CATALOG OF ELECTIVE DISCIPLINES

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

6B015 - Teacher training 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)

6B01501 - Mathematics
(Code and name of the educational program)

bachelor
(Level of preparation)

set of 2023

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Chairman of the Academic Council Oralkanova I.A.

Computable algebras

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

Short description of discipline
This course studies methods for solving problems in the theory of computability and computable functions. In the course of training, students are given a stock of basic knowledge on the main sections of the theory of algorithms, ideas are formed about the theory of computability as a method of studying a wide range of solvable and unsolvable mathematical problems.

Purpose of studying of the discipline
The purpose of the discipline is to teach students methods of solving computability theory problems and appropriate thinking. In the course of training, it is required to give students a stock of basic knowledge on the main sections of the theory of algorithms, to teach the rational and effective use of the knowledge gained in solving typical problems of the theory; to form students` understanding of the theory of computability as a method of studying a wide range of solvable and unsolvable mathematical problems, the ability to classify them by levels of complexity of resolution.

Learning Outcomes
ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline
- basic concepts of computability theory, definitions and properties of mathematical objects used in this field, formulations of statements, methods of their proof, possible areas of their applications.
- solve theoretical and applied problems from various sections of the theory of computability, prove statements.
- mathematical apparatus of computability theory, methods of proving statements in this field, skills of algorithmization of basic tasks. to solve problems of a theoretical and applied nature from various sections of the theory of computability, to prove statements.

Prerequisites
Algebra and number theory

Postrequisites
Pedagogical practice

Numerical methods

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

Short description of discipline
The subject of the discipline is a systematized concept of numerical methods for solving problems of an applied nature. In the course of studying the discipline, students get acquainted with the methods of solving linear equations and their systems, with approximate methods of integration and differentiation. Students form basic concepts about the numerical solution of the problem.

Purpose of studying of the discipline
The purpose of the discipline is to form students` concepts of approximate methods of solving applied problems, methods of mathematical modeling, sources of errors in a systematic form.

Learning Outcomes
ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline
- demonstrates algorithms of numerical methods for solving mathematical problems using various programming languages
- have an idea of the basic methods of solving equations, systems of equations, differential, integral equations, solving boundary value problems;
- methods for solving equations, systems of equations, differential, integral equations, solving boundary value problems; be able to: make mathematical models of practical problems, use known methods of solving and draw conclusions

Prerequisites
Algebra and number theory

Postrequisites
Pedagogical practice

Multimedia Processing Technology

Discipline cycle	Basic disciplines
Course	3
Credits count	5

Short description of discipline

As part of the study of the discipline, students get acquainted with the general concepts and definitions in the field of multimedia technologies, the scope, history of development, directions and application of multimedia technologies. The laws and principles of constructing animation, timing rules, calculating the playback time of an animation fragment, the rules for overlaying sound and building multimedia clips, including video, animation and sound, are studied. The means of stylistic integrity of multimedia design are considered.

Purpose of studying of the discipline

Formation of theoretical ideas about the history of multimedia development, scope, obtaining practical skills in creating and processing multimedia information

Learning Outcomes

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

ON9 Apply information and communication technologies in their teaching activities in accordance with the educational program.

Learning outcomes by discipline

1. Operate with basic concepts and definitions in the field of multimedia technologies;

2. Create high-quality multimedia content;

3. Work with modern tools focused on the creation and processing of multimedia content.

Prerequisites

Mathematic teacing theory Information and communication technology

Postrequisites

Pedagogical practice

Features studying stochastic line in school mathematics

Discipline cycle	Profiling discipline
Course	4
Credits count	6
Knowledge control form	Examination

Short description of discipline

In the process of studying the sections of the probabilistic-statistical line, probabilistic, statistical and combinatorial thinking of students is formed and develops. Stochastic line is being introduced into the school mathematics course. The probabilistic-statistical line includes elements of combinatorics, repeated and non-repeated samples. Students are taught the methodology of introducing the basic concepts of probability theory and mathematical statistics in the school mathematics course. As well as the methodology for constructing the simplest probabilistic and statistical models based on statistical data.

Purpose of studying of the discipline

The study of the topics under consideration of the discipline "Features of the study of the stochastic line in the school course of mathematics in the school course of mathematics". Methodological assistance to a future specialist in working on these topics. Learn to analyze probabilistic models and mathematical statistics problems in a school mathematics course.

Learning Outcomes

ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline

- demonstrates the features of the methodology for solving probability and combinatorics problems;

- explores the methodology of solving mathematical statistics problems at school;

- formulates aspects of students` statistical thinking.

Prerequisites

Theory of possibility and mathematical statistics

Postrequisites

Production (pedagogical) practice

Pregraduation practice

Discipline cycle	Profiling discipline
Course	4
Credits count	15
Knowledge control form	Total mark on practice

Short description of discipline

During this type of practice, the student will systematize the material on the research topic. He will learn how to analyze the results of his research activities and introduce them into the production process, formulate the results in the form of research articles and reports on the topic. He will also receive qualified assistance in the registration of work in accordance with the established norms and rules for the preparation of work for the passage of norm control, pre-protection and anti-plagiarism.

Purpose of studying of the discipline

The purpose of the pre- graduate practice is the formation and consolidation of the student`s skills in performing scientific and methodological research work. Pre- graduate practice is part of the educational process of training specialists working in various departments of educational fields with higher education in the future.

Learning Outcomes

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the

work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.
ON9 Apply information and communication technologies in their teaching activities in accordance with the educational program.
ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline
- *use scientific, educational, methodological and reference literature at work*
- *independent training of new research methods, acquisition and use in practice of new knowledge and skills, including in new areas of knowledge not directly related to the field of activity*
- *to make judgments on the topic under consideration, to draw conclusions from the materials studied*

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Final examination

Production (pedagogical) practice

Discipline cycle	Profiling discipline
Course	4
Credits count	15
Knowledge control form	Total mark on practice

Short description of discipline
During this type of practice, students will learn how to apply their knowledge in the disciplines of the profile cycle. During the practice, there is a close acquaintance with the features of the school curriculum, with all the necessary documentation accompanying the educational process. In addition to the educational process, practice also implies the implementation of educational work, teaches qualified use of modern teaching technologies, based on the age characteristics of secondary school students.

Purpose of studying of the discipline
Conducting academic and extracurricular work in mathematics. Studying the level of knowledge, skills and abilities of students in mathematics (analysis of a class journal, notebooks of students, their control papers, etc.); development of a lesson plan during practice, development of summaries or detailed lesson plans, lectures and seminars, elective classes, classes of a circle or other extracurricular activities in mathematics, preparation of didactic materials, visual aids, electronic computing equipment for a lesson or extracurricular activity; conducting separate lessons and extracurricular activities in mathematics, attending lessons of teachers and trainees, participation in the analysis.

Learning Outcomes
ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.
ON9 Apply information and communication technologies in their teaching activities in accordance with the educational program.
ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline
- *demonstrates basic knowledge in the field of pedagogy, using various techniques and techniques during classes;*
- *designs a model of mathematical education, principles, methods and technologies of teaching mathematics;*
- *carries out intrasubject and intersubject connections in the educational process, argues logical judgments;*
- *formulate and solve pedagogical problems arising during the educational process;*
- *selection of the necessary methods of teaching and upbringing, design and modification of existing and new methods of organizing and evaluating the quality of the educational process.*

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Final examination

Algebra and number theory

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

Short description of discipline
When studying this discipline, students master such topics as second- and higher-order determinants, elements of matrix theory that are widely used in practical problems using Kramer, Gauss, Jordano-Gauss methods in solving. Also during the course the basic algebraic structures are considered: groups, rings, fields, algebras. In the course of mastering these sections, applied mathematical programs are actively used.

Purpose of studying of the discipline
To develop logical thinking, to teach how to build logical chains of reasoning, at the beginning of which there are no doubtful facts and positions, and at the end – the right conclusions;

Learning Outcomes
ON3 Apply fundamental knowledge of modern mathematics in solving practical problems in various fields of human activity. Interpret the results obtained, build hypotheses about the further course of solving the problem.

Learning outcomes by discipline
- *know the basic concepts and theorems of the theory of matrices and determinants, apply methods for solving systems of linear equations;*
- *know and apply the basic principles of vector analysis and the coordinate method, apply elements of the theory of linear spaces and linear operators;*
- *be able to apply techniques to a set of complex numbers;*
- *use the apparatus of the theory of linear spaces and linear operators to solve applied problems;*

- application of modern mathematical tools

Prerequisites
Elementary mathematic
Postrequisites
Selected chapters of algebra and number theory Computable algebras Numerical methods

Vector and Euclidean space

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

Short description of discipline
The concept of vector space. Completeness and independence of the vector system. The basis of vectors in space, isomorphism of vector space, vector subspace are considered. A scalar product in Euclidean space, an orthogonal basis, and an orthogonal projection are considered. Linear mappings. Linear mapping matrices. Classification of second-order lines. Transition from one basis to another. Orthogonal transformations. Affine classification of second-order hypersurfaces

Purpose of studying of the discipline
selected chapters of algebra and number theory, mathematical logic and discrete mathematics.

Learning Outcomes
ON3 Apply fundamental knowledge of modern mathematics in solving practical problems in various fields of human activity. Interpret the results obtained, build hypotheses about the further course of solving the problem.

Learning outcomes by discipline
he has a culture of thinking, is able to generalize, analyze, perceive information, set goals and choose ways to achieve it;
- can logically correctly, argumentatively and clearly build oral and written speech;
- is able to implement training programs of basic and elective courses in various educational institutions

Prerequisites
Elementary mathematic
Postrequisites
Selected chapters of algebra and number theory Computable algebras Numerical methods

Linear algebra

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

Short description of discipline
The program is designed for students who have mastered a full course of mathematics at school. The results of studying the discipline can serve as a basis for such disciplines as mathematical logic and discrete mathematics, programming languages. It is planned to get acquainted with the concept of linear algebra and methods of solving problems.Familiarity with the basic concepts of algebra, teach how to solve linear algebra problems encountered in the polynomial ring. Concepts of linear space, linear independence and linear dependence, concepts of dimension, basis, rank.

Purpose of studying of the discipline
The purpose of this course is to inform 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
ON3 Apply fundamental knowledge of modern mathematics in solving practical problems in various fields of human activity. Interpret the results obtained, build hypotheses about the further course of solving the problem.

Learning outcomes by discipline
- to know theorems, proofs, generalization of formulas considered in the course, use of the proposed literature, description of mathematical concepts through formal language, application of the acquired knowledge in other areas of mathematics: theoretical computer science, theory of artificial intelligence, logical programming, etc.
- the student has the skills to master simple numerical methods and achieve the level of their implementation on computers;
- to know the basic concepts, definitions and formulas, the main methods of solving problems, to build hypotheses about the further course of solving the problem;
- apply the Kramer method, the inverse matrix method, the Gauss method to solve a system of linear equations;
- perform linear actions with vectors, find the decomposition of the vector by the basis;
- to apply vector calculus in solving geometric problems, to study curves of the 2nd order according to their canonical equations;

Prerequisites
Elementary mathematic
Postrequisites
Selected chapters of algebra and number theory Computable algebras Numerical methods

Actual problems of teaching school mathematics

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

Short description of discipline

In the content of the study of the discipline, some issues of teaching mathematics in secondary schools are considered. It tells about the development of the system of mathematical education with the use of advanced information, innovative learning technologies. Students master the problems of in-depth study of mathematics, the importance of modular learning technology, the features of the differentiated teaching method. The ways of educating creative activity and developing the scientific worldview of schoolchildren are highlighted.

Purpose of studying of the discipline
The purpose of the discipline is the formation of students` theoretical and practical knowledge and skills necessary for teaching mathematics, the introduction of innovative ideas into the educational process, modeling in educational activities necessary for a teacher to improve his professional activity.

Learning Outcomes
ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.
ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

Learning outcomes by discipline
- methods of teaching mathematics, traditional and non- traditional approaches focused on developing learning; methods of mathematical information processing, theoretical and experimental research;
- curricula of basic and elective courses in various educational institutions.
- to form the subject skills of students;
- to use knowledge about the modern natural science picture of the world in educational and professional activities;
- innovative teaching methods; various methods of studying complex sections of the mathematics course.

Prerequisites
Introduction to the profession of a mathematics teacher
Postrequisites
Pedagogical practice

Modern mathematics in the world

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

Short description of discipline
The discipline examines the meaning, place and role of modern mathematics in the world, discoveries in science. Modern mathematics offers general and clear logical models for studying the surrounding reality. The ways of solving any problems of an economic, transport, medical, natural science nature with translation into a mathematical language, the construction of its model are considered. Students get acquainted with the achievements of mathematical schools, the place in world science, the peculiarities of development and the nature of mathematics among different peoples.

Purpose of studying of the discipline
The purpose of the discipline is to form students` ideas about the general trends in the development of mathematics, its structure, research methods, applications, history and trends of its development, about the place of mathematics in the system of sciences and the role of mathematical modeling in scientific cognition.

Learning Outcomes
ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.
ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

Learning outcomes by discipline
- general trends in the development of mathematics, its structure, research methods, applications and history of its development;
- possibilities of using the acquired knowledge in practical work;
- organize mathematics education, competently select material for it, as well as critically evaluate ongoing or planned reforms of mathematical education;
- skills of analysis of elementary (school) mathematics from the point of view of higher, and vice versa – analysis of higher mathematics from the point of view of elementary.

Prerequisites
Introduction to the profession of a mathematics teacher
Postrequisites
Pedagogical practice

Mathematic teacing theory

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

Short description of discipline
The discipline is designed to master the future mathematics teacher general patterns, goals and content of teaching mathematics, methodological research, the ability to apply various methods and techniques of teaching. Students get acquainted with the general problems of teaching mathematics, methods of scientific cognition in the study of the school course of mathematics, mathematical concepts and work with them, tasks and its place in teaching mathematics, ways of organizing teaching mathematics.

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

ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.

ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

Learning outcomes by discipline

- 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

Introduction to the profession of a mathematics teacher

Postrequisites

Pedagogical practice

Multiple integrals

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

Short description of discipline

The student expands his knowledge of integral calculus, namely integral calculus of a function of several variables. He gets the skills of finding the volume of a body in space through a double integral, the mass of a body through a triple integral, the surface area in space through surface integrals, the mass of an arc through a curved integral. In the future, the student uses the knowledge gained on multiple integrals in the theory of vector analysis.

Purpose of studying of the discipline

To provide students with information about multiple integrals, methods of their calculation and application of multiple integrals;
Education of a sufficiently high mathematical culture that allows you to independently expand mathematical knowledge and conduct mathematical analysis of applied problems.

Learning Outcomes

ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.

ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

Learning outcomes by discipline

- know the definitions of multiple (double and triple) integrals, basic properties, calculation rules, formula for replacing variables in multiple integrals, basic physical and geometric applications of multiple integrals;
- be able to calculate multiple integrals by reducing them to the corresponding repeated integrals, calculate double integrals by moving to polar coordinates, calculate triple integrals by moving to cylindrical and spherical coordinates;
- apply multiple integrals to the calculation of area, volume, mass, moments of inertia, static moments and coordinates of the center of mass of material bodies and flat figures.

Prerequisites

Mathematical analysis 1 Mathematical analysis 2

Postrequisites

Mathematical analysis 4

Mathematical analysis 3

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

Short description of discipline

This discipline is designed to study the theory of series and their applications. In the process of studying the discipline, students master the signs of studying numerical, functional and power series for convergence and determining the area of their convergence, as well as the use of series in calculating limits, values of some integrals, approximate calculations of numbers. Skills of decomposition of even and odd functions into Fourier series are formed.

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

ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.

ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

Learning outcomes by discipline
- *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
Mathematical analysis 1 Mathematical analysis 2

Postrequisites
Mathematical analysis 4

Theory of functions of several variables

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

Short description of discipline
This course is dedicated to the study of the functions of several variables. In the course of studying this course, students, in addition to basic concepts such as the domain of definition and the set of values, get acquainted with the features of the theory of limits, as well as with the differential calculus of such functions. Considers the extremes of a function of several variables. Particular attention in this course is paid to the applications of functions of many variables to problems of an applied nature.

Purpose of studying of the discipline
Formation of systematic knowledge about modern methods of the theory of functions,

Learning Outcomes
ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.

ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

Learning outcomes by discipline
- *builds functions of several variables and conducts their research*
- *applies the apparatus of mathematical analysis in applied problems*
- *interprets the results of a mathematical study.*

Prerequisites
Mathematical analysis 1 Mathematical analysis 2

Postrequisites
Mathematical analysis 4

Selected chapters of algebra and number theory

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

Short description of discipline
This discipline involves students mastering the basic knowledge formed in the field of algebra and number theory, the formation of skills for their effective use in mathematics lessons and preparation for use in their future professional activities. In the process of studying the discipline, students acquire the skills of mastering the algebraic language that connects it with other fundamental sciences.

Purpose of studying of the discipline
To expand the mathematical apparatus necessary for solving both theoretical and practical problems; to instill in students the ability and skills of self-study of educational literature in mathematics; to develop logical thinking and improve the overall level of mathematical culture.

Learning Outcomes
ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline
- *to know the concepts of a polynomial from several variables, a homogeneous polynomial from several variables, decomposition of polynomials from several variables into a polynomial by elementary symmetric polynomial, definition and properties of comparisons dependent and independent of the module, the concept of ideal*
- *solve comparisons with a single variable. Be able to solve higher-order problems.*
- *apply the trial method, the Euler method, suitable fractions, indices to the solution of comparisons with one unknown*
- *the ability to understand and apply modern mathematical apparatus in research and applied activities*
- *demonstrates the skills of further use in various tasks;*
- *explores the connection with other sciences.*

Prerequisites
Algebra and number theory

Postrequisites
Pedagogical practice

Mathematical analysis 4

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

Short description of discipline

The discipline is designed to teach integral calculus of a function of several variables. The content of the discipline deals with the theory of two and triple integrals, curvilinear integrals and surface integrals. Students get acquainted with the basic properties of these concepts, types of integrals, connections with each other, master the methods of calculating integrals, form graphic literacy by constructing schemes for a given area of integration on the plane and in space.

Purpose of studying of the discipline

Ensuring the formation of scientific mathematical culture of students when teaching double and triple, curved and surface integrals. Mastering the fundamental training of students in the field of mathematical analysis, mastering the modern apparatus of mathematical analysis for solving problems of applied mathematics and computer science.

Learning Outcomes

ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline

- be able to calculate and apply multiple integrals in practice;
- be able to calculate curvilinear and surface integrals of the I and II kind and own their connections;
- be able to effectively use curved coordinates when solving problems.

Prerequisites

Mathematical analysis 1 Mathematical analysis 3 Mathematical analysis 2

Postrequisites

Pregraduation practice

Fourier transform and their applications

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

Short description of discipline

In the natural and technical sciences, the Fourier transform is widely used in the study of various oscillatory, wave processes, the mathematical model of which is expressed by periodic functions. To master the Fourier transform, students must know the Fourier series and the Fourier integral, its properties. The definition and basic properties of the Fourier transform and the inverse transform in the real domain are given with proof. Learners can find for any function the Fourier transform and the cosine and sine transform. These transformations are used in solving and researching problems of mathematical physics.

Purpose of studying of the discipline

To introduce students to trigonometric series, expand their understanding of the series and the scope of their application

Learning Outcomes

ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline

-To know the basic concepts, definitions and properties of objects in the theory of Fourier series and integrals, formulations and proofs of statements, methods of their proof, possible areas of their applications in other areas of mathematical knowledge.
-Be able to operate with Fourier series and integrals in all forms;
-Possess theoretical and practical skills in applying the methods of the theory of series and Fourier integrals in research and applied activities.

Prerequisites

Mathematical analysis 3

Postrequisites

Pregraduation practice Production (pedagogical) practice

Appendixes od rows and vector calculus

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

Short description of discipline

This subject makes it possible to apply the knowledge gained on multiple integrals in vector field theory, as well as the ability to determine the convergence of power series to approximate calculations of function values, certain integrals, limits, differential equations. Higher order derivatives. Application of vector analysis elements to problems of physics and mechanics. Solving problems resulting in the concepts of scalar and vector fields.

Purpose of studying of the discipline
To consider the theoretical issues of vector analysis and the application of series theory, to form students` skills and problem solving skills.

Learning Outcomes
ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline
- know the definitions of series, scalar field and its main characteristics (directional derivative, gradient), definitions of vector field, its main characteristics and physical meaning, Stokes and Ostrogradsky-Gauss formulas in vector form;
- be able to find the convergence region of the series, calculate the derivative in the direction and gradient of the scalar field, calculate the flow, divergence, circulation and rotor of the vector field;
- apply series theory to applied problems, apply the Ostrogradsky-Gauss formula to calculate the flow of a vector field through a closed surface, apply the Stokes formula to calculate the circulation of a vector field.

Prerequisites
Mathematical analysis 1 Mathematical analysis 3 Mathematical analysis 2

Postrequisites
Pregraduation practice

Mathematical logic

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

Short description of discipline
In the course of studying this course, students will learn how to formulate hypotheses, not only make logical conclusions, but also check and evaluate the correctness of logical reasoning based on the laws and formulas of the logic of statements. The course provides skills in working with Boolean functions, introduces students to the elements of coding theory

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
ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.

ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

Learning outcomes by discipline
- formulates logical problems and applies mathematical logic tools to solve them
- identifies and distinguishes the necessary and sufficient conditions of the task;
- translates information from natural language to logical and mathematical language and vice versa;
- checks the reasoning for correctness from the point of view of logic

Prerequisites
School course

Postrequisites
Basic and profile disciplines of the EP

Mathematical logics and descrete mathematic

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

Short description of discipline
This course is an important step in gaining knowledge in the field of applying mathematics to programming. During the course, the student will learn how to build mathematical models of problems from various spheres of life, as well as find algorithms for solving them suitable for machine processing of information

Purpose of studying of the discipline
Study of the basic methods of solving combinatorial and logical problems , as well as the basics of the theory of algorithms.

Learning Outcomes
ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.

ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

Learning outcomes by discipline
- defines the types of graphs and gives their characteristics;
- build the simplest automata
- develops models of objects and concepts, the processing of which is carried out using standard algorithms used in graph theory using modern programming languages.

Prerequisites
School course

Postrequisites
Basic and profile disciplines of the EP

Applied graph theory

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

Short description of discipline
The course provides familiarity with the basic concepts of graph theory, the study of the main tasks of graph theory, algorithms for finding the main characteristics of graph structures, teaches the basic methods of graph theory, forms the skills of using algorithms to solve applied problems, the use of modern tools for the implementation of graph algorithms.

Purpose of studying of the discipline
The purpose of the discipline is to teach students methods of graph theory, to study algorithms for finding structural and numerical characteristics of graph structures; to get acquainted with the fundamental concepts and mathematical apparatus of graph theory for their subsequent use; to study the main problems of graph theory and methods of their solution

Learning Outcomes
ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.
ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

Learning outcomes by discipline
- the main types of graphs, their characteristic features, the main provisions of graph theory and its basic algorithms;
- applied graph models in the information sphere;
- analyze the description of the applied problem and determine the feasibility of developing a graph model, use graph models to describe applied tasks; basic algorithms of graph theory to solve applied problems
- skills in developing graph models for solving applied problems, skills in programming algorithms of graph theory.

Prerequisites
School course

Postrequisites
Basic and profile disciplines of the EP

Forms and methods of STEM learning

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

Short description of discipline
The discipline is aimed at the formation of knowledge and skills in the use of various forms and methods of STEM education, as well as the ability to evaluate the effectiveness of their application. Students learn the basic concepts, learning objectives within STEM. In the course of studying the discipline, students learn to apply modern educational technologies as part of the implementation of STEM education, learn the methods of organizing and conducting project work.

Purpose of studying of the discipline
Prepare students for the use of STEM learning technology in the educational process, teach them how to use various forms and methods of STEM learning in practice, and integrate STEM activities into the learning process.

Learning Outcomes
ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.
ON9 Apply information and communication technologies in their teaching activities in accordance with the educational program.
ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline
1. Compare and describe the forms and methods of STEM education;
2. Apply various learning technologies in STEM education;
3. Organize and conduct the integration of STEM events into the learning process.

Prerequisites
Mathematic teacing theory Information and communication technology

Postrequisites
Pedagogical practice

Electronic educational resources

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

Short description of discipline

This discipline is focused on familiarizing students with the possibilities of electronic educational resources, their types and features of use in future professional activities, both as a teaching tool and as a management of the educational process. Also, in the course of studying the discipline, students will master the practical skills of developing educational resources in their specialization using modern tools and study the methodology for organizing educational activities based on them.

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

ON9 Apply information and communication technologies in their teaching activities in accordance with the educational program.
ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline

- owns the technology of designing the structure of web pages
- owns the technology of creating a website by means of programming
- uses modern development tools and software solutions, techniques and models used in web development

Prerequisites

Mathematic teacing theory

Postrequisites

Pedagogical practice

Appendix of functions complex variable to calculation of certain integrals

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

Short description of discipline

To study this course, you need basic knowledge of the theory of the function of complex variables, mathematical analysis and analytical geometry. The course studies such sections as: improper integrals over an infinite interval, improper integrals from functions unlimited on a segment, drawing up a contour integral, calculating certain integrals using contour integration in the complex plane, Fresnel integrals.

Purpose of studying of the discipline

Teaching students fundamental methods of the theory of the function of a complex variable

Learning Outcomes

ON9 Apply information and communication technologies in their teaching activities in accordance with the educational program.
ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline

-To know the basic concepts of the theory of the function of complex variables
-To apply knowledge in practice, to solve the simplest problems of the field of the theory of the function of a complex variable
- Have the skills of calculating integrals from a function of a complex variable, calculating deductions, limits and derivatives of Laurent series expansion

Prerequisites

Mathematical analysis 1 Mathematical analysis 2

Postrequisites

Production (pedagogical) practice

Theory of complex variable function

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

Short description of discipline

Students finish the school course with a set of real numbers. This mathematics course introduces students to a variety of complex numbers. A new concept appears as a complex plane, an analytical expression of various lines through a function of a complex variable. We expand the skills of students in calculating curvilinear integrals by calculating the integral of a complex function. To get acquainted with a new concept as a deduction and its application in calculating the integral of a complex function along a circle.

Purpose of studying of the discipline

The purpose of mastering the discipline is to familiarize students with one of its most important sections – methods and techniques of functional analysis on the example of the theory of infinite-dimensional linear operators. Formation of ideas about the basic concepts and methods of the theory of functions of a complex variable, its relationship with other mathematical and physical disciplines.

Learning Outcomes

ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline

- know the basic concepts of complex analysis; basic properties and theorems of complex analysis; basic methods of complex analysis;
- calculate limits, derivatives, integrals in the complex domain, solve problems of convergence of series, decomposition of functions into

series on the complex plane, construct the simplest conformal maps, find deductions at singular points and know their application
- possess modern knowledge about complex analysis and its applications; standard methods and models of complex analysis and their application to solving applied problems;

Prerequisites
Mathematical analysis 3 Mathematical analysis 2
Postrequisites
Production (pedagogical) practice

Physics-1

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

Short description of discipline
The discipline Physics -1 includes sections of mechanics, molecular physics electricity and magnetism. The kinematics and dynamics of matter and solids, molecular kinetic theory of an ideal gas, fundamentals of thermodynamics, real gases, electric field, direct electric current and magnetic field are considered. It includes the concepts, theories of classical and modern physics, as well as methods of physical research.
Purpose of studying of the discipline
Future specialists need to be guided by scientific and technical information, to know the physical principles and laws. Basic concepts, physical quantities, their mathematical records, units of measurement, fundamentals of practical methods and processing of measurement results. It is also the provision of fundamental physical training that allows you to use the results of physical discoveries in the field of technologies with which they work.
Learning Outcomes
ON 10 Use additional skills and competencies in professional and daily activities.
Learning outcomes by discipline
- To characterize the basics of classical and modern physics and physical phenomena
- To compare modern physical phenomena and laws in practice and the results of physical experience
- Apply practical skills to solve specific physical problems
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Production (pedagogical) practice

Features of teaching integrated lessons of algebra and geometry

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

Short description of discipline
Deepen the knowledge, skills and abilities of future mathematics teachers in the implementation of integrated lessons in algebra and geometry. Show the features of teaching integrated lessons of algebra and geometry in the school course of mathematics and the essence of interdisciplinary connections. As well as its theoretical basis and ways of implementation, practical aspects of teaching integrated lessons in a school course
Purpose of studying of the discipline
Formation of problem-solving skills in the educational process according to the model of integration of subjects Algebra and geometry
Learning Outcomes
ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.
ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.
Learning outcomes by discipline
- knows the integrative structure of the development of the educational process
- is able to use elements of the natural science method of cognition in a complex
- has the skills to compose and conduct integrated classes
- demonstrates basic knowledge of organizational forms of integrated classes in algebra and geometry
Prerequisites
Elementary mathematic
Postrequisites
Production (pedagogical) practice

Practician of mathematical problems solution

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

Short description of discipline
The study of this discipline is a continuous test of real knowledge, practical skills of future teachers-students teaching mathematics, and

assistance to their pedagogical and professional development. Formation of students` problem solving skills on the topic: transformation of rational and irrational expressions; construction of exponential- logarithmic expressions; proof and solution of inequalities; solution of equations and systems of equations, transformation of trigonometric expressions

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 the educational mathematical activities of schoolchildren, on the development of their mathematical thinking.

Learning Outcomes
ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.
ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.
ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline
- 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 mathematic

Postrequisites
Production (pedagogical) practice

Solving parametric equations and inequalities

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

Short description of discipline
The program is designed to strengthen students` theoretical knowledge, deepen their knowledge of mathematical laws, and enhance their creative development. The ability to gain mathematical knowledge by solving linear equations and inequalities with parameters, fractional- rational equations and inequalities, rational equations and inequalities, irrational equations and inequalities, trigonometric equations and inequalities with parameters. Consider different cases, in each of which the solution methods differ significantly from each other.

Purpose of studying of the discipline
The purpose of the course is to develop students` practical skills and abilities to solve parametric equations and inequalities of mathematical problems;

Learning Outcomes
ON3 Apply fundamental knowledge of modern mathematics in solving practical problems in various fields of human activity. Interpret the results obtained, build hypotheses about the further course of solving the problem.
ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.
ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

Learning outcomes by discipline
- to recognize, solve and choose the correct method for solving parametric equations, inequalities and systems of equations and inequalities.
- determine at what parameter values solutions exist;
- to find the appropriate set of solutions for each acceptable system of parameter values
- to deepen knowledge of mathematics, providing for the formation of a stable interest in the subject

Prerequisites
Elementary mathematic

Postrequisites
Production (pedagogical) practice

The algebra of polynomials

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

Short description of discipline
Basic concepts and methods of working with polynomials, their use for solving standard applications. Ability to demonstrate the application of polynomial algebra to solve various practical problems. Getting a fundamental mathematical training in algebra and the formation of the initial level of mathematical culture sufficient for the study of other sections of higher mathematics and scientific work. Application of acquired knowledge to rationalize calculations, solve equations, evidence in solving olympiad, competitive and applied problems.

Purpose of studying of the discipline

Formation of students` systematized knowledge in the field of algebra and its methods. Introduction of students to the modern mathematical apparatus of the algebra of polynomials. Education and development of mathematical culture of students. Their awareness of the applied nature of mathematics in general and the algebra of polynomials in particular, the use of the algebra of polynomials in applications and in the school course of mathematics.

Learning Outcomes

ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline

- know the basic formulas and algorithms for the divisibility of polynomials, finding the roots of polynomials, separating multiple factors, the place of this material in the school mathematics course, the processes of other fields of science described by rational polynomial functions.

- apply the described algorithms and formulas to solving problems from the theory of polynomials related to finding roots over various numeric fields. Horner schemes for various types of problems, finding nodes using the Euclidean algorithm and its linear form, finding NOC polynomials.

- analyze the simplest reasoning, find errors in reasoning;

- to illustrate the theoretical-algebraic approach to concepts and operations on the elements of the studied structures with examples from textbooks.

Prerequisites

Theory of possibility and mathematical statistics

Postrequisites

Production (pedagogical) practice

Methods of solving probabilistic problems

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

Short description of discipline

To analyze the sections of the school mathematics course under consideration on the topics of probability theory and mathematical statistics. Consider ways to achieve the goals proposed by the long-term plan of the mathematics course at school. Providing methodological assistance to a future specialist in working on these topics. Formation of skills for solving probabilistic problems of the school mathematics course. Drawing up a lesson plan on these topics, conducting, studying analytical work.

Purpose of studying of the discipline

To study methods of solving problems in probability theory. Instilling in students the skills of mathematical thinking, mathematical analysis of applied problems at school and conducting research using basic mathematical methods. To analyze the chapters of a school textbook on the topic probabilistic problems.

Learning Outcomes

ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline

- to understand the connections of scientific mathematical knowledge with the content of the school mathematics course to analyze the logical structure of mathematical statements and definitions;

- know the basic concepts of probability theory and be able to determine the types of random events;

- possess the basic formulas of combinatorics, possess various ways of solving problems in mathematical statistics.

- apply probabilistic problem solving skills to solve everyday life problems.

- to use the skills of solving probabilistic, statistical problems in solving problems of disciplines in natural sciences.

Prerequisites

Theory of possibility and mathematical statistics

Postrequisites

Production (pedagogical) practice

Statistical methods for processing experimental results

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

Short description of discipline

When studying this subject, the student uses the acquired knowledge of probability theory and elements of mathematical statistics in solving problems of mathematical statistics, namely correlation, regression and variance analysis, when building various models, we consider not only single-factor problems, but also statistical processing of multifactorial statistical data. The student performs laboratory work on the construction of not only linear, but also nonlinear models.

Purpose of studying of the discipline
Formation of statistical thinking of students through teaching fundamental methods of mathematical statistics

Learning Outcomes
ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline
- understands and applies modern mathematical apparatus in research and applied activities
-formulates the basic methods of mathematical statistics;
-demonstrates knowledge of statistics to test statistical hypotheses;
- applies methods of mathematical statistics to the construction of models.

Prerequisites
Theory of possibility and mathematical statistics

Postrequisites
Production (pedagogical) practice

Differential and integral calculations in tasks of the physics and mathematics equations

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

Short description of discipline
Differential and integral calculus reflects a rich mathematical apparatus in modeling and research of processes occurring in economics and natural sciences. The study of this discipline contributes to the formation of students` systematic knowledge both in the field of differential and integral calculus, and about its place and role in the system of mathematical sciences, applications in economics and physics.

Purpose of studying of the discipline
The purpose of the discipline is to study the basic concepts and methods of solving differential equations; to develop practical skills in solving and composing differential equations; to study the application of equations to various fields of economics and physics

Learning Outcomes
ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline
- general methods for solving differential equations, have a concept of the Cauchy problem and the theorem of the existence and uniqueness of the solution of the Cauchy problem for differential equations and systems; basic methods for integrating ordinary differential equations;
- solve problems in sections of the course, apply theoretical material, creatively approach the solution of professional problems, analyze emerging problems; find a partial solution of an inhomogeneous linear differential equation with constant coefficients.
- methods and techniques for solving practical problems and proving statements; work skills and be ready to understand sections of educational and scientific literature related to the use of ordinary differential equations and systems

Prerequisites
Mathematical analysis 3 Mathematical analysis 4

Postrequisites
Production (pedagogical) practice

Differential eguation

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

Short description of discipline
The course studies methods for solving ordinary differential equations. In the course of studying the discipline, students master the mathematical apparatus of the theory of ordinary differential equations, which is necessary for solving theoretical and practical problems, as well as the development of logical thinking, which will allow mathematically correctly formulate the problems to be solved and find their solutions.

Purpose of studying of the discipline
The purpose of the discipline is to study the basic concepts of the theory of differential equations and master the basic techniques for solving practical problems on the topics of the discipline

Learning Outcomes
ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms

of educational work, to formulate proofs competently.
ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.
ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline
- the basic concepts of the theory of differential equations; the scope 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.
- classify differential equations and apply the necessary methods to solve these equations.
- the professional language of the subject area of knowledge; the main 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
Mathematical analysis 1 Mathematical analysis 3 Mathematical analysis 2

Postrequisites
Production (pedagogical) practice

Non-standardt asks of school geometry

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

Short description of discipline
This discipline provides familiarity with the questions of the extracurricular geometry program. In the process of studying the discipline, geometric problems related to logical thinking are considered. The content of the subject of the discipline is aimed at mastering mathematical terms suitable for further use and at solving such problems that will help students participate in various competitions and Olympiads.

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

Learning Outcomes
ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.
ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.
ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline
- different methods of actions for solving non-standard geometry problems
- choose convenient ways to perform a specific task; discuss problematic issues; express your own opinion and argue it
- methods and techniques for solving non-standard problems and proving statements

Prerequisites
Mathematical analysis 3 Mathematical analysis 4

Postrequisites
Production (pedagogical) practice

Differential geometry and topology

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

Short description of discipline
The subject of differential geometry and topology is the formation of a student`s mathematical culture in the field of geometry and topology. In the course of teaching this discipline, there is an expansion and systematization of students` knowledge in the field of studying and describing the environment using basic geometric and topological methods, the skills of using which underlie the application of theoretical research in solving problems of a practical nature.

Purpose of studying of the discipline
The purpose of this course is to inform 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 achieving the mathematical culture that is necessary for studying other disciplines and subsequent work in the specialty. Getting an idea about the methods of topology; knowledge about the basic concepts and results of combinatorial topology; the ability to solve various specific problems by means of topology.

Learning Outcomes
ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline
- 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 areas of application
- Possess the skills of solving problems in the course of differential geometry and topology, experience in their application

Physics 2

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

Short description of discipline
The subject of ncludes the sections geometric and wave optics, elements of quantum optics and quantum statistics, and the atomic nucleus.
Fundamentals of geometric optics, elements of photometry, wave properties of light, electromagnetic waves in matter, Compton effect, elements of atomic physics, quantum statistics are considered. Basic physical laws, their application in technology, given information about mathematical

Purpose of studying of the discipline
knowledge of physics required for the specialty, assistance in correctly understanding the meaning of the laws of physics, obtaining knowledge about the main phenomena, the features of their passage, basic concepts, physical quantities, their mathematical notation, units of measurement; the basics of practical methods and processing of measurement results;

Learning Outcomes
ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline
- correctly apply the laws of physics to analyze and solve specific practical problems;
- to talk about experimental facts, concepts, laws, theories, methods of electromagnetic phenomena;
- to understand and explain the integrity of the electromagnetic theory of light, to distinguish the limits of its applicability and its place among other physical theories;
- to give examples of the basic physical laws, their observability in nature and application in technology, their mathematical methods
- independent learning of new research methods, acquisition and use in practice of new knowledge and skills, including in new areas of knowledge not directly related to the field of activity.

Prerequisites
Mathematical analysis 3 Mathematical analysis 4
Postrequisites
Production (pedagogical) practice

Functional analysis

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

Short description of discipline
The discipline functional analysis studies the theory of metric and normed spaces, as well as the theorem on spaces with a scalar product. The basic concepts of such sections as subspace, separable space are considered. Linear functionals in normalized spaces and the basic concepts of the theory of linear (closed, bounded, compact, Hilbert– Schmidt) operators operating in infinite- dimensional Hilbert spaces are studied. The spectral the or yofautonomous compact operators is considered

Purpose of studying of the discipline
Formation of mathematical culture of students, development of systematic mathematical thinking. The study of the dynamic characteristics of the system by determining the processes of changing its state over time based on the accepted algorithms of functioning.

Learning Outcomes
ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline
- Know the basic definitions, problem statements and methods of their solution
- Be able to apply their knowledge in such areas as information theory, information security, cryptography.
- Have the skills to apply the methods of the theory of functional analysis.

Prerequisites
Mathematical analysis 3 Mathematical analysis 4
Postrequisites
Production (pedagogical) practice

The laws of probability and methods of statistical data processing

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

Short description of discipline
The knowledge gained in the study of probability theory and mathematical statistics is used by the student in the construction of mathematical and statistical models. Perform laboratory work on the construction of a linear model, parabolic and exponential models, checking their adequacy. To do this, they learn to apply the criteria of consent of Pearson, Romanovsky, Student. Probabilistic methods

are used in constructing the theoretical frequencies of a normal, exponential distribution. And they confirm the hypotheses put forward not only analytically, but also through the construction of graphs.

Purpose of studying of the discipline
The purpose of teaching the discipline is to teach students fundamental methods of mathematical statistics.

Learning Outcomes
ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline
- to know the basic concepts of set theory, the axiomatic method of presenting probability theory. Know the basic methods of proof and algorithms of probability theory, identifying connections;
- to use knowledge about the modern natural science picture of the world in educational and professional activities. Be able to apply the basic methods of probability theory in solving problems of related fields of mathematics;
- master the methods of proof against the contrary, the method of logical following, the basics of stochastic thinking;
- apply application programs in the study and analysis of statistical data.

Prerequisites
Elementary mathematic

Postrequisites
Production (pedagogical) practice

Solving non-standard problems

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

Short description of discipline
This course is devoted to the classification of non-standard problems, as well as the main ways to solve them, such as: search for related problems, reverse, application of graph theory, invariant, Dirichlet principle, elements of number theory. During the study of the material, students will learn to analyze non-standard tasks in order to determine the method of their solution. The course plays a leading role in the selection of material for conducting mathematical competitions of various levels.

Purpose of studying of the discipline
The tasks considered in the course should be closely related to non-standard, Olympiad tasks for secondary school students. They form the knowledge, skills, and skills of future specialists in mathematics. Mastering the ways of solving non-standard tasks.
Formation of skills, skills of using theoretical knowledge in solving Olympiad and prize-winning tasks.

Learning Outcomes
ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline
- the student must have the methodology for solving non-standard tasks and the skills of teaching students;
- makes up the structure of solving mathematical problems, makes up the algorithm of educational work, competently formulates proofs;
- knows the methodology of solving Olympiad problems, reveals hidden predictions;
- identifies topics that require in-depth training.

Prerequisites
Elementary mathematic Practician of mathematical problems solution

Postrequisites
Production (pedagogical) practice

Olympiad and competitiv problems solution

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

Short description of discipline
This course plays a leading role in the development of professional training of future teachers. Promotes the formation of work skills in classes with in-depth study of mathematics, in the organization and conduct of mathematical circles, competitions, Olympiads, etc. In the course of the study, effective methods of solving competitive and non-standard problems of mathematics are considered and analyzed, which allows the teacher to better prepare students to participate in mathematical Olympiads of various levels. Competently prove ways to solve problems. Be able to correctly compose tasks.

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

educates a competitive younger generation.

Learning Outcomes

ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline

- to make up the structure of solving mathematical problems, the algorithm of educational work, to formulate proofs competently;

- master the methodology of solving Olympiad problems, identify hidden predictions;

- identify topics that require in-depth training.

Prerequisites

Elementary mathematic Practician of mathematical problems solution

Postrequisites

Production (pedagogical) practice

History and methodology of mathematics

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

Short description of discipline

The discipline examines the objective laws of the development of mathematics. In the course of studying the discipline, students get acquainted with the history of mathematics, the epochs of the development of mathematics, the life and works of famous mathematicians, master the history of the formation of mathematical concepts. Through the reflection of the evolution of the basic concepts and ideas of mathematics studied in fundamental courses, interest in the study of the works of the classics of mathematics increases. The article describes the development of mathematics in Kazakhstan, the historical development of each content-methodical path of the school mathematics course.

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

ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.

ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline

- 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

Elementary mathematic Methods of mathematic teaching

Postrequisites

Production (pedagogical) practice

Mathematical literacy

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

Short description of discipline

The study of modern theories related to the search for solutions to problems with practical content. Informational and internal structure of the school`s tasks with practical content. Solving various tasks with parameters or logical nature. Formation of students` skills in finding ways to solve various problems with practical content. Systematization of knowledge, skills and abilities acquired by students in the school mathematics course. The ability of the student to formulate, apply and interpret mathematics in various contexts: to use mathematical concepts, facts and means for mathematical reasoning, description, explanation and prediction of phenomena.

Purpose of studying of the discipline

Formation of skills in the application of interdisciplinary connections, practical application of the solution of mixed tasks for the purpose of continuing 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 ability of the student to formulate, apply and interpret mathematics in various contexts: to use mathematical concepts, facts and means for mathematical reasoning, description, explanation and prediction of phenomena.

Learning Outcomes

ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.

ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline

- selects effective methods, techniques, didactic teaching tools to achieve educational goals

- uses the results of monitoring studies in solving pedagogical tasks

- has the skills to conduct classes in a particular school, the use of various techniques and techniques, mathematical literacy and problem solving

- understands the essence and social significance of his future profession, shows interest

- 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

Prerequisites

Basic and profile disciplines of the EP Elementary mathematic

Postrequisites

Final examination

Basis of problem solving methods

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

Short description of discipline

In the process of studying the discipline, students get acquainted with the types of tasks, the classification of tasks, their meaning. The didactic functions of text tasks in the learning process, methods of solving problems are studied, the features of solving problems for movement, work, mixture and fusion are mastered. Students learn to establish connections between a known quantity and a desired quantity, build models of problems and find solutions using equations and systems of equations.

Purpose of studying of the discipline

Mastering the methods and techniques of solving various text problems in the school mathematics course by students.

Learning Outcomes

ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.

ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline

- be able to distinguish between tasks and their types;

- be able to solve text problems by composing equations set to numerical dependencies, percentage and proportion, movement, labor productivity, concentration, mixture and alloy;

- to apply inequalities with one or more variables when solving text problems.

Prerequisites

Elementary mathematic

Postrequisites

Production (pedagogical) practice

Geometric construction tasks

Discipline cycle	Basic disciplines
Course	4
Credits count	6
Knowledge control form	Examination

Short description of discipline

When studying this subject, all types of subjects of the school curriculum are considered. They also study and analyze analyzed examples of varying complexity, tasks for self-solution and methodological recommendations for the teacher. In this course, additional attention is paid to transformation methods, the algebraic method, the method of geometric arrangement of points, a clear statement of the stages of solving construction problems, as well as the axioms of constructive geometry.

Purpose of studying of the discipline

Consider the general axioms of constructive geometry; the axioms of mathematical tools; the formulation of the construction problem. To study the methodology for solving construction problems.

Learning Outcomes

ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.

ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

ON 10 Use additional skills and competencies in professional and daily activities.
Learning outcomes by discipline
- the ability to apply the methodology of solving geometric problems for construction;
- demonstrates various methods for solving problems for construction;
- constructs the basic theoretical concepts and facts of geometry.
Prerequisites
Methods of mathematic teaching Basis of problem solving methods
Postrequisites
Production (pedagogical) practice

Methods of geometric problems solution

Discipline cycle	Basic disciplines
Course	4
Credits count	6
Knowledge control form	Examination

Short description of discipline
This subject covers all sections of school geometry. It expands the pedagogical horizons of students, teaches them to draw correctly, use problem solving techniques, teach students to master the types of organization of educational and methodological activities, prove and calculate general patterns in solving problems. The GeometryPad application also teaches how to use geometric axioms and theorems in class when drawing shapes.
Purpose of studying of the discipline
Systematize the knowledge, skills and abilities of students in the course of geometry at school;
Mastering practical skills in solving mathematical problems;
Development and formation of educational and cognitive activity.
Learning Outcomes
ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.
ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.
ON 10 Use additional skills and competencies in professional and daily activities.
Learning outcomes by discipline
- apply the basic techniques and methods of solving geometry;
- problems the ability to conduct a full justification when solving problems;
- to build mathematical models of various situations.
Prerequisites
Methods of mathematic teaching Basis of problem solving methods
Postrequisites
Production (pedagogical) practice

Problem-based approach in teaching geometry

Discipline cycle	Basic disciplines
Course	4
Credits count	6
Knowledge control form	Examination

Short description of discipline
According to the discipline of the problem approach in teaching geometry, it covers all sections of school geometry. The curriculum includes training on how to use the Geometry Pad application. This is an indispensable addition to the study of geometry. When there is no ready approach to solving problems, a problematic situation arises, and the student`s motivation to search for such a problem increases. In the process of solving problems, teach how to solve problems that arise when solving problems.
Purpose of studying of the discipline
To supply to students with the necessary information on a problematic approach in training of geometry; to form scientific outlook at students, to develop logical thinking.
Learning Outcomes
ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.
ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.
Learning outcomes by discipline
- basic methods for solving planimetric and stereometric problems of elementary geometry;
- to find errors in solving geometric problems of the subject;
- under consideration to prove the basic statements of elementary geometry.
Prerequisites
Methods of mathematic teaching Basis of problem solving methods
Postrequisites
Production (pedagogical) practice

And practical for solving trigonomeyric problems

Discipline cycle	Profiling discipline

Course	4
Credits count	6
Knowledge control form	Examination

Short description of discipline

To teach students to systematize methods for solving trigonometric problems in the course of mathematics and algebra. Independently study methods for solving trigonometric problems. Develop the skill of solving problems on trigonometric transformations. Formation of students` skills in finding ways to solve various problems in trigonometry. Ability to perform complex trigonometric calculations. Understand the essence of solving geometric problems produced by trigonometric expressions, as well as problems used in natural science disciplines.

Purpose of studying of the discipline

To study the existing theories related to the genesis of trigonometric problems.

Learning Outcomes

ON4 Analyze and solve problems of the theoretical and methodological course of higher mathematics, demonstrate basic knowledge in the field of pedagogy when conducting classes in a modern school using various techniques and techniques.

ON5 To design models for the construction of mathematical education, principles, methods and technologies of teaching mathematics. To carry out intrasubject and intersubject connections in the educational process, argues logical reasoning, make your own and find new opportunities, explain mathematical knowledge in various forms.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline

- forms the structure of solving trigonometric problems
- to make an algorithm for teaching a course of trigonometry
- competently formulates evidence

Prerequisites

Elementary mathematic Practician of mathematical problems solution

Postrequisites

Pregraduation practice Production (pedagogical) practice

Special course of trigonometry

Discipline cycle	Profiling discipline
Course	4
Credits count	6
Knowledge control form	Examination

Short description of discipline

The study of this discipline examines such issues as trigonometric functions and inverse trigonometric functions. Properties and graph of trigonometric functions is the theoretical basis for the study of trigonometric functions. Mastering the identical transformation, trigonometric expressions of one argument makes it possible to understand the essence of trigonometric transformations. When mastering this course, the student will learn how to prove, solve inequalities, equations, systems of equations and inequalities. The teacher pays special attention to the application of application programs: GeoGebra, Mathcad.

Purpose of studying of the discipline

Mastering by students of the basic knowledge formed in the field of pedagogical technologies, formation of skills of their effective use in mathematics lessons and preparation for their use in their professional activities. Teach to apply innovative methods of teaching mathematics and evaluate learning outcomes.

Learning Outcomes

ON6 Conduct experiments in the field of classical branches of mathematics, describe methods of mathematical reasoning, apply mathematical terms, comprehensively solving typical problems. To design the solution of mathematical problems, to create algorithms of educational work, to formulate proofs competently.

ON7 Master the methodology of solving competitive problems, identify hidden assumptions, formulate and analyze emerging problems using statistical or applied mathematical methods.

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.

Learning outcomes by discipline

- solves typical trigonometry problems, uses mathematical terms.
- develops the concept using applied mathematical methods in solving trigonometric problems
- conducts research on trigonometric functions using application programs

Prerequisites

Elementary mathematic Practician of mathematical problems solution

Postrequisites

Production (pedagogical) practice

Workshop solving problems in mechanics

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

Short description of discipline

The mechanics problem solving workshop teaches students how to solve problems of any complexity in the mechanics section, find the coordinates of material points, and plot changes in vector quantities over time. Forms the ability to apply techniques to vector quantities, as well as apply the theoretical knowledge gained by students in mathematics and physics. in practice.

Purpose of studying of the discipline

The study of the basic experimental laws and laws underlying mechanics, mastering by students the method of scientific physical cognition of natural phenomena

Learning Outcomes

ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline

Apply general laws of physics to solve specific problems of mechanics
To set and solve the simplest experimental problems in mechanics
Based on observations and experiments, build mathematical models of the simplest mechanical phenomena and use the mathematical apparatus available to them to study these models.

Prerequisites

Physics-1 Physics 2

Postrequisites

Production (pedagogical) practice

Theory of matrices

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

Short description of discipline

The course provides for the study of the basic concepts of matrix theory, obtaining basic knowledge, skills and abilities in the theory of matrix calculus. The application of matrix operations in various fields is considered. In the process of studying the discipline, students form solid theoretical knowledge in the field of matrix theory, which are necessary for the study of systems of linear differential equations and solving applied problems.

Purpose of studying of the discipline

The study of the basic concepts of matrix theory and its application in various fields, the application of basic concepts, laws, classical and modern theories of mathematics, scientific literature

Learning Outcomes

ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline

- know the theoretical foundations of matrix calculus
- be able to apply basic methods of solving mathematical and engineering problems
- be able to choose the right method that is most suitable for solving the problem

Prerequisites

Analitic geometry Algebra and number theory Differential eguation

Postrequisites

Production (pedagogical) practice

Equation of mathematical physics

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

Short description of discipline

This discipline is based on the fundamental concepts of mathematics that study objectively existing laws of nature, and also complements the quantitative indicators of the laws of mathematics. Along with the study of various fields of sciences (physics, engineering), ongoing changes and phenomena in the Macro and microcosm, their mathematical models can be expressed in partial differential equations. And their decisions reflect the patterns of the processes taking place.

Purpose of studying of the discipline

The purpose of this course is to inform 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 achieving the mathematical culture that is necessary for studying other disciplines and subsequent work in the specialty.

Learning Outcomes

ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline

- methods for solving equations of heat conduction, string oscillation et al., In particular the method of separation of variables, potential method solving boundary value problems.
- to solve practical problems using differential`s partial differential equations, to construct a mathematical model ability to make some physical problems.
- solving equations of heat conduction, string oscillation et al., In particular the method of separation of variables, potential method solving boundary value problems.

Prerequisites

Differential eguation

Postrequisites

Production (pedagogical) practice

Active teaching methods in math lessons

Discipline cycle	Profiling discipline
Course	4

| Credits count | 5 |
| Knowledge control form | Examination |

Short description of discipline

The state of the methodology of teaching mathematics based on the implementation of innovative approaches to teaching, as well as the experience of using active teaching methods in mathematics lessons. The possibility and expediency of using active methods of teaching mathematics, to determine the organizational and pedagogical conditions for their use. The effectiveness of training future teachers to master the skills of using active teaching methods in professional activities.

Purpose of studying of the discipline

Familiarization of students with existing theoretical materials, didactic manuals, visual illustrations. To teach them to use all opportunities for the development of the student`s personality, his active mental growth, where there is an independent search for the student, as well as research activities, various creative work.

Learning Outcomes

ON8 Demonstrate the desire for professional self-improvement, work in a team, make decisions, show leadership qualities. Evaluate the work of colleagues, make judgments on the topic under consideration, draw conclusions from the materials studied.
ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline

- master active lesson methods for the ability to formulate and analyze facts;
- to work with various sources, to put forward hypotheses, to prove the correctness of hypotheses;
- formulate conclusions, defend their position when discussing educational activities.

Prerequisites

Mathematic teacing theory Methods of mathematic teaching

Postrequisites

Production (pedagogical) practice

Educational robotics at school

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

Short description of discipline

The basis of robotics is considered in the context of physical knowledge of students. Basic knowledge is given in the field of electrical engineering and electronics, passed by students in the school course of physics, thereby linking robotics and physics. Within the framework of the discipline, microcontrollers from Atmega and STM are studied, which is due to the simplicity of their use and wide distribution in practice. It is especially important that students can get acquainted with such important peripheral devices of the microcontroller as memory and ADC.

Purpose of studying of the discipline

the formation of a system of knowledge, skills and abilities in the field of robotics among future teachers is one of the most important areas of scientific and technological progress, in which the problems of mechanics and new technologies come into contact with the problems of artificial intelligence.

Learning Outcomes

ON9 Apply information and communication technologies in their teaching activities in accordance with the educational program.
ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline

- develop algorithms and create robot control programs;
- configure and debug the robot design;
- create real-life models of devices using special elements according to the developed scheme.

Prerequisites

Information and communication technology

Postrequisites

Production (pedagogical) practice

Digital tools and services for educational content creation

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

Short description of discipline

In the course of studying the discipline, students get acquainted with the types of educational content, the functions performed, the stages and technology of creation, quality requirements, as well as methods of application in future professional activities. The practical component of the discipline is aimed at obtaining the skills to create full-featured educational content using modern tools (sound and video processing tools, infographics, services for creating online tasks, courses, etc.).

Purpose of studying of the discipline

Formation of theoretical and practical skills in the creation and use of digital educational resources using modern tools

Learning Outcomes

ON9 Apply information and communication technologies in their teaching activities in accordance with the educational program.
ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline

- create high-quality digital educational resources;
- understand the types of educational content and their functions;
- work with modern tools for creating digital resources.

Prerequisites
Information and communication technology
Postrequisites
Production (pedagogical) practice

Academic writing and the basics of scientific research

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

Short description of discipline
In the process of studying the discipline, knowledge of the norms of the literary language is formed, the culture of speech, oral and written speech is developed through the use of phraseological phrases, proverbs and sayings, skills of using language in interpersonal and professional communications are formed. During the study, students will be able to master the language means of scientific style, improving the skills of creating and formatting their own scientific texts.

Purpose of studying of the discipline
The purpose of mastering the discipline is to familiarize students with the main features of the scientific style of speech.

Learning Outcomes
ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline
- correctly apply lexical, grammatical, stylistic and compositional-structural means of constructing a text
- own the methodology of constructing a written text depending on the genre;
- to form the ability to freely and reasonably express thoughts on a scientific problem, using the appropriate vocabulary.

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Final examination Pregraduation practice

Management in education

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

Short description of discipline
To study the general concepts of management, its functions and historical aspects of the development of the theory and practice of management, the place and role of the leader`s personality in organizational structures. Consider the general characteristics of pedagogical management; basic concepts, goals, objectives, functions and principles of pedagogical management. Methods of pedagogical management: economic, organizational and managerial, psychological and pedagogical influence. Factors that determine the effectiveness of pedagogical management; the results of the activities of the subjects of pedagogical management and their evaluation.

Purpose of studying of the discipline
The purpose of mastering the discipline is to study by students the theoretical foundations of management in the structure of the educational system. The study of the discipline contributes to the formation of the student`s skills in using the basic principles, methods and mechanisms of management in the field of education, which, in turn, will improve the professional qualities of future teachers and help them in their professional growth.

Learning Outcomes
ON9 Apply information and communication technologies in their teaching activities in accordance with the educational program.
ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline
able to organize professional and pedagogical activities on a legal basis;
able to identify the essence of the problems that arise in the course of professional and pedagogical activities

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Pregraduation practice

Applied programs in mathematics

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

Short description of discipline
Mastering by students of theoretical knowledge and practical skills of working with modern application software packages for practical application and solving mathematical problems. Familiarization of students with the capabilities of modern software designed to solve mathematical problems. Assistance in acquiring knowledge and concepts about application software packages, skills in working with programs for solving mathematical problems.

Purpose of studying of the discipline
The purpose of studying the discipline is to master the basic methods of working with application software packages to use their resources in solving mathematical problems.

Learning Outcomes

ON9 Apply information and communication technologies in their teaching activities in accordance with the educational program.

ON 10 Use additional skills and competencies in professional and daily activities.

Learning outcomes by discipline

- search and use the information necessary for the effective implementation of professional tasks, professional and personal development.

- be proficient in package tools for implementing algorithms and problem solving programs.

- organize their own activities, choose standard methods and methods for performing professional tasks, evaluate their effectiveness and quality.

- be able to build a chain of interrelated actions leading to a result.

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Pregraduation practice Production (pedagogical) practice