategies for effective reading of literature (articles);
to determine the specifics of the organization of Research in action;
develop a plan for conducting Research in action;
identify the specifics of scenarios and ways to implement the "Lesson Study" approach;
demonstrate ways to design the results of Research in action and Lesson Research.

Prerequisites

Pedagogical research

Postrequisites

Basic and profile disciplines of the EP

Physics

Discipline cycle	Profiling discipline
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers conduct a practical study of the laws of nature, the properties and structure of matter, and the laws of its motion. They explore the basic knowledge of the fundamental physical laws through practical experiments, while paying particular attention to the essence of the laws themselves and the phenomena they describe.

Purpose of studying of the discipline

Creating the foundations for students of a sufficiently broad theoretical background in physics, which allows them to navigate the flow of scientific and technical information and provides them with the opportunity to use new physical principles in the fields of technology in which they specialize.

Learning Outcomes

Learning outcomes by discipline
- The ability to navigate the flow of scientific and technical information and the ability to use new physical principles in professional activities.
- Be able to organize their work, evaluate the results of their activities with a high degree of independence, possess the skills of independent work; be able to apply basic knowledge in professional activities; possess theory and practical skills; analyze the results obtained, draw the necessary conclusions and formulate proposals; present the results obtained in research in the form of reports.
Prerequisites
School course Lesson Study and Action Research
Postrequisites
Applied packages in mathematics learning

Plane and spatial geometric constructions

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
During the course, pre-service teachers study the theory of constructions on the plane and in space and learn to master the methods of solving geometric problems in construction. They also learn to master the technique of geometric constructions and develop their constructive and logical thinking, as well as their skills as a researcher.
Purpose of studying of the discipline
"To consider the general axioms of constructive geometry; the axioms of mathematical tools; the formulation of the problem of construction. To study the methodology for solving construction tasks.
Learning Outcomes
ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
Learning outcomes by discipline
"- the ability to apply the methodology of solving geometric problems for construction
- demonstrate various methods in solving construction tasks
- to construct the basic theoretical concepts and facts of geometry
Prerequisites
Mathematics teaching methods
Postrequisites
Final examination

Research, Development, and Innovation

Discipline cycle	Basic disciplines
Course	4
Credits count	4
Knowledge control form	Examination

Short description of discipline
To stay up-to-date and be able to continuously develop themselves and their work, pre-service teachers acquire new research-based knowledge and conduct practice-based research in an ethical manner in various networks concerning the development of education and teacher profession, innovative approaches to learning, as well as learning and guidance of students. Pre- service teachers adopt development-oriented mindset and are able to develop, update and apply innovative teaching approaches and technologies in the context of ongoing changes in society and the educational environment.
Purpose of studying of the discipline
Learning Outcomes
ON 3 critically select theoretical knowledge based on advanced concepts of pedagogical education using various information and communication technologies and use the knowledge to improve the skills of teaching mathematics and their own professional growth
ON 5 to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education
ON 11 to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the knowledge and skills gained in practice
Learning outcomes by discipline
RO3 – critically select theoretical knowledge based on advanced concepts of teacher education using various information and communication technologies and use the knowledge to improve math teaching skills and their own professional growth;
RO5 – to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue for their own position of applying and integrating knowledge from other fields of science to solve global and local problems of mathematical education;
RO11 - to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of the material by students and apply the acquired knowledge and skills in practice;
Prerequisites

Innovation and Research in Education

Postrequisites

Applied packages in mathematics learning Design of learning resources in mathematics

Mathematically based teaching method

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers evaluate the basic ways and algorithms of teaching students to solve mathematical problems. They develop their methodological skills and their abilities to competently explain algorithms step by step for solving mathematical problems. Pre-service teachers also develop their abilities to form students`` understanding of the importance of their skills in solving mathematical problems for their further life.

Purpose of studying of the discipline

To provide information on theoretical issues, methods of scientific cognition, didactic principles of teaching mathematics, to study the features of the organization of education and methods of teaching mathematics in secondary schools."

Learning Outcomes

ON 8 to understand the features and properties of solving mathematical problems and choose the best methods and approaches to its training

ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies

ON 11 to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the knowledge and skills gained in practice

Learning outcomes by discipline

RO8 – to understand the features and properties of solving mathematical problems and choose the best methods and approaches to teaching it;

RO10 – to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;

RO11 – to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the acquired knowledge and skills in practice;

-Knows the didactic principles of teaching mathematics and methods of scientific cognition and can be used when teaching a school mathematics course;

-Has the skills of forming mathematical concepts, classification features, teaching axioms, methods of proving theorems;

- Knows how to organize extracurricular activities and extracurricular activities.

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination

Foundations of geometry

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers build their understanding of the axiomatic theory of mathematical science, and axiomatic theory of geometry construction. They also develop their skills in using methods of axiomatic justification of Euclidean geometry. Pre-service teachers form a general geometric and worldview culture as a basis for mastering the language of modern mathematics.

Purpose of studying of the discipline

The main goal of mastering the discipline is the formation of a modern personand education
development of the student`s subject competence by improving the level of
practical mastery of modern geometric information in its various fields.

Learning Outcomes

ON 3 critically select theoretical knowledge based on advanced concepts of pedagogical education using various information and communication technologies and use the knowledge to improve the skills of teaching mathematics and their own professional growth

ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking

ON 11 to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the knowledge and skills gained in practice

Learning outcomes by discipline

RO3 – critically select theoretical knowledge based on advanced concepts of teacher education using various information and communication technologies and use the knowledge to improve math teaching skills and their own professional growth;

RO9 – apply IT to expand one`s own worldview of modern society and develop a demonstration experiment and practical work, use CLIL technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking;

RO11 – to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the acquired knowledge and skills in practice;

He is able to identify the structural elements included in the system of cognition of the subject area (in accordance with the profile and level of training), analyze them in the unity of content, form and functions performed.
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Prerequisites
Elementary mathematics (algebra) Elementary mathematics (geometry)

Postrequisites
Mathematics history

Mathematic

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
During the course, pre-service teachers develop their abilities to reflect on a mathematical solution to a real-world problem, as well as to recognize and identify opportunities to use mathematical apparatus (mathematical concepts, facts, procedures and tools). They also develop their abilities to reason about the rationality of using mathematical apparatus to create a mathematical model reflecting the features of the described situation, and to interpret and evaluate the resulting solution. Pre-service teachers develop their abilities to explain and argue a mathematical solution in the context of a real-world problem.

Purpose of studying of the discipline
"The formation of skills in the application of interdisciplinary connections, the practical application of solving mixed problems in order to continue education.
Instilling in students the skills of mathematical thinking, mathematical analysis of applied problems and conducting research using basic mathematical methods. Systematization of knowledge, skills and abilities acquired in the school mathematics course. The student`s ability to formulate, apply and interpret mathematics in various contexts: to use mathematical concepts, facts and tools for mathematical reasoning, description, explanation and prediction of phenomena.

Learning Outcomes
ON 3 critically select theoretical knowledge based on advanced concepts of pedagogical education using various information and communication technologies and use the knowledge to improve the skills of teaching mathematics and their own professional growth
ON 8 to understand the features and properties of solving mathematical problems and choose the best methods and approaches to its training
ON 11 to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the knowledge and skills gained in practice

Learning outcomes by discipline
RO3 – critically select theoretical knowledge based on advanced concepts of teacher education using various information and communication technologies and use the knowledge to improve math teaching skills and their own professional growth;
RO8 – to understand the features and properties of solving mathematical problems and choose the best methods and approaches to teaching it;
RO11 – to use modern and effective methods for conducting research in the educational process to identify problems in the assimilation of material by students and apply the acquired knowledge and skills in practice; students to develop tasks for the development of analytical and critical thinking;
"- to choose effective methods, techniques, didactic teaching tools to achieve educational goals
- to use the results of monitoring studies in solving pedagogical tasks
- possess the skills of conducting classes in a specific school, apply various techniques and techniques, mathematical literacy and solve problems
- to understand the essence and social significance of his future profession, shows interest
- I am ready to interact with specialists of related profiles in the development of methods, tools and technologies at the stages of conducting classes in professional activity of mathematical reasoning, description, explanation and forecasting of phenomena.

Prerequisites
Elementary mathematics (algebra) Elementary mathematics (geometry)

Postrequisites
Final examination

Basics of scientific research

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
During the course, pre- service teachers develop their understanding of the general scientific methodology of psychological and pedagogical research, and the preparation for the organization of research in the field of education. They master the knowledge of the evolution stages of research in education, as well as the basic approaches of research, and the methods of organizing and conducting scientific research.

Purpose of studying of the discipline
The purpose of studying this academic discipline "Fundamentals of scientific research" is to develop students` research skills; to introduce students to scientific knowledge, their willingness and ability to conduct research.

Learning Outcomes
ON 7 to generalize and analyze cause and effect relationships between phenomena and processes occurring in human life to interpret the idea of unity and integrity of science
ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL

technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

RO7 – to generalize and analyze the cause-and-effect relationships between phenomena and processes occurring in human life in order to interpret the idea of unity and integrity of science;
RO9 – apply IT to expand one`s own worldview of modern society and develop a demonstration experiment and practical work, use CLIL technologies in a substantive way
-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking;
RO12 – to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
The graduate must professionally possess knowledge of a set of general education, basic and specialized disciplines in accordance with the chosen trajectory of education in full

Prerequisites

Econometrics

Postrequisites

Final examination

Algebra problem solving practicum

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers develop a holistic understanding of the content of the high school algebra course and analyze its sections in the context of its connection with other subjects. They develop their abilities and skills in learning to solve algebra problems by using standard and non-standard methods, and transformation of algebraic and transcendental expressions. Pre-service teachers develop their abilities to develop algebraic problems for different levels of secondary school.

Purpose of studying of the discipline

"Instilling in students the skills of mathematical thinking, mathematical analysis of applied problems and conducting research using basic mathematical methods. Systematization of knowledge, skills and abilities acquired in the school mathematics course.

Learning Outcomes

ON 8 to understand the features and properties of solving mathematical problems and choose the best methods and approaches to its training
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

RO8 – to understand the features and properties of solving mathematical problems and choose the best methods and approaches to teaching it;
RO12 – to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
- to explain the educational mathematical material (within the framework of the programs of basic general and secondary general education) and to solve and explain the solution of problems of elementary mathematics
- to carry out contextual analysis of educational mathematical texts
- identify and evaluate the practical consequences of possible solutions to the problem
- in the process of solving the problem, make correct mathematical conclusions
- freely apply elementary mathematical solutions in the field of advanced study of mathematics

Prerequisites

School course

Postrequisites

Mathematically based teaching method

Problem solving practicum: Geometry

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers form students`` ideas about geometric methods and the possibilities of their application, as well as the importance of studying geometry for their future professional activities and the application of their knowledge in everyday life. Pre-service teachers consolidate and deepen students`` knowledge and skills in solving geometric problems of the school course. During the course, pre-service teachers form students`` logical thinking and their ability to use mathematical symbols in proofs and in solving various geometric problems.

Purpose of studying of the discipline

"The purpose of this course is to develop students` skills and abilities necessary for the implementation of the educational process in lessons and extracurricular activities in mathematics. It is necessary to create the best conditions for students to deeply penetrate into the ideological side of the taught subject, to realize the connection of mathematical science with its foundations reflected in the academic subject, taking into account modern pedagogical science and the experience of schools.

Learning Outcomes

ON 8 to understand the features and properties of solving mathematical problems and choose the best methods and approaches to its training
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

RO8 – to understand the features and properties of solving mathematical problems and choose the best methods and approaches to teaching it;
RO12 – to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
"- apply basic techniques and methods for solving geometry problems
- the ability to carry out a full justification for solving problems
- build mathematical models of various situations

Prerequisites

Algebra problem solving practicum

Postrequisites

Basic and profile disciplines of the EP Mathematically based teaching method

Applied packages in mathematics learning

Discipline cycle	Profiling discipline
Course	4
Credits count	4
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers investigate the basics of dynamic geometry and computer algebra systems as well as explore the possibilities of learning mathematics using them. They also conduct an analysis of the benefits and possible harms of using computer-based environments in secondary school mathematics teaching.

Purpose of studying of the discipline

The purpose of mastering the discipline: the formation of students` complex of knowledge,
skills and abilities to perform calculations of parameters
of environmental management and protection machines in emergency situations using

Learning Outcomes

ON 3 critically select theoretical knowledge based on advanced concepts of pedagogical education using various information and communication technologies and use the knowledge to improve the skills of teaching mathematics and their own professional growth
ON 5 to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies

Learning outcomes by discipline

– possess intercultural and communicative competence, apply skills of independent continuation of further education and build professional relationships in pedagogical and social activities; purposefully use means and methods to ensure the preservation and strengthening of health in professional activities
– to collect and interpret information for the formation of knowledge, taking into account social, ethical and scientific considerations, critically evaluate their values, attitudes, ethical principles and teaching methods, set new goals for their own pedagogical development;
– critically select theoretical knowledge based on advanced concepts of teacher education using various information and communication technologies and use the knowledge to improve math teaching skills and their own professional growth
– to understand the psychological and pedagogical problems of teaching and educating students with disabilities in inclusive education, to take into account the diverse abilities of students in the learning process, to ethically support their psychological well-being in a life and educational context;
a graduate
should be able to acquire
new knowledge with a high degree of independence using modern educational and
information technologies;

Prerequisites

Digital technologies in education

Postrequisites

Innovation and Research in Education

Design of learning resources in mathematics

Discipline cycle	Profiling discipline
Course	4
Credits count	4
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers investigate the concepts and types of digital educational resources, didactic, and the principles of developing multimedia digital content, as well as the analysis of existing digital educational resources in mathematics for secondary schools in the Republic of Kazakhstan. Pre- service teachers develop their skills in working with digital tools and developing digital educational resources in mathematics for secondary schools.

Purpose of studying of the discipline

"Formation of systematized knowledge in the field of development and use of various kinds of electronic educational resources in the

future professional activity of a teacher

Learning Outcomes

ON 3 critically select theoretical knowledge based on advanced concepts of pedagogical education using various information and communication technologies and use the knowledge to improve the skills of teaching mathematics and their own professional growth
ON 5 to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies

Learning outcomes by discipline

– possess intercultural and communicative competence, apply skills of independent continuation of further education and build professional relationships in pedagogical and social activities; purposefully use means and methods to ensure the preservation and strengthening of health in professional activities
– to collect and interpret information for the formation of knowledge, taking into account social, ethical and scientific considerations, critically evaluate their values, attitudes, ethical principles and teaching methods, set new goals for their own pedagogical development;
RO3 – critically select theoretical knowledge based on advanced concepts of teacher education using various information and communication technologies and use the knowledge to improve math teaching skills and their own professional growth;
RO4 – to understand the psychological and pedagogical problems of teaching and educating students with disabilities in inclusive education, to take into account the diverse abilities of students in the learning process, to ethically support their psychological well-being in a life and educational context;
"- to work with modern software and online resources to create electronic educational resources
- create high-quality electronic educational resources about your subject area
- identify the main varieties and features of the methodology for creating electronic educational resources

Prerequisites

Information and communication technology

Postrequisites

Mathematically based teaching method

Differential equations

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course focuses on developing pre-service teachers' understanding of the basic mathematical apparatus for studying the processes and phenomena of the world around by using concrete examples from applied fields of knowledge. Pre-service teachers develop their skills in identifying factors that significantly affect a process or phenomenon in creating its dynamic model, described by ordinary differential equations. They also build their understanding of the relationship between the laws of science applied with the nature of the problem being studied and mathematics connected to it.

Purpose of studying of the discipline

"Studying the basic concepts of the theory of differential equations and mastering the basic techniques for solving practical problems on the topics of the discipline.

Learning Outcomes

ON 7 to generalize and analyze cause and effect relationships between phenomena and processes occurring in human life to interpret the idea of unity and integrity of science
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

RO7 – to generalize and analyze the cause-and-effect relationships between phenomena and processes occurring in human life in order to interpret the idea of unity and integrity of science;
RO10 – to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
RO12 – to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
"- to know the basic concepts of the theory of differential equations; areas of application of differential equations as a tool for mathematical description of the natural scientific picture of the world; the main classes of ordinary differential equations and methods of their solution.
- be able to classify differential equations and apply the necessary methods to solve these equations.
- to master the professional language of the subject area of knowledge; the basic methods of solving differential equations; methods of constructing and solving mathematical models of phenomena of various nature using differential equations; to apply the knowledge gained in practice.

Prerequisites

Single variable differential calculus of functions Single variable integral calculus of functions

Postrequisites

Theory of series

Complex analysis

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course aims to provide pre-service teachers with an understanding of the basic concepts of complex analysis, numerical and functional series, Fourier integral, Fourier and Laplace integral transforms, as well as the relationship between this discipline and other mathematical disciplines. Pre-service teachers are introduced to the current developments in analysis and their use in solving real-world problems.

Purpose of studying of the discipline

The purpose of teaching this discipline is to form
students` understanding of the complex number, the theory of functions of a complex
variable, the theory of deductions, the decomposition of analytical functions into series
Taylor and Laurent, contour integration, summation of series,
ideas about asymptotic expansions and methods for obtaining them. This
knowledge will enable the future specialist to apply
the methods of the theory of functions of a complex variable in practice, to understand and analyze
mathematical methods based on the theory of analytical functions.

Learning Outcomes

ON 7 to generalize and analyze cause and effect relationships between phenomena and processes occurring in human life to interpret the idea of unity and integrity of science
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

RO7 – to generalize and analyze the cause-and-effect relationships between phenomena and processes occurring in human life in order to interpret the idea of unity and integrity of science;
RO10 – to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
RO12 – to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
to know the basic provisions of the theory of functions
of a complex variable
to be able to apply the theory of functions of a complex
variable in their professional
activities
to master the methods of solving problems of the theory of functions
of a complex variable

Prerequisites

Theory of series

Postrequisites

Differential equations

Logics and discrete mathematics

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers examine the fundamental material on sections of mathematical logic and discrete mathematics, including many mathematical methods and knowledge, which are necessary for a modern teacher of mathematics in the development of algorithms for solving problems of different levels of complexity, and which can be used in their future professional activities and self-development.

Purpose of studying of the discipline

"To form students` clear understanding of the role and place of mathematical logic in the system of sciences; understanding of the universality of the laws of logic of mathematical reasoning; development of abstract thinking, general mathematical and information culture.

Learning Outcomes

ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

RO9 – apply IT to expand one`s own worldview of modern society and develop demonstration experiments and practical works, use CLIL

technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking;
RO10 – to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
RO12 – to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
"- formulate logical tasks and apply mathematical logic tools to solve them;
- identify and distinguish between necessary and sufficient conditions for the task;
- translates information from natural language to logical and mathematical language and back;
- check the reasoning for correctness from the point of view of logic.

Prerequisites
School course

Postrequisites
Basic and profile disciplines of the EP

Theory of series

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
During the course, pre-service teachers build their understanding of the basics of series theory, and develop their skills in proving mathematical statements of series theory and in solving practical problems using the methodological principles and mathematical apparatus of the course. Pre-service teachers also develop their skills in logical and algorithmic thinking to solve optimization problems by using methods of mathematical programming and application software packages on the computer.

Purpose of studying of the discipline
""To give students theoretical knowledge on the topics of numerical series, functional series, Fourier series, to teach methods of studying a series for convergence; to form students` mathematical culture, fundamental training in the field of mathematical analysis.

Learning Outcomes
ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline
RO9 – apply IT to expand one`s own worldview of modern society and develop a demonstration experiment and practical work, use CLIL technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking;
RO10 – to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
RO12 – to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results
"- to master the methods of studying the numerical and functional series, the Fourier series for convergence;
- be able to apply the theory of series in approximate calculations, in solving differential equations;
- the ability to classify elementary functions into a rank series, a Fourier series.

Prerequisites
Complex analysis

Postrequisites
Final examination Differential equations

Econometrics

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
During the course, pre-service teachers build their understanding of economic processes by using modeling and quantitative analysis, and finding quantitative confirmation or refutation of the formulated hypothesis. They also develop their skills in building predictions based on available data, and presenting scenarios, taking into account different execution probabilities. Pre-service teachers also develop their skills in using methods of econometric research, allowing them to describe, analyze, and forecast real economic processes occurring at macro- and micro levels.

Purpose of studying of the discipline
The purpose of teaching the course "Econometrics" is to give students a general idea of the methods and models of econometrics used to analyze economic processes and indicators based on statistical data, the features and boundaries of their applicability, the role of econometrics in theoretical and practical research in the field of economics.

Learning Outcomes

ON 3 critically select theoretical knowledge based on advanced concepts of pedagogical education using various information and communication technologies and use the knowledge to improve the skills of teaching mathematics and their own professional growth
ON 5 to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of mathematical education
ON 9 apply IT to expand ones own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students intercultural knowledge to develop tasks for the development of analytical and critical thinking

Learning outcomes by discipline

In the process of studying the course "Econometrics", students must:
Have an idea of the place and role of econometrics in economic research, the main methods and techniques used in the construction of econometric models.
Know the order and stages of building an econometric model, the main problems that arise when selecting model parameters and ways to eliminate them.
Be able to use econometric methods in scientific research and in solving practical problems facing the financial manager in his activities, to assess the reliability of the constructed models.
To acquire: practical skills in the construction and evaluation of parameters of econometric models based on empirical data.

RO3 – critically select theoretical knowledge based on advanced concepts of teacher education using various information and communication technologies and use the knowledge to improve math teaching skills and their own professional growth;
RO5 – to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering natural and mathematical sciences, to argue for their own position of applying and integrating knowledge from other fields of science to solve global and local problems of mathematical education;
RO9 – apply IT to expand one`s own worldview of modern society and develop demonstration experiments and practical works, use CLIL technologies for subject-language teaching of natural subjects, expanding students` intercultural knowledge to develop tasks for the development of analytical and critical thinking;
In the process of studying the course "Econometrics", students must:
Have an idea of the place and role of econometrics in economic research, the main methods and techniques used in the construction of econometric models.
Know the order and stages of building an econometric model, the main problems that arise when selecting model parameters and ways to eliminate them.
Be able to use econometric methods in scientific research and in solving practical problems facing the financial manager in his activities, to assess the reliability of the constructed models.
To acquire: practical skills in the construction and evaluation of parameters of econometric models based on empirical data.

Prerequisites

Mathematic Applied packages in mathematics learning

Postrequisites

Basic and profile disciplines of the EP

Mathematics history

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

During the course, pre-service teachers develop their knowledge of mathematics, and the evolution of mathematics as a science. They also develop their skills in identifying the advantages of problem-solving methods used earlier and currently, as well as in systematizing knowledge obtained in various mathematical courses. Pre-service teachers increase their understanding of the general mathematical culture and expand their horizons through familiarization with the historical facts of mathematics, as well as the life and work of outstanding mathematicians.

Purpose of studying of the discipline

To expand and systematize students` knowledge about the path of development of mathematics and its founders, to form a holistic view of mathematical science, to reveal its methodological and ideological foundations."

Learning Outcomes

ON 2 to collect and interpret information for the formation of knowledge, taking into account social, ethical and scientific considerations, critically evaluate their values, attitudes, ethical principles and teaching methods, set new goals for their own pedagogical development
ON 6 o comprehensively and objectively cover the main stages of the history, evolution of the forms of statehood and civilization of the Kazakh people, to know the methods of scientific research and academic writing, to understand the importance of the principles and culture of academic honesty
ON 12 to systematize and generalize the acquired knowledge in mathematics for their application in future professional activities, to model educational processes for conducting research, experiments and obtaining their results

Learning outcomes by discipline

PO2 – to collect and interpret information for the formation of knowledge, taking into account social, ethical and scientific considerations, critically evaluate their values, attitudes, ethical principles and teaching methods, set new goals for their own pedagogical development;
RO6 – to comprehensively and objectively cover the main stages of the history, evolution of the forms of statehood and civilization of the Kazakh people, to know the methods of scientific research and academic writing, to understand the importance of the principles and culture of academic honesty;
RO10 – to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics,

using modern pedagogical technologies;
-to show the evolution of the basic concepts and ideas of mathematics that are familiar with in fundamental courses;
- to know the meaning and place of the history of mathematics in the system of mathematical sciences, the main stages of the history of mathematics, the main mathematical schools and its founders;
- to apply the acquired knowledge about the main achievements of mathematical culture in the development of arithmetic, algebra, geometry, mathematical analysis in the study of the school mathematics course."

Prerequisites
Algebra problem solving practicum Problem solving practicum: Geometry

Postrequisites
Mathematically based teaching method

Olympiad problems methods solving

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
During the course, pre-service teachers develop their skills in applying basic concepts, ideas, and methods of fundamental mathematical disciplines to solve Olympiad problems, and to determine by the type of a problem the probable methods of its solution. Pre-service teachers develop their skills in solving and composing Olympiad problems, improving the creative approach to their solution, and to sharpening the flexibility of thinking.

Purpose of studying of the discipline
"Formation of skills, skills of using theoretical knowledge in solving Olympiad and competitive tasks. To familiarize with the TIMSS, PISA, PIRLS international research program and directions for the development of functional literacy of schoolchildren. Training of a teacher who educates a competitive younger generation.

Learning Outcomes
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies

Learning outcomes by discipline
RO10 – to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
"- to make up the structure of solving mathematical problems, the algorithm of educational work, to formulate proofs competently.
- to master the methodology of solving Olympiad problems, to identify hidden forecasts
- identify topics that require in-depth training

Prerequisites
Elementary mathematics (algebra) Elementary mathematics (geometry)

Postrequisites
Final examination

Mathematically based non-conventional methods

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
During the course, pre-service teachers learn to raise students`` interest and positive attitudes toward mathematics by using methods and techniques to support the learner. Pre-service teachers explore ways to develop mathematical content and flexible curricula, and how to implement different problem-solving methods, which contribute to students`` personal development and individual improvement, but are not found in school textbooks.

Purpose of studying of the discipline
"To organize intellectual, practical and research activities of students aimed at the development of spatial representations, imaginative thinking, visual and graphic skills, techniques of constructive activity, skills to overcome difficulties in solving mathematical problems; to form logical and abstract thinking

Learning Outcomes
ON 8 to understand the features and properties of solving mathematical problems and choose the best methods and approaches to its training
ON 10 to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies

Learning outcomes by discipline
RO8 – to understand the features and properties of solving mathematical problems and choose the best methods and approaches to teaching it;
RO10 – to apply theoretical and practical knowledge to solve educational, practical and professional problems in the field of mathematical education, to design the conditions of educational activity in accordance with the set goals of teaching mathematics, using modern pedagogical technologies;
"- to know different methods of action for solving non-standard problems in mathematics
- be able to choose convenient ways to complete a specific task; discuss problematic issues; express your own opinion and argue it
- possess methods and techniques for solving non-standard problems and proving statements in mathematics

Prerequisites
Single variable differential calculus of functions Multivariable differential and integral calculus of functions of series
Postrequisites
Basic and profile disciplines of the EP