# EDUCATIONAL PROGRAM

## 6B01 - Pedagogical sciences
(Code and classifcation of the feld of education)

## 6B015 - Teacher training in natural science subjects
(Code and classifcation of the direction of training)

## 0114
(Code in the International Standard Classifcation of Education)

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

## 6B01502 - Mathematics-Informatics
(Code and name of the educational program)

## Bachelor
(Level of preparation)

**Semey**

# Educational program

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

## 6B015 - Teacher training in natural science subjects
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(Code in the International Standard Classification of Education)

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## 6B01502 - Mathematics-Informatics
(Code and name of the educational program)

## bachelor
(Level of preparation)

Semey 2023

# PREFACE

## Developed

The educational program 6B01502 - Mathematics-Informatics in the direction of preparation 6B015 - Teacher training in natural science subjects on the basis of the State Compulsory Standards of Higher and Postgraduate Education approved by the Order of the Ministry of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No 2 (as amended by the order) was developed by the Academic Committee dated 20.02.2023 No 66).

| Members of the Academic Committee | Full name | Academic degree, academic title, position | Signature |
|---|---|---|---|
| Head of the Academic Committee | Mukayev Zhandos | Dean of the Faculty of Natural Mathematics, PhD | |
| Educational program manager | Sagitova Shuga | Senior lecturer | |
| Member of the AC | Ospanova Dinara | Head of the Department of Physical and Mathematical Sciences and Computer Science | |
| Member of the AC | Rakhmatullina Zarina | Senior lecturer | |
| Member of the AC | Mynbayeva Maigul | Teacher of computer science «Nazarbayev Intellectual school of Physics and Mathematics in Semey» | |
| Member of the AC | Bazhenova Gulzhanat | Teacher of mathematics KSU «Secondary school No. 25» | |
| Member of the AC | Abdrakhmanova Zhupar | Student of the MI-001 group | |
| Member of the AC | Slyambekova Akmaral | Student of the MI-101 group | |

## Reviewing

| Full name of the reviewer | Position, place of work | Signature |
|---|---|---|
| Toktubaeva Gulpariza | Director of the school of KSU «Secondary School No. 49» | |

### Reviewed
At the meeting of the Quality Assurance Commission
Natural and  Mathematical of the faculty
Recommended to be for approved
by the Academic Council of the University
Protocol №4.1  April 04,  2023 y.
Chairman of the Commission  Zheldybayeva B.S.

### Agreed
Head of the education department of the city of Semey Bulabaev B.Z.

Approved at the meeting of the Academic Council of the University Protocol No. 8 "25" April 2023.

### Approved
at the meeting of the Academic Council of the University
Protocol № 1 "01" of September 2023
Chairman of the Academic Council of the University Orynbekov D.R.

# Content

# 1.Introduction

## 1.1.General data

The Department of Physical and Mathematical Sciences and Informatics of the Faculty of Natural Sciences and Mathematics of the NAO "Shakarim University of Semey" provides training on the educational program 6B01502 - "Mathematics-Informatics". The educational program for the training of teachers of mathematics and computer science has been operating since 2019.

Graduates of the educational program 6B01502 - "Mathematics- Informatics" apply the acquired skills in any work that is related to the use of software, information computing techniques, communication networks and systems and the conduct of mathematical calculations. The student will be able to apply the acquired skills in analytical, scientific, design, research and technological fields. Also, EPs are in demand in small-grade schools in sparsely populated regions of the republic.

The educational program provides for the education of a student with special educational needs in the conditions of a higher educational institution, as well as his socialization and integration into society.

## 1.2.Completion criteria

The main criterion for the completion of the educational process in the preparation of bachelors is the acquisition of at least 205 credits of theoretical training, as well as at least 27 credits of practice, not 8 credits for the preparation of diplomas. Total 240 credits.

## 1.3.Typical study duration:    4 year

# 2.PASSPORT OF THE EDUCATIONAL PROGRAM

| | |
|---|---|
| **2.1.EP purpose** | Training of a competitive specialist with professional competencies in the field of theory and methods of teaching mathematics and computer science, who knows how to apply modern information technologies at a high level, possesses theoretical knowledge, practical skills and skills. |
| **2.2.Map of the training profile within the educational program** | |
| Code and classification of the field of education | 6B01 - Pedagogical sciences |
| Code and classification of the direction of training | 6B015 - Teacher training in natural science subjects |
| Code in the International Standard Classification of Education | 0114 |
| Code and classification of the educational program group | B009 - Math teacher training |
| Code and name of the educational program | 6B01502 - Mathematics-Informatics |
| **2.3.Qualification characteristics of the graduate** | |
| Degree awarded / qualification | bachelor of Education in the educational program 6B01502-Mathematics-Informatics |
| Name of the profession / list of positions of a specialist | Teacher. High school teacher |
| OQF qualification level (industry qualification framework) | 6 |
| Area of professional activity | - Teacher of mathematics and informatics;<br>- research institutions;<br>- middle schools, and secondary professional education institutions;<br>⬜ state management bodies;<br>organizations of various forms of ownership that use the methods of mathematics and computer science in their work;<br>- state-owned enterprises and institutions.<br>⬜ business, economy.<br>officials in educational organizations (Director of a general education institution, Deputy directors for educational work, etc.)<br>- methodologist in educational organizations;<br>- specialist in the field of pedagogical sciences; in research institutions. |
| Object of professional activity | - research institutions;<br>- middle schools, and secondary professional education institutions;<br>- state educational management bodies;<br>- organizations of various forms of ownership that use methods of teaching mathematics and computer science in their work. |
| Types of professional activity | - use modern pedagogical technologies in teaching mathematics and informatics; - plan and implement research work in the field of pedagogical sciences;<br>- conducting scientific and pedagogical activities in general education organizations;<br>- use of software and computer technology;<br>- organizational and management;<br>- social and pedagogical;<br>- training and educational; |

| | |
|---|---|
| | - educational and technological. |
| Graduate Model | Able to apply socio-cultural, economic and legal, environmental knowledge, communication skills, ready to apply modern information technologies;<br>Ready to apply modern teaching methods and technologies to ensure the quality of the educational process;<br>Able to apply fundamental knowledge of modern mathematics in solving practical problems in various fields;<br>Ready to carry out intrasubject and intersubject connections in the educational process, to explain mathematical knowledge in various forms;<br>Ready to apply the basic methods of special sections of computer science in professional activity;<br>Capable of developing software packages and database components using modern programming tools and technology;<br>Able to conduct experiments and analyze using statistical and applied mathematical methods in the field of mathematics and computer science;<br>Ready to demonstrate the desire for professional self-improvement by showing leadership qualities. |

# 3.Modules and content of the educational program

## Module 1. Fundamentals of social and humanitarian knowledge

### Foreign language

| | |
|---|---|
| Discipline cycle | General educational disciplines |
| Discipline component | Compulsory component |
| SubjectID | 26827 (3013847) |
| Course | 1 |
| Term | 1 |
| Credits count | 5 |
| Practical and seminar classes | 45hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**
*The content of the discipline «Foreign language» assumes the formation of students` intercultural and communicative competencies at B1 level. The discipline is aimed at mastering the knowledge, skills and abilities that allow using a foreign language in interpersonal communication and professional activity. All types of speech activity are taught, such as reading, writing, listening and production of texts of level complexity with a certain degree of grammatical and lexical correctness.*
**Purpose of studying of the discipline**
*Formation of intercultural and communicative competence of students in the process of foreign language education at a sufficient level (A2, pan-European competence) and the level of basic sufficiency (B1, pan-European competence). Depending on the level of training, the student at the time of completion of the course reaches the B1 level of the pan-European competence if the language level of the student at the start is higher than the A2 level of the pan-European competence.*
**Learning Outcomes**
*ON 1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*
**Prerequisites**
*School course*
**Postrequisites**
*Foreign language*

### Kazakh language

| | |
|---|---|
| Discipline cycle | General educational disciplines |
| Discipline component | Compulsory component |
| SubjectID | 26829 (3013855) |
| Course | 1 |
| Term | 1 |
| Credits count | 5 |
| Practical and seminar classes | 45hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**
*The discipline is aimed at deepening the acquired knowledge of students in the framework of the school curriculum, as well as the use of language and speech means based on a full understanding of vocabulary and grammatical system of knowledge; the formation of socio-humanitarian worldview of students within the framework of the national idea of spiritual revival; free expression of mobile thought as a means of speech communication and in the process of communication; awareness of the national culture of the people, the ability to distinguish features of national cognition.*
**Purpose of studying of the discipline**
*Forms through phraseological units the recognition of national culture, its meaning as a linguistic unit related to spiritual culture; skills of identifying facts of national and cultural significance in the formation of Kazakh phraseology.*
**Learning Outcomes**
*ON 1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*
**Prerequisites**
*School course*
**Postrequisites**
*Kazakh language*

### The module of socio-political knowledge (sociology, political science, cultural studies, psychology)

| | |
|---|---|
| Discipline cycle | General educational disciplines |

| Discipline component | Compulsory component |
|---|---|
| SubjectID | 26830 (3013922) |
| Course | 1 |
| Term | 1 |
| Credits count | 8 |
| Lections | 30hours |
| Practical and seminar classes | 45hours |
| Independent work of a student under the guidance of a teacher | 55hours |
| Independent work of the student | 110hours |
| Total | 240hours |
| Knowledge control form | Examination |

### Short description of discipline

*The module of socio-political knowledge involves the study of four scientific disciplines – sociology, political science, cultural studies, psychology, each of which has its own subject, terminology and research methods. Interactions between these scientific disciplines are carried out on the basis of the principles of information complementarity; integrativity; methodological integrity of research approaches of these disciplines; generality of the methodology of learning, result-oriented; unified system representation of the typology of learning outcomes as formed abilities.*

### Purpose of studying of the discipline

*Formation of social and humanitarian worldview of students in the context of solving the problems of modernization of public consciousness, defined by the state program "Looking into the Future: Modernization of Public Consciousness".*

### Learning Outcomes

*ON 1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

### Prerequisites

*School course*

### Postrequisites

*Philosophy*

## Russian language

| Discipline cycle | General educational disciplines |
|---|---|
| Discipline component | Compulsory component |
| SubjectID | 26828 (3013850) |
| Course | 1 |
| Term | 1 |
| Credits count | 5 |
| Practical and seminar classes | 45hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline

*The discipline is intended for the development of the language personality of the student, who is able to carry out cognitive and communicative activities in Russian in the areas of interpersonal, social, professional, intercultural communication; for teaching students practical mastery of the Russian language in various areas of communication and various situations, mastering the specifics of functional semantic types and genres of functional styles of speech, enriching the vocabulary with special vocabulary, forming and improving the skills of monologue and dialogic speech.*

### Purpose of studying of the discipline

*The purpose of the program is to form the socio-humanitarian worldview of students in the context of the national idea of spiritual modernization, involving the development on the basis of national consciousness and cultural code of the qualities of internationalism, tolerant attitude to world cultures and languages as translators of world-class knowledge, advanced modern technologies, the use and transfer of which can ensure the modernization of the country and personal career growth of future specialists.*

### Learning Outcomes

*ON 1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

### Prerequisites

*School course*

### Postrequisites

*Russian language*

## Physical Culture

| Discipline cycle | General educational disciplines |
|---|---|
| Discipline component | Compulsory component |
| SubjectID | 26826 (3013839) |
| Course | 1 |
| Term | 1 |

| | |
|---|---|
| Credits count | 2 |
| Practical and seminar classes | 60hours |
| Total | 60hours |
| Knowledge control form | Differentiated attestation |

**Short description of discipline**

*It provides for the joint cooperation of a teacher and a student in the process of physical education throughout the training in the context of the requirements for the level of mastering the discipline, preparing students for participation in mass sports competitions; forms motivational and value attitudes towards physical culture and the need for systematic physical exercises and sports; gives basic knowledge about the use of physical culture and sports in the development of vital physical qualities.*

**Purpose of studying of the discipline**

*The purpose of the program is the formation of social and personal competencies of students and the ability to purposefully use the means and methods of physical culture, ensuring the preservation, strengthening of health to prepare for professional activities; to the persistent transfer of physical exertion, neuropsychic stress and adverse factors in future work.*

**Learning Outcomes**

*ON 1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

**Prerequisites**

*School course*

**Postrequisites**

*Physical Culture*

# Kazakh language

| | |
|---|---|
| Discipline cycle | General educational disciplines |
| Discipline component | Compulsory component |
| SubjectID | 26835 (3013849) |
| Course | 1 |
| Term | 2 |
| Credits count | 5 |
| Practical and seminar classes | 45hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**

*The discipline is aimed at expanding language literacy, free communication with the environment and mental and ideological skills of the student, understanding the role of language in the process of mastering world‑class knowledge through the formation of a future specialist`s worldview based on national consciousness and cultural code, improving the knowledge of the state language by future specialists, increasing the scope of use of the Kazakh language by specialists.*

**Purpose of studying of the discipline**

*Ensuring high‑quality mastery of the Kazakh language as a means of social, intercultural, professional communication through the formation of communicative competencies at all levels of language use.*

**Learning Outcomes**

*ON 1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

**Prerequisites**

*Kazakh language*

**Postrequisites**

*Basic and profile disciplines of the EP*

# Foreign language

| | |
|---|---|
| Discipline cycle | General educational disciplines |
| Discipline component | Compulsory component |
| SubjectID | 26834 (3013848) |
| Course | 1 |
| Term | 2 |
| Credits count | 5 |
| Practical and seminar classes | 45hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**

*The content of the discipline «Foreign language» assumes the formation of students` linguo‑cultural, socio‑cultural, cognitive and communicative competencies at B2 level.The discipline is aimed at deep and extended study of productive and receptive language material. As a result, the student must be able to understand all types of speech activity in accordance with the requirements of B2 level*

*and master the subject content of the discipline and speech.*

**Purpose of studying of the discipline**

*Formation of linguo-culturological, socio-cultural, cognitive and communicative competence of students in the process of foreign language education at the B2 level, pan-European competence. Depending on the level of training, the student at the time of completing the course reaches the level B2 of the common European competence, if the language level of the student at the start is higher than the level B1 of the common European competence.*

**Learning Outcomes**

*ON 1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

**Prerequisites**

*Foreign language*

**Postrequisites**

*Basic and profile disciplines of the EP*

# Bases of economics, law and ecological knowledge

| | |
|---|---|
| Discipline cycle | General educational disciplines |
| Discipline component | University component |
| SubjectID | 26837 (3013923) |
| Course | 1 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**

*The discipline is integrated, which includes the main issues and principles in the field of fundamentals of law and anti-corruption culture, economics, entrepreneurship and leadership, ecology and life safety. Features of the use of regulatory legal acts, the ability to use business, ethical, social, economic, entrepreneurial and environmental norms of society. The specifics of environmental, legal, economic, entrepreneurial relations, leadership qualities and principles of the fight against corruption.*

**Purpose of studying of the discipline**

*It consists in studying the basic patterns of the functioning of living organisms, the biosphere as a whole and the mechanisms of their sustainable development under the conditions of anthropogenic impact and emergency situations; in understanding the concept of corruption, the legitimacy of the fight against it, the content of the state penal policy; in the formation of students` basic fundamental stable knowledge on the basics of economic theory, in instilling the skills and abilities of economic thinking; in introducing students to the theory and practice of entrepreneurship, to the basics of creating their own business; in the formation of theoretical knowledge and practical skills for the development and improvement of leadership qualities.*

**Learning Outcomes**

*ON 1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

**Prerequisites**

*School course*

**Postrequisites**

*Basic and profile disciplines of the EP*

# Russian language

| | |
|---|---|
| Discipline cycle | General educational disciplines |
| Discipline component | Compulsory component |
| SubjectID | 26836 (3013851) |
| Course | 1 |
| Term | 2 |
| Credits count | 5 |
| Practical and seminar classes | 45hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**

*The discipline is intended for the development of the language personality of the student, who is able to carry out cognitive and communicative activities in Russian in the areas of interpersonal, social, professional, intercultural communication; to teach the scientific style of speech as a language of specialty, the creation of secondary texts, the formation of skills for the production of oral and written speech in accordance with the communicative goal and the professional sphere of communication, instilling the skills of speech etiquette, business rhetoric.*

**Purpose of studying of the discipline**

*The purpose of the program is to form the socio-humanitarian worldview of students in the context of the national idea of spiritual*

*modernization, involving the development on the basis of national consciousness and cultural code of the qualities of internationalism, tolerant attitude to world cultures and languages as translators of world-class knowledge, advanced modern technologies, the use and transfer of which can ensure the modernization of the country and personal career growth of future specialists.*

### Learning Outcomes
*ON 1  Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

### Prerequisites
*Russian language*

### Postrequisites
*Basic and profile disciplines of the EP*

# Physical Culture

| | |
|---|---|
| Discipline cycle | General educational disciplines |
| Discipline component | Compulsory component |
| SubjectID | 26833 (3013840) |
| Course | 1 |
| Term | 2 |
| Credits count | 2 |
| Practical and seminar classes | 60hours |
| Total | 60hours |
| Knowledge control form | Differentiated attestation |

### Short description of discipline
*It provides for the joint cooperation of a teacher and a student in the process of physical education throughout the training in the context of the requirements for the level of mastering the discipline, the ability to exercise control and self-control in the process of classes, gaining knowledge on health promotion, hardening and increasing the body`s resistance to the effects of adverse factors of labor activity, mastering methods of selection of physical exercises and sports.*

### Purpose of studying of the discipline
*The purpose of the program is the formation of social and personal competencies of students and the ability to purposefully use the means and methods of physical culture, ensuring the preservation, strengthening of health to prepare for professional activities; to the persistent transfer of physical exertion, neuropsychic stress and adverse factors in future work.*

### Learning Outcomes
*ON 1  Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

### Prerequisites
*Physical Culture*

### Postrequisites
*Physical Culture*

# History of Kazakhstan

| | |
|---|---|
| Discipline cycle | General educational disciplines |
| Discipline component | Compulsory component |
| SubjectID | 26877 (3013921) |
| Course | 2 |
| Term | 1 |
| Credits count | 5 |
| Lections | 30hours |
| Practical and seminar classes | 15hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*The main stages of the history of Kazakhstan are studied with: nomadic statehood, Turkic civilization, the era of colonialism, the Soviet period, independence. The driving forces, trends, patterns of historical development are analyzed; problems: ethnogenesis of the Kazakh people, the formation of statehood, national liberation movements, demographic development. The skills of analyzing historical events and facts, working with historical literature are being formed.*

### Purpose of studying of the discipline
*The purpose of the discipline is to provide objective knowledge about the main stages of the development of the history of Kazakhstan from ancient times to the present.*

### Learning Outcomes
*ON 1  Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

### Prerequisites
*School course*

# Physical Culture

| | |
|---|---|
| Discipline cycle | General educational disciplines |
| Discipline component | Compulsory component |
| SubjectID | 26839 (3013841) |
| Course | 2 |
| Term | 1 |
| Credits count | 2 |
| Practical and seminar classes | 60hours |
| Total | 60hours |
| Knowledge control form | Differentiated attestation |

**Short description of discipline**
*Provides for the joint cooperation of the teacher and the student in the process of physical education throughout the training in the context of the requirements for the level of mastering the discipline; increasing the level of physical fitness and developing physical qualities; mastering the technique of sports; education of discipline, collectivism, comradely mutual assistance; education of mental stability, development and improvement of basic motor qualities - endurance, strength, speed, dexterity, flexibility.*

**Purpose of studying of the discipline**
*The purpose of the program is the formation of social and personal competencies of students and the ability to purposefully use the means and methods of physical culture, ensuring the preservation, strengthening of health to prepare for professional activities; to the persistent transfer of physical exertion, neuropsychic stress and adverse factors in future work.*

**Learning Outcomes**
*ON 1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

**Prerequisites**
*Physical Culture*

**Postrequisites**
*Physical Culture*

# Information and communication technology

| | |
|---|---|
| Discipline cycle | General educational disciplines |
| Discipline component | Compulsory component |
| SubjectID | 26879 (3013925) |
| Course | 2 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 15hours |
| Laboratory works | 15hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**
*The discipline is aimed at mastering the conceptual foundations of the architecture of computer systems, operating systems and networks by students; formation of the ability to critically understand the role and signifcance of modern information and communication technologies in the era of digital globalization, new "digital" thinking, knowledge about the concepts of developing network and web applications, skills in using modern information and communication technologies in various felds of professional activity, scientifc and practical work, for self-educational and other purposes.*

**Purpose of studying of the discipline**
*Formation of the ability to critically evaluate and analyze processes, methods of searching, storing and processing information, methods of collecting and transmitting information through digital technologies.*

**Learning Outcomes**
*ON 1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

**Prerequisites**
*School course*

**Postrequisites**
*Basic and profile disciplines of the EP*

# Physical Culture

| | |
|---|---|
| Discipline cycle | General educational disciplines |
| Discipline component | Compulsory component |
| SubjectID | 26878 (3013842) |
| Course | 2 |

| Term | 2 |
|---|---|
| Credits count | 2 |
| Practical and seminar classes | 60hours |
| Total | 60hours |
| Knowledge control form | Differentiated attestation |

**Short description of discipline**

*Provides for the joint cooperation of the teacher and the student in the process of physical education throughout the training in the context of the requirements for the level of mastering the discipline; acquisition of versatile abilities and skills for the development of physical abilities, socio-cultural experience and socio-cultural values of physical culture and sports; development of communication skills, thinking, self-development, the formation of experience in the implementation of sports and recreational and training programs.*

**Purpose of studying of the discipline**

*The purpose of the program is the formation of social and personal competencies of students and the ability to purposefully use the means and methods of physical culture, ensuring the preservation, strengthening of health to prepare for professional activities; to the persistent transfer of physical exertion, neuropsychic stress and adverse factors in future work.*

**Learning Outcomes**

*ON 1  Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

**Prerequisites**

*Physical Culture*

**Postrequisites**

*Basic and profile disciplines of the EP*

# World of Abai

| Discipline cycle | Basic disciplines |
|---|---|
| Discipline component | University component |
| SubjectID | 26893 (3013860) |
| Course | 2 |
| Term | 2 |
| Credits count | 3 |
| Lections | 15hours |
| Practical and seminar classes | 15hours |
| Independent work of a student under the guidance of a teacher | 20hours |
| Independent work of the student | 40hours |
| Total | 90hours |
| Knowledge control form | Examination |

**Short description of discipline**

*The discipline is aimed at studying historical facts, the philosophical and artistic foundations of the works of Abay Kunanbaev, Shakarim Kudaiberdiev, which form worldview and aesthetic values, the student`s ability to express his opinion, practical skills and perception of such human qualities as morality, honesty, artistic character. The genius of the writers of Kazakh literature and the role of M. Auezov in the study and popularization of Abai`s heritage, the significance of his works for history, literature and science are determined.*

**Purpose of studying of the discipline**

*Formation of the meaning of philosophical and ideological being, understanding of the problems raised in the works of Abai Kunanbayuly, Shakarim Kudaiberdiuly, Mukhtar Auezov and application of the acquired knowledge in the practice of everyday life.*

**Learning Outcomes**

*ON 1  Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

**Prerequisites**

*Kazakh language  The module of socio-political knowledge (sociology, political science, cultural studies, psychology)*

**Postrequisites**

*Basic and profile disciplines of the EP*

# Philosophy

| Discipline cycle | General educational disciplines |
|---|---|
| Discipline component | Compulsory component |
| SubjectID | 30583 (3013853) |
| Course | 3 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**

*The discipline is aimed at developing students` openness of consciousness, understanding their own national code and self-consciousness, spiritual modernization, competitiveness, realism and pragmatism, independent critical thinking, the cult of knowledge and education, a holistic view of philosophy as a special form of understanding the world, mastering key worldview concepts, as well as the development and strengthening of the values of tolerance, intercultural dialogue and a culture of peace.*

## Purpose of studying of the discipline
*Formation in students of a holistic view of philosophy as a special form of knowledge of the world, its main sections, problems and methods of studying them in the context of future professional activities.*

## Learning Outcomes
*ON 1  Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern trends in the development of society.*

## Prerequisites
*History of Kazakhstan The module of socio-political knowledge (sociology, political science, cultural studies, psychology)*

## Postrequisites
*Basic and profile disciplines of the EP*

# Module 2. Psychological-pedagogical and methodological training of personnel

# Age psychology and physiology

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 26832 (3013859) |
| Course | 1 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

## Short description of discipline
*The course allows you to form an idea of human anatomy and physiology, the specifics and features of age-related development, the patterns of higher nervous activity and functional features of the human nervous system are considered. Forms students` systematic understanding of mental and physiological development in ontogenesis, the main patterns of development and neoplasms of age, the most important mental features of the emerging personality of the child on the basis of taking into account psychophysiological norms.*

## Purpose of studying of the discipline
*Formation of students` ideas about the diversity of approaches to the development of correct, scientific knowledge, mental and physiological development of a person in ontogenesis on the most important issues of psychology and physiological development in the aspect of cultural development. To equip students with theoretical and practical knowledge that contributes to strengthening their professional psychological, pedagogical and physiological training, in- depth study of the section of psychological and physiological knowledge.*

## Learning Outcomes
*ON2  Apply modern teaching technologies and criteria- based assessment, taking into account the individual, physiological and psychological characteristics of students.*

## Prerequisites
*School course*

## Postrequisites
*Pedagogical practice (psychological and pedagogical)*

# Pedagogy

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 26838 (3013918) |
| Course | 1 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

## Short description of discipline
*The content of the discipline is aimed at forming students` holistic understanding of the theoretical and methodological foundations of pedagogical science and the essence of professional pedagogical activity. Studying the course allows you to form the necessary knowledge about the content, principles, forms and methods of organizing a holistic pedagogical process in an educational environment.*

The study of the course forms the necessary competencies for the successful implementation of modern approaches in teaching and learning.

**Purpose of studying of the discipline**

*Pedagogy as an academic discipline aims to form students` knowledge about the object and subject of pedagogy, its functions, categorical apparatus, methodology of science.*

*The study of the course provides for the formation of the necessary competencies in the design and evaluation of the pedagogical process in the conditions of an educational institution .The content of the discipline topics allows you to acquire knowledge and skills in the selection and successful application of forms, means, methods of teaching and upbringing.*

**Learning Outcomes**

*ON2 Apply modern teaching technologies and criteria-based assessment, taking into account the individual, physiological and psychological characteristics of students.*

**Prerequisites**

*School course*

**Postrequisites**

*Basic and profile disciplines of the EP*

# Inclusive education

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 26840 (3013861) |
| Course | 2 |
| Term | 1 |
| Credits count | 3 |
| Lections | 15hours |
| Practical and seminar classes | 15hours |
| Independent work of a student under the guidance of a teacher | 20hours |
| Independent work of the student | 40hours |
| Total | 90hours |
| Knowledge control form | Examination |

**Short description of discipline**

*When studying the discipline, students acquire knowledge about the principles and methodological foundations of inclusive education. Ideas are being formed about modern models of psychological and pedagogical support for children with special needs, the elimination of existing barriers in the legal support of inclusive education and the competence of organization and management in the area of inclusive practice. Get an idea about the models of psychological and pedagogical support for children with disabilities in educational institutions.*

**Purpose of studying of the discipline**

*The purpose of this discipline is to familiarize students with the basic provisions of the organization and management of inclusive processes in education; the formation of a dynamic, effective, self-improving specialist, ready for professional activity in an inclusive education, owning innovative technologies for building an educational route for all students, taking into account their individual needs and capabilities, able to provide social psychological and pedagogical support for children and their families.*

**Learning Outcomes**

*ON2 Apply modern teaching technologies and criteria-based assessment, taking into account the individual, physiological and psychological characteristics of students.*

**Prerequisites**

*Age psychology and physiology*

**Postrequisites**

*Basic and profile disciplines of the EP*

# Technologies of the updated content of education and criteria assessment

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 30438 (3013846) |
| Course | 2 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**

*The course is designed to familiarize students with the technology of updated educational content and the features of criteria assessment. During the course, the main documents for secondary schools will be studied, ways of applying the basic principles of organization and planning of educational work, which have gained a permanent place in the practice of many teachers around the world, will be considered. Students master the types of criteria assessment and their features.*

**Purpose of studying of the discipline**

*To introduce the technology of the updated content of education and the features of criteria assessment, to form students` skills, such as becoming independent, self-motivated, enthusiastic, confident, responsible individuals with developed critical thinking, showing competence in digital technologies.*

**Learning Outcomes**

*ON2 Apply modern teaching technologies and criteria-based assessment, taking into account the individual, physiological and psychological characteristics of students.*

**Prerequisites**

*Pedagogy*

**Postrequisites**

*Basic and profile disciplines of the EP*

# Pedagogical practice

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 30452 (3013874) |
| Course | 2 |
| Term | 2 |
| Credits count | 3 |
| Pedagogical practics | 90hours |
| Total | 90hours |
| Knowledge control form | Total mark on practice |

**Short description of discipline**

*Pedagogical practice is aimed at the practical application of theoretical knowledge gained in the study of psychological, pedagogical, social and special disciplines. Students develop the skills of organizing and conducting extracurricular, educational work on the subject. In general education schools, in accordance with the requirements of the updated content of education, they master the methods of processing the necessary documents for work, methods of working with information tools.*

**Purpose of studying of the discipline**

*Consolidation and deepening of knowledge in general scientific, cultural, psychological and pedagogical, methodological and special disciplines, as well as the formation of pedagogical skills, skills and competencies based on theoretical knowledge.*

**Learning Outcomes**

*ON2 Apply modern teaching technologies and criteria-based assessment, taking into account the individual, physiological and psychological characteristics of students.*

**Prerequisites**

*Pedagogy*

**Postrequisites**

*Pedagogical practice*

# Pedagogical practice (psychological and pedagogical)

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 26886 (3013857) |
| Course | 2 |
| Term | 2 |
| Credits count | 2 |
| Pedagogical practics | 60hours |
| Total | 60hours |
| Knowledge control form | Total mark on practice |

**Short description of discipline**

*The content of psychological and pedagogical practice is aimed at forming an idea about the peculiarities of the organization of the educational and pedagogical process and the management system in the holistic pedagogical process of the school. The student gets acquainted with all types and directions of the teacher`s activities, including the system of work of the class teacher, observation during lessons and extracurricular activities, psychological and pedagogical diagnostics of the age characteristics of the development of students, conducts psychological and pedagogical educational work.*

**Purpose of studying of the discipline**

*The purpose of pedagogical practice is the formation of professional pedagogical competencies related to the design and implementation of the educational process of teaching in the education system, providing conditions for the social and professional adaptation of students, mastering the norms and values of the teaching profession, gaining experience in practical pedagogical activity, becoming a professional orientation of their personality*

**Learning Outcomes**

*ON2 Apply modern teaching technologies and criteria-based assessment, taking into account the individual, physiological and psychological characteristics of students.*

**Prerequisites**

*Pedagogy*

**Postrequisites**

*Pedagogical practice*

# Theory and methodology of teaching mathematics

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 30450 (3013873) |
| Course | 2 |
| Term | 2 |
| Credits count | 5 |
| Lections | 30hours |
| Practical and seminar classes | 15hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*The discipline is intended for the development of general laws, goals and content, didactic principles of teaching mathematics, methods of scientific cognition and consideration of methods of teaching topics of the school course of mathematics. Students are invited to analyze mathematics textbooks, additional didactic materials, familiarize themselves with the content of the textbook presentation and perform a system of exercises of a given level of complexity. In the process of studying the discipline, students form the knowledge, skills, and skills necessary for conducting scheduled, extracurricular activities.*

### Purpose of studying of the discipline
*To provide information on theoretical issues of teaching mathematics, didactic principles, methods of scientific cognition, to acquaint with the methodology of teaching mathematics in secondary schools, the peculiarities of the organization of training and to form students` professional competencies necessary in future professional and pedagogical activities.*

### Learning Outcomes
*ON2 Apply modern teaching technologies and criteria- based assessment, taking into account the individual, physiological and psychological characteristics of students.*
*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.*

### Prerequisites
*Introduction to the profession of a teacher of mathematics and computer science*

### Postrequisites
*Pedagogical practice*

## Information and communication technologies in the specialized school

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30462 (3013845) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*The discipline is designed to study the features of the use of modern information, communication and educational technologies in the process of teaching in specialized schools. The content of the discipline considers the methodology of application of modern information and communication technologies in the system of general education. It is focused on teaching practical use of theoretical knowledge in the field of ICT in accordance with the program of the profile school. Has the ability to effectively choose various pedagogical approaches to improve the effectiveness of teaching in the discipline.*

### Purpose of studying of the discipline
*Formation of students` skills and abilities in the field of modern information, communication and educational technologies during classes at a specialized school.*

### Learning Outcomes
*ON2 Apply modern teaching technologies and criteria- based assessment, taking into account the individual, physiological and psychological characteristics of students.*
*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.*

### Prerequisites
*Introduction to the profession of a teacher of mathematics and computer science*

### Postrequisites
*Pedagogical practice*

## Methods of using ICT in the educational process

| | |
|---|---|
| Discipline cycle | Basic disciplines |

| Discipline component | Electives |
|---|---|
| SubjectID | 30461 (3013844) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*The discipline is aimed at training students to develop skills and abilities in the field of modern information, communication and educational technologies. In the course of studying the discipline, the ways and features of the use of ICT in pedagogical activity are outlined, methods of solving pedagogical problems by modern means of ICT are proposed. Students master the use of ICT tools and methods in order to improve the effectiveness of teaching the subject they conduct in their future activities.*

### Purpose of studying of the discipline
*Formation of students` skills and abilities in the field of modern information, communication and educational technologies.*

### Learning Outcomes
*ON2 Apply modern teaching technologies and criteria- based assessment, taking into account the individual, physiological and psychological characteristics of students.*
*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.*

### Prerequisites
*Introduction to the profession of a teacher of mathematics and computer science*

### Postrequisites
*Pedagogical practice*

# Teaching Techniques of  Informatics

| Discipline cycle | Basic disciplines |
|---|---|
| Discipline component | Electives |
| SubjectID | 30460 (3013843) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*When studying the discipline, general issues of the methodology of teaching computer science at school are considered. Students master computer knowledge, the basics of programming and methods of teaching algorithmic languages, general methods of solving problems on a computer, learn how to work with computer technology, means of communication with a personal computer. The study of the discipline is aimed at the formation of students` information and methodological skills and the development of computer literacy.*

### Purpose of studying of the discipline
*Preparation of a future computer science teacher of secondary educational institutions, who should be ready to carry out training and education of students taking into account the specifics of the taught subject; promote socialization, formation of a general culture of personality, conscious choice and subsequent development of professional educational programs; use a variety of techniques, methods and means of teaching; ensure the level of training of students.*

### Learning Outcomes
*ON2 Apply modern teaching technologies and criteria- based assessment, taking into account the individual, physiological and psychological characteristics of students.*
*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.*

### Prerequisites
*Introduction to the profession of a teacher of mathematics and computer science*

### Postrequisites
*Pedagogical practice*

# Pedagogical practice

| Discipline cycle | Basic disciplines |
|---|---|
| Discipline component | University component |
| SubjectID | 30598 (3013894) |
| Course | 3 |

| | |
|---|---|
| Term | 2 |
| Credits count | 5 |
| Pedagogical practics | 150hours |
| Total | 150hours |
| Knowledge control form | Total mark on practice |

**Short description of discipline**

*Pedagogical practice is aimed at the formation of professional pedagogical competencies related to the design and implementation of the educational process of learning in the education system. Students master the norms and values of the teaching profession, professional orientation is carried out in obtaining experience of pedagogical activity. At the stage of theoretical training at the university, creative, research views are formed using various methods of teaching mathematics and computer science.*

**Purpose of studying of the discipline**

*Formation of professional pedagogical competencies related to the design and implementation of the educational process of teaching in the education system, providing conditions for social and professional adaptation of students, mastering the norms and values of the pedagogical profession, gaining experience in practical pedagogical activity, the formation of professional orientation of their personality.*

**Learning Outcomes**

*ON2 Apply modern teaching technologies and criteria- based assessment, taking into account the individual, physiological and psychological characteristics of students.*

**Prerequisites**

*Pedagogical practice (psychological and pedagogical) Pedagogical practice*

**Postrequisites**

*Pregraduation practice Professional  (pedagogical)*

## Module 3. Foundational level of preparation

## Introduction to the profession of a teacher of mathematics and computer science

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 26870 (3013865) |
| Course | 1 |
| Term | 1 |
| Credits count | 3 |
| Lections | 15hours |
| Practical and seminar classes | 15hours |
| Independent work of a student under the guidance of a teacher | 20hours |
| Independent work of the student | 40hours |
| Total | 90hours |
| Knowledge control form | Examination |

**Short description of discipline**

*The discipline is intended for familiarization with pedagogical activity and its role in society, consideration of normative legal documents related to pedagogical activity, the law "On the status of a teacher", which establishes the rights, social guarantees and restrictions, duties and responsibilities of a teacher. The professional abilities and ethics of teachers of mathematics and computer science are considered. The requirements for the level of professional competence and education are formulated. The features of teaching mathematics and computer science in secondary schools are formulated.*

**Purpose of studying of the discipline**

*Familiarization with the psychological and pedagogical features of the teacher`s profession, the formation of skills to work with a person, the definition and analysis of fundamental documents 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.*

**Prerequisites**

*School course*

**Postrequisites**

*Pedagogical practice (psychological and pedagogical)*

## Mathematical analysis 1

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 30432 (3013867) |
| Course | 1 |
| Term | 2 |
| Credits count | 5 |
| Lections | 30hours |
| Practical and seminar classes | 15hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |

| | |
|---|---|
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**

*A branch of mathematics in which the discipline teaches the method of studying the processes of change, movement, and dependencies between quantities in terms of their quantitative relations. When studying the discipline, the general theory of functional dependencies is considered, the real set of numbers, the sequence of numbers, the limit of the sequence, the concept of a function, the limit of a function at a point, the derivative of a function, methods of plotting a function using a derivative are studied. The student acquires fundamental knowledge of the theory of differential calculations.*

**Purpose of studying of the discipline**

*To introduce fundamental research methods by analyzing the finite quantities that make up the differential calculations of a function of one variable.*

**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.*

**Prerequisites**

*School course*

**Postrequisites**

*Mathematical analysis 2*

# Training practice

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 30430 (3013856) |
| Course | 1 |
| Term | 2 |
| Credits count | 2 |
| Study practics | 60hours |
| Total | 60hours |
| Knowledge control form | Total mark on practice |

**Short description of discipline**

*It is carried out for students in an organization that, by its introductory nature, is the object of future professional activity. The educational practice is aimed at understanding the content of the future profession. During the practice, primary professional competencies of students are formed, including the development of general cultural competencies, consolidation and deepening of theoretical knowledge acquired in the course of training, acquisition of primary research skills, practical and working skills in accordance with the educational program.*

**Purpose of studying of the discipline**

*the development of general cultural competencies of students, the acquisition of primary professional competencies, including the consolidation and deepening of theoretical knowledge gained in the learning process, obtaining the first skills of research, business correspondence skills, the acquisition of practical skills and work skills in accordance with the educational program*

**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.*

**Prerequisites**

*Introduction to the profession of a teacher of mathematics and computer science*

**Postrequisites**

*Pedagogical practice (psychological and pedagogical)*

# Elementary mathematic

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 30431 (3013858) |
| Course | 1 |
| Term | 2 |
| Credits count | 3 |
| Lections | 0hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 20hours |
| Independent work of the student | 40hours |
| Total | 90hours |
| Knowledge control form | Examination |

**Short description of discipline**

*The formation of students` general cultural, general professional, professional and special competencies that contribute to the systematization of knowledge and their addition with new interesting facts from various sections of elementary mathematics, as well as teaching students to prove course theorems and solve school mathematical problems in different ways, which allows you to see the intra- and interdisciplinary connections of mathematics.*

**Purpose of studying of the discipline**

*Instilling in students the skills of mathematical thinking, mathematical analysis of applied problems and conducting research using basic*

*mathematical methods. Systematization of knowledge, skills and abilities acquired in the school mathematics course.*

**Learning Outcomes**

*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.*

**Prerequisites**

*School course*

**Postrequisites**

*Basic and profile disciplines of the EP*

# Algebra and number theory

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30439 (3013862) |
| Course | 2 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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.*

**Prerequisites**

*Elementary mathematic*

**Postrequisites**

*Basic and profile disciplines of the EP*

# Analitic geometry

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 30440 (3013868) |
| Course | 2 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**

*The content of the discipline deals with the equations of straight lines on the plane and the theory of curves of the second order. Equations of straight lines and planes in space, second- order surfaces and related concepts, elements of vector algebra and their application in solving various problems are studied. In the process of mastering the discipline, students deepen their knowledge on topics necessary in accordance with the school mathematics program, and problem-solving skills are formed.*

**Purpose of studying of the discipline**

*To introduce students to the main sections of analytical geometry, to teach techniques for solving problems by presenting knowledge about a straight line, plane, curves and surfaces of the second order.*

**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.*

**Prerequisites**

*School course*

**Postrequisites**

*Methods of geometric problems solution*

# Vector and Euclidean space

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30443 (3013869) |
| Course | 2 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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.*

### Prerequisites
*Elementary mathematic*

### Postrequisites
*Basic and profile disciplines of the EP*

# Linear algebra

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30437 (3013836) |
| Course | 2 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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.*

### Prerequisites
*Elementary mathematic*

### Postrequisites
*Basic and profile disciplines of the EP*

# Mathematical analysis 2

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 30444 (3013872) |
| Course | 2 |
| Term | 1 |

| | |
|---|---|
| Credits count | 5 |
| Lections | 30hours |
| Practical and seminar classes | 15hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

## Short description of discipline
*The discipline is designed to teach integral calculus of a function of one variable and differential calculus of a function of several variables. In the process of studying the discipline, students master the concept of a primitive function, an indefinite and definite integral, ways of integrating various functions, the use of a certain integral, deepen the theoretical knowledge gained in the school mathematics course. It covers the study of the basic concepts of several variable functions, continuity, derivatives and differentials.*

## Purpose of studying of the discipline
*To introduce fundamental research methods using the analysis of infinite sets that make up the theory of integral calculations of functions of one variable. Determination of the practical application of a certain integral. Teaching differential calculus of functions of multiple variables.*

## 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.*

## Prerequisites
*Mathematical analysis 1*

## Postrequisites
*Mathematical analysis 3*

# Theoretical basics of informatics

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 30449 (3013864) |
| Course | 2 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

## Short description of discipline
*The subject organizes preparedness in such matters that are related to the theoretical foundations of information processing, using computer technology, students will take concepts about the types and structures of variables that in the future will help students to find out and solve practical problems of improving variables that will arise in the course of professional work. The concepts of important concepts of computer science are established.*

## Purpose of studying of the discipline
*To form an idea of the fundamental concepts of computer science: the foundations of information theory, the theory of digital automata, the theory of algorithms, the analysis of the effectiveness of algorithms, information modeling and the semantic foundations of computer science.*

## Learning Outcomes
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*

## Prerequisites
*School course*

## Postrequisites
*Databases and Information Systems*

# Module 4. Theoretical and methodological level of preparation

# Multiple integrals

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30453 (3013876) |
| Course | 2 |
| Term | 2 |
| Credits count | 5 |
| Lections | 30hours |
| Practical and seminar classes | 15hours |

| | |
|---|---|
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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, namely, the calculation of the flow through.*

**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.*

**Prerequisites**

*Mathematical analysis 2*

**Postrequisites**

*Differential eguation*

# Mathematical analysis 3

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30446 (3013835) |
| Course | 2 |
| Term | 2 |
| Credits count | 5 |
| Lections | 30hours |
| Practical and seminar classes | 15hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**

*The discipline is designed to study the theory of series, multiple integrals and their application. In the educational process, students study numerical series, signs of their research on convergence, determination of the area of convergence of functional series, the use of series in the calculation of limits, the values of some integrals, approximate calculations. Having studied the methods of calculating two and three-fold integrals, graphic skills are formed by constructing schemes for a given area of integration on the plane and in space.*

**Purpose of studying of the discipline**

*To give students theoretical knowledge about numerical series, functional series, multiple integrals, to study series for convergence, to teach methods of calculation and application of multiple integrals; 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.*

**Prerequisites**

*Mathematical analysis 2*

**Postrequisites**

*Differential eguation*

# Theory of functions of several variables

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30448 (3013863) |
| Course | 2 |
| Term | 2 |
| Credits count | 5 |
| Lections | 30hours |
| Practical and seminar classes | 15hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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.

## Prerequisites
Mathematical analysis 2

## Postrequisites
Differential eguation

# Multimedia Processing Technology

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30466 (3013879) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

## 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
ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.
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.

## Prerequisites
Theory and methodology of teaching mathematics

## Postrequisites
Pedagogical practice

# Forms and methods of STEM learning

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30465 (3013878) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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**

*ON5  To carry out intrasubject and intersubject connections in the educational process, to explain mathematical knowledge in various forms.*

*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.*

**Prerequisites**

*Theory and methodology of teaching mathematics*

**Postrequisites**

*Pedagogical practice*

# Electronic educational resources

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30464 (3013877) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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**

*ON5  To carry out intrasubject and intersubject connections in the educational process, to explain mathematical knowledge in various forms.*

*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.*

**Prerequisites**

*Theory and methodology of teaching mathematics*

**Postrequisites**

*Pedagogical practice*

# Mathematical logic

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30576 (3013870) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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**

*ON5  To carry out intrasubject and intersubject connections in the educational process, to explain mathematical knowledge in various forms.*

*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.*
**Prerequisites**
*School course*
**Postrequisites**
*Basic and profile disciplines of the EP*

# Mathematical logic and discrete mathematics

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30579 (3013919) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**
*This course is aimed at studying set theory, logical functions, coding and algorithms, formulas and tautologies of the algebra of statements and predicates, mastering the basics of modern mathematics, mastering formal axiomatic theory, forming students` logical thinking skills. It contains the use of logical operations, formulas and laws of the algebra of logic in the study of other mathematical disciplines, the formulation of various tasks in the language of mathematical logic.*

**Purpose of studying of the discipline**
*The study of the basic methods of solving combinatorial and logical problems, as well as the basics of the theory of algorithms.*
**Learning Outcomes**
*ON5 To carry out intrasubject and intersubject connections in the educational process, to explain mathematical knowledge in various forms.*
*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.*
**Prerequisites**
*School course*
**Postrequisites**
*Basic and profile disciplines of the EP*

# Applied graph theory

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30577 (3013871) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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**
*ON5 To carry out intrasubject and intersubject connections in the educational process, to explain mathematical knowledge in various forms.*
*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.*
**Prerequisites**
*School course*
**Postrequisites**

## Practician of mathematical problems solution

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30600 (3013885) |
| Course | 3 |
| Term | 2 |
| Credits count | 5 |
| Practical and seminar classes | 45hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*to equip the future teacher training in specific knowledge of school mathematics, expand educational horizons of the student, to help him learn the correct general provisions on the forms and methods of teaching students mathematical activity, the development of their mathematical thinking, to explore the communication methods of teaching mathematics to philosophy, mathematics , psychology, education; explore methods of evidence, methods of solving problems, methods of teaching mathematics.*

### 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
*ON5 To carry out intrasubject and intersubject connections in the educational process, to explain mathematical knowledge in various forms.*
*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.*

### Prerequisites
*Elementary mathematic*

### Postrequisites
*Professional (pedagogical)*

## And practical for solving trigonomeyric problems

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30599 (3013886) |
| Course | 3 |
| Term | 2 |
| Credits count | 5 |
| Practical and seminar classes | 45hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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
*ON5 To carry out intrasubject and intersubject connections in the educational process, to explain mathematical knowledge in various forms.*
*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.*

### Prerequisites
*Elementary mathematic*

### Postrequisites
*Professional (pedagogical)*

## Solving parametric equations and inequalities

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |

| | |
|---|---|
| SubjectID | 30601 (3013887) |
| Course | 3 |
| Term | 2 |
| Credits count | 5 |
| Practical and seminar classes | 45hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*The program of the course "Solving parametric equations and inequalities" is designed to strengthen the theoretical knowledge of students, deepen their knowledge of mathematical laws, enhance their creative development through self-search. The ability to obtain 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, exponential equations and inequalities, logarithmic equations and inequalities, they say.*

### 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
*ON5  To carry out intrasubject and intersubject connections in the educational process, to explain mathematical knowledge in various forms.*
*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.*

### Prerequisites
*Elementary mathematic*

### Postrequisites
*Professional  (pedagogical)*

## Geometric construction tasks

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30625 (3013898) |
| Course | 4 |
| Term | 1 |
| Credits count | 6 |
| Lections | 30hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 40hours |
| Independent work of the student | 80hours |
| Total | 180hours |
| 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
*ON5  To carry out intrasubject and intersubject connections in the educational process, to explain mathematical knowledge in various forms.*
*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.*

### Prerequisites
*Theory and methodology of teaching mathematics*

### Postrequisites
*Professional  (pedagogical)*

## Methods of geometric problems solution

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30627 (3013896) |
| Course | 4 |
| Term | 1 |
| Credits count | 6 |

| | |
|---|---|
| Lections | 30hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 40hours |
| Independent work of the student | 80hours |
| Total | 180hours |
| 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

*ON5  To carry out intrasubject and intersubject connections in the educational process, to explain mathematical knowledge in various forms.*
*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.*

### Prerequisites

*Theory and methodology of teaching mathematics*

### Postrequisites

*Professional  (pedagogical)*

## Problem-based approach in teaching geometry

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30626 (3013897) |
| Course | 4 |
| Term | 1 |
| Credits count | 6 |
| Lections | 30hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 40hours |
| Independent work of the student | 80hours |
| Total | 180hours |
| 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

*ON5  To carry out intrasubject and intersubject connections in the educational process, to explain mathematical knowledge in various forms.*
*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.*

### Prerequisites

*Theory and methodology of teaching mathematics*

### Postrequisites

*Professional  (pedagogical)*

## Professional  (pedagogical)

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30630 (3013920) |
| Course | 4 |
| Term | 2 |
| Credits count | 15 |
| Working practice | 450hours |
| Total | 450hours |
| 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
*Consolidation of professional competencies, acquisition of practical skills and professional experience.*

## Learning Outcomes
*ON8 Conduct and design experiments in the field of classical branches of mathematics and computer science.*
*ON9 Formulate and analyze emerging problems using statistical and applied mathematical methods.*
*ON10 Draw conclusions from the materials studied and demonstrate the desire for professional self-improvement by showing leadership qualities.*

## Prerequisites
*Basic and profile disciplines of the EP*

## Postrequisites
*Final examination*

# Module 5. Fundamentals of Computer science and Robotics

# Python Programming

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | University component |
| SubjectID | 30445 (3013875) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

## Short description of discipline
*In the course of studying the discipline, students will learn how to create console programs, consider the syntax of the language, get acquainted with the input / output operators and their parameters, solve many problems in programming linear, branching and cyclic algorithms. They will work with various data types, including string data type, one-dimensional and multidimensional arrays, study the issues of algorithm tracing, get acquainted with the PyGame library for creating 2D games.*

## Purpose of studying of the discipline
*Formation of ideas about programming languages; acquaintance with the fundamental concepts of algorithms and programming languages; learning how to write programs in a high-level language; mastering the Python programming methodology.*

## Learning Outcomes
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*

## Prerequisites
*Theoretical basics of informatics*

## Postrequisites
*C++ Programming  Object Oriented Programming in Python*

# Fundamentals of frontend development

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30594 (3013892) |
| Course | 3 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

## Short description of discipline
*When studying this discipline, students will master the basics of frontend development, get acquainted with the possibilities of HTML and CSS for layout of web page layouts, learn how websites work, learn how to create designs for web pages, compose their own web*

pages and place them on the web. the Internet. Also, as part of the course, students will get acquainted with the basics of the JavaScript language, consider working with Canvas and learn how to manage web page elements.

**Purpose of studying of the discipline**
*Teaching web page layout, building skills in creating high-quality and functional web page design based on HTML and CSS, dynamic web pages and controls using JavaScript and Canvas capabilities.*

**Learning Outcomes**
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*

**Prerequisites**
*Python Programming*

**Postrequisites**
*Mobile app development*

# Java  Programming

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30591 (3013884) |
| Course | 3 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**
*In the course of studying the discipline, students will master the basics of programming in the Java language, get acquainted with the structure of the program, the alphabet of the language and data types, and learn the basics of working with arithmetic and bitwise operators. Students will learn how to write algorithms of varying complexity, work with arrays, use methods and objects in programming, create subroutines, and also master operator overloading and recursive functions.*

**Purpose of studying of the discipline**
*The goals of mastering the discipline are to gain knowledge about the modern object- oriented programming language Java and mastering the basic programming techniques, obtaining practical skills in developing programs in Java.*

**Learning Outcomes**
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*

**Prerequisites**
*Python Programming*

**Postrequisites**
*Object Oriented Programming in Python Object-oriented programming in Java*

# Fundamentals of Web Development

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30592 (3013891) |
| Course | 3 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**
*When studying this discipline, students learn the basics of web development. Get acquainted with the principles of building web pages using HTML, study numerous tags, attributes, features of HTML interpretation, get acquainted with the structure of an HTML document, code editor, work with lists, images, addresses, links, anchors and composite elements. They will also learn the basics of CSS and advanced layout. They will learn how to work with pseudo-classes, transition animations, media queries and adaptive grid.*

**Purpose of studying of the discipline**
*Acquaintance with the basic concepts of web programming, the formation of skills in the field of creating web pages using the HTML*

*hypertext markup language and CSS styles.*

**Learning Outcomes**
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*
**Prerequisites**
*Python Programming*
**Postrequisites**
*Mobile app development*

# Basics of Internet Technologies

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30595 (3013893) |
| Course | 3 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**
*This discipline allows students to form an understanding of modern Internet technologies, study the basics of network technologies and the principles of building network protocols, get acquainted with Arpanet, consider the topology of the Internet, TCP / IP, DNS, HTTP domain name service. The discipline also covers the use of HTML / XHTML and CSS, the development of static and dynamic sites, client-side programming in JavaScript, server-side programming using PHP.*
**Purpose of studying of the discipline**
*Formation of ideas about the history of the development of the Internet, knowledge of basic concepts and terms in the field of Internet technologies, understanding of the basic principles of client-server interaction, obtaining practical skills in creating web applications.*
**Learning Outcomes**
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*
**Prerequisites**
*Python Programming*
**Postrequisites**
*Mobile app development*

# C# Programming

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30589 (3013883) |
| Course | 3 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

**Short description of discipline**
*This discipline provides an opportunity to study the basic principles, technologies, structures and models of programming in the C # language. Students will learn the basic concept of object-oriented programming languages, properties, methods and variables of objects, consider the construction of reusable program modules, including related data and procedures. The practical part of the discipline is aimed at developing the skills of developing programs using the capabilities of the high-level object-oriented programming language C#.*
**Purpose of studying of the discipline**
*Learning the basics of system programming using the console application of the Visual programming environment.Studio.NET. The technology of system programming of the Windows operating system, since its very first version, is based on the use of dynamically connected libraries that define all the functions of the Win32 API.*
**Learning Outcomes**
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course*

*program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*
**Prerequisites**
*Python Programming*
**Postrequisites**
*Object Oriented Programming in Python Object-oriented programming in C++/C#*

# C++ Programming

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30588 (3013882) |
| Course | 3 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*The discipline forms the basic principles of programming in the high-level language C ++, gives knowledge of the methodology of the programming language. During the training, practical skills of writing, coding and optimizing the code of console programs are formed. The study of the discipline allows you to form theoretical knowledge and practical skills that allow you to develop algorithms for solving problems in the C ++ programming language and navigate in the field of writing program code.*
### Purpose of studying of the discipline
*Formation of systematized knowledge about programming methods and features of the C++ programming language as a basis for the development of universal competencies and the basis for the development of professional competencies.*
### Learning Outcomes
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*
### Prerequisites
*Python Programming*
### Postrequisites
*Object Oriented Programming in Python*

# Databases and Information Systems

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30602 (3013888) |
| Course | 3 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*This discipline allows you to form students` knowledge in the field of databases and information systems, introduces students to the basic concepts and principles of working in a DBMS. Students learn the main components of databases, learn to define the life cycle of database applications, gain practical skills in building and customizing a user interface to work with large amounts of information.*
### Purpose of studying of the discipline
*To study the basic concepts of algorithms in a database, types of data models, ways to sort data, teach how to create a database and control its execution, as well as algorithms for processing, protecting and analyzing data based on a database management system.*
### Learning Outcomes
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*
### Prerequisites
*Theoretical basics of informatics*

# Corporate information systems

| Discipline cycle | Profiling discipline |
|---|---|
| Discipline component | Electives |
| SubjectID | 30603 (3013890) |
| Course | 3 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

## Short description of discipline
*The discipline is aimed at the formation of practical competencies of students in the field of using various methods of designing corporate information systems. As part of the discipline, students will master the skills of working with various software tools for the design and implementation of information systems, get acquainted with the structural components of corporate governance and their characteristics. The discipline also covers the issues of corporate management based on the development of appropriate software (reference books, standards, information networks, etc.)*

## Purpose of studying of the discipline
*Familiarization with the models and methods of information security management of corporate information systems, the conceptual apparatus in the field of information security, the methodological foundations of integrated support, the analysis and management of information systems security, as well as the assessment of the effectiveness of measures to ensure information protection.*

## Learning Outcomes
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*

## Prerequisites
*Theoretical basics of informatics*

## Postrequisites
*Pedagogical practice*

# Modern database management system

| Discipline cycle | Profiling discipline |
|---|---|
| Discipline component | Electives |
| SubjectID | 30604 (3013889) |
| Course | 3 |
| Term | 2 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

## Short description of discipline
*In the course of studying the discipline, students acquire theoretical knowledge and practical skills in working with the components of database management systems (tables, queries, reports, forms) and get acquainted with their functional features. During the discipline, students also get acquainted with various types of databases, implement relational databases using modern tools, and learn to create links between records.*

## Purpose of studying of the discipline
*The purpose of teaching disciplines is the formation of students` necessary competencies for theoretical and practical training in the creation and use of data bases in management systems, design of logical structures of data bases, interfaces of data bases, interfaces, data, data.*

## Learning Outcomes
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*

## Prerequisites
*Theoretical basics of informatics*

## Postrequisites

*Pedagogical practice*

# Active teaching methods in math lessons

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30614 (3013911) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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
*ON5  To carry out intrasubject and intersubject connections in the educational process, to explain mathematical knowledge in various forms.*

### Prerequisites
*Theory and methodology of teaching mathematics Electronic educational resources*

### Postrequisites
*Professional  (pedagogical)*

# Educational robotics at school

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30615 (3013910) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*The discipline, built on the principle of practical implementation of projects, provides basic knowledge and skills in the field of robotics. During the course of studying the discipline, students will assemble, design, model and program robots to solve various tasks. During the study of the discipline, LEGO® MINDSTORMS® EV3 constructors will be used, which are an advanced training platform and provide an opportunity to gain practical experience.*

### 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
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*

### Prerequisites
*Information and communication technology*

### Postrequisites
*Professional  (pedagogical)*

# Object-oriented programming in C++/C#

| | |
|---|---|
| Discipline cycle | Profiling discipline |

| Discipline component | Electives |
|---|---|
| SubjectID | 30612 (3013905) |
| Course | 4 |
| Term | 1 |
| Credits count | 6 |
| Lections | 15hours |
| Practical and seminar classes | 45hours |
| Laboratory works | 0hours |
| Independent work of a student under the guidance of a teacher | 40hours |
| Independent work of the student | 80hours |
| Total | 180hours |
| Knowledge control form | Examination |

**Short description of discipline**

*As part of training in this discipline, students study one of the main programming paradigms - object-oriented programming in C++/C#. Software development is carried out in the Eclipse and Visual Studio programming environments using special libraries and plug-ins that expand the capabilities of the environment and speed up the development process. Students also learn teamwork using OOP and working with GitHub repositories.*

**Purpose of studying of the discipline**

*The study of methods and means of object‐oriented programming for the development of applications with a graphical interface in modern technologies of programming.*

**Learning Outcomes**

*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*

*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*

**Prerequisites**

*Python Programming C++ Programming*

**Postrequisites**

*Professional  (pedagogical)*

## Object-oriented programming in Java

| Discipline cycle | Profiling discipline |
|---|---|
| Discipline component | Electives |
| SubjectID | 30620 (3013906) |
| Course | 4 |
| Term | 1 |
| Credits count | 6 |
| Lections | 15hours |
| Practical and seminar classes | 45hours |
| Laboratory works | 0hours |
| Independent work of a student under the guidance of a teacher | 40hours |
| Independent work of the student | 80hours |
| Total | 180hours |
| Knowledge control form | Examination |

**Short description of discipline**

*During the study of the discipline, students will study the theoretical aspects of the object-oriented approach in one of the most popular programming languages Java, used for various fields. Students learn how to apply OOP methods by developing software for applied problems in solving mathematical calculations. Students also consider the development of software with a graphical interface, which can later be used to create games.*

**Purpose of studying of the discipline**

*The purpose of studying the discipline is to master the methodology and technology of using object-oriented programming based on the Java language for creating applications.*

**Learning Outcomes**

*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*

*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*

**Prerequisites**

*Python Programming Java  Programming*

**Postrequisites**

*Professional  (pedagogical)*

## Object Oriented Programming in Python

| Discipline cycle | Profiling discipline |
|---|---|
| Discipline component | Electives |

| | |
|---|---|
| SubjectID | 30621 (3013904) |
| Course | 4 |
| Term | 1 |
| Credits count | 6 |
| Lections | 15hours |
| Practical and seminar classes | 45hours |
| Laboratory works | 0hours |
| Independent work of a student under the guidance of a teacher | 40hours |
| Independent work of the student | 80hours |
| Total | 180hours |
| Knowledge control form | Examination |

## Short description of discipline

*As part of this course, students study the basic paradigms of object-oriented programming in Python, in which the main concepts are objects and classes. With this approach, students will be able to create their own data types (classes) and define their methods in them. In addition, many development environments for the Python programming language allow you to use embedded objects, which greatly simplifies the process of creating software.*

## Purpose of studying of the discipline

*The purpose of the discipline is to teach the object-oriented programming language Python, the use of libraries of standard modules and consideration of the principles of developing software systems.*

## Learning Outcomes

*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*

## Prerequisites

*Python Programming C++ Programming*

## Postrequisites

*Professional  (pedagogical)*

# Programming mobile applications in Java

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30623 (3013900) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

## Short description of discipline

*The discipline forms practical knowledge for self-creation of applications for various operating systems, a logical understanding of building programs with a graphical user interface is formed. During the course of studying the discipline, students will gain practical experience in developing various mobile applications for multithreaded, network devices with client-server architecture, with a graphical interface, as well as for working with a database.*

## Purpose of studying of the discipline

*Formation of a system of concepts, knowledge, skills and abilities in the field of modern programming, which includes methods of designing, analyzing and creating software products in the Java language based on the use of object-oriented methodology.*

## Learning Outcomes

*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*

## Prerequisites

*Fundamentals of Web Development*

## Postrequisites

*Professional  (pedagogical)*

# Programming of mobile devices

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30624 (3013901) |
| Course | 4 |

| | |
|---|---|
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*The discipline examines the issues of software development for mobile devices. Getting knowledge about mobile technologies, knowledge about programming features in operating systems. In the course of studying the discipline, methods of programming and installing programs for mobile devices are studied, skills of creating programs are acquired. Also, students will get acquainted with the prospects for the development of hardware and software for mobile devices.*

### Purpose of studying of the discipline
*Studying the basic device of popular mobile platforms and the capabilities that this platform provides for the development of mobile systems based on emulators, gaining practical skills in creating user interfaces, services, as well as using alarms, hardware sensors and standard information storages of popular mobile platforms.*

### Learning Outcomes
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*

### Prerequisites
*Fundamentals of Web Development*

### Postrequisites
*Professional  (pedagogical)*

## Mobile app development

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30622 (3013899) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*The discipline focuses on obtaining basic concepts and abilities in the field of creating and designing applications for smartphones. During the course of studying the discipline, students will get acquainted with the main mobile operating systems, as well as with various tools for creating software for mobile devices and learn how to work with them in practice. They will get the skills and abilities to create a mobile application in practice.*

### Purpose of studying of the discipline
*To form students` readiness to project and create applications for modern gadgets that are focused on the Android platform, as well as to introduce them to the main mobile operating systems and tools for creating software*

### Learning Outcomes
*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*
*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*

### Prerequisites
*Fundamentals of Web Development*

### Postrequisites
*Professional  (pedagogical)*

## Digital tools and services for educational content creation

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30613 (3013912) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |

| | |
|---|---|
| Laboratory works | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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

*ON6 Master and apply the basic methods of special sections of computer science, theory and methodology of the school course program of informatics.*

*ON7 Build logical arguments, hypotheses and rigorous proofs, develop software packages and database components using modern programming tools and technology.*

### Prerequisites

*Information and communication technology*

### Postrequisites

*Professional (pedagogical)*

## Module 6. Research

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

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30459 (3013838) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline

*Introduction to the theory of ordinary differential equations. General, particular, special solutions. The order of the equation. Integral curve. Entry conditions. Theorem of existence and uniqueness of a particular solution (Cauchy theorem). First order differential equations with separated, separating variables are homogeneous. Method of solution. Linear differential equation. Bernoulli equation.*

### 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

*ON8 Conduct and design experiments in the field of classical branches of mathematics and computer science.*

### Prerequisites

*Mathematical analysis 3 Mathematical analysis 1 Mathematical analysis 2*

### Postrequisites

*Basic and profile disciplines of the EP*

## Differential eguation

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30457 (3013837) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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
ON8 Conduct and design experiments in the field of classical branches of mathematics and computer science.

## Prerequisites
Mathematical analysis 3 Mathematical analysis 1 Mathematical analysis 2

## Postrequisites
Basic and profile disciplines of the EP

# Non-standardt asks of school geometry

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30571 (3013881) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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
ON8 Conduct and design experiments in the field of classical branches of mathematics and computer science.

## Prerequisites
Elementary mathematic

## Postrequisites
Basic and profile disciplines of the EP

# Theory of possibility and mathematical statistics

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | University component |
| SubjectID | 30578 (3013880) |
| Course | 3 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

## Short description of discipline
This subject introduces the student to the laws of random events., mass random phenomena. To build a probabilistic model of random phenomena, the basic probability theorems (addition and multiplication theorems, total probability, repetition of tests, etc.), the laws of large numbers are used. Having the school basics of mathematical statistics, the student expands his knowledge of the methods of correlation-regression and variance analysis. When testing hypotheses put forward, learn to apply various criteria of Pearson, Student.

## Purpose of studying of the discipline
To teach students the fundamental methods of studying probability theory and mathematical statistics and apply this theory to practical calculations.
The basic formulas of the application of probability theory and mathematical statistics in physics, mechanics; axiomatic approach to the definition of probabilities, the main theorems, the Bernoulli scheme, including the local and integral Laplace theorems, the concept of

*random variables, their numerical characteristics, the simplest random processes - Poisson.*
*Basic concepts of set theory, an axiomatic method of presenting probability theory. The main methods of proof and algorithms of probability theory, revealing connections. Modern mathematical modeling methods, the central limit theorem, its consequences and applications in probability theory and in related disciplines such as queuing theory.*
*To teach how to apply the basic methods of probability theory in solving problems in related fields of mathematics and theoretical physics. Be able to apply doc methods*

## Learning Outcomes
*ON8 Conduct and design experiments in the field of classical branches of mathematics and computer science.*
*ON9 Formulate and analyze emerging problems using statistical and applied mathematical methods.*

## Prerequisites
*School course*

## Postrequisites
*Professional  (pedagogical)*

# Academic writing and the basics of scientific research

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30607 (3013913) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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
*ON8 Conduct and design experiments in the field of classical branches of mathematics and computer science.*
*ON9 Formulate and analyze emerging problems using statistical and applied mathematical methods.*
*ON10 Draw conclusions from the materials studied and demonstrate the desire for professional self-improvement by showing leadership qualities.*

## Prerequisites
*Basic and profile disciplines of the EP*

## Postrequisites
*Pregraduation practice*

# The laws of probability and methods of statistical data processing

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30610 (3013895) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Practical and seminar classes | 45hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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 model, 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
*ON8 Conduct and design experiments in the field of classical branches of mathematics and computer science.*
*ON9 Formulate and analyze emerging problems using statistical and applied mathematical methods.*

# Management in education

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30605 (3023043) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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
*ON10 Draw conclusions from the materials studied and demonstrate the desire for professional self-improvement by showing leadership qualities.*

### Prerequisites
*Basic and profile disciplines of the EP*

### Postrequisites
*Pregraduation practice*

# Applied programs in mathematics

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30606 (3013914) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 30hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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
*ON8 Conduct and design experiments in the field of classical branches of mathematics and computer science.*
*ON9 Formulate and analyze emerging problems using statistical and applied mathematical methods.*

### Prerequisites
*Basic and profile disciplines of the EP*

### Postrequisites
*Pregraduation practice*

## Solving non-standard problems

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30609 (3013903) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Practical and seminar classes | 45hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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
*ON9 Formulate and analyze emerging problems using statistical and applied mathematical methods.*

### Prerequisites
*Elementary mathematic*

### Postrequisites
*Professional  (pedagogical)*

## Olympiad and competitiv problems solution

| | |
|---|---|
| Discipline cycle | Basic disciplines |
| Discipline component | Electives |
| SubjectID | 30608 (3013902) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Practical and seminar classes | 45hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| 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
*ON9 Formulate and analyze emerging problems using statistical and applied mathematical methods.*

### Prerequisites
*Elementary mathematic*

### Postrequisites
*Professional  (pedagogical)*

## Data protection

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30617 (3013907) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |

| Practical and seminar classes | 15hours |
| Laboratory works | 15hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*This discipline allows students to master the concept of information security and information security. Threats to information security and ways to implement them, as well as the possibility of applying the legislative and legal aspects of ensuring information security are being studied. They will be able not only to learn about cryptographic methods, methods and means of protecting information, but also to use organizational and technical means of protecting information.*

### Purpose of studying of the discipline
*The study of methods and means of information protection, mastering the work with technical, hardware and software information security, steganography, familiarization with the methods and techniques of hiding information, cryptographic models, encryption algorithms, symmetric and asymmetric cryptosystems, authentication and user identification algorithms, as well as familiarization with issues of information security in networks.*

### Learning Outcomes
*ON8 Conduct and design experiments in the field of classical branches of mathematics and computer science.*
*ON10 Draw conclusions from the materials studied and demonstrate the desire for professional self-improvement by showing leadership qualities.*

### Prerequisites
*Databases and Information Systems*

### Postrequisites
*Professional  (pedagogical)*

## Information security in computer networks

| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30619 (3013908) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |
| Practical and seminar classes | 15hours |
| Laboratory works | 15hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

### Short description of discipline
*The discipline introduces students to the theoretical and practical issues of building and applying information protection systems and ensuring information security in computer networks and systems. Students learn various security technologies, work with specialized software for data protection and message encryption, and also put into practice various methods of cryptographic protection of information to ensure its security when transmitting data over networks.*

### Purpose of studying of the discipline
*Consider the basic rules of information security, information security risk analysis, information security principles, master the practical methods of protecting information, master working with software for protecting against viruses, teach software protection against unauthorized access and research, consider cryptographic means of protecting information, familiarize with security issues information in networks.*

### Learning Outcomes
*ON8 Conduct and design experiments in the field of classical branches of mathematics and computer science.*
*ON10 Draw conclusions from the materials studied and demonstrate the desire for professional self-improvement by showing leadership qualities.*

### Prerequisites
*Databases and Information Systems*

### Postrequisites
*Professional  (pedagogical)*

## Cryptographic methods of information protection

| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30618 (3013909) |
| Course | 4 |
| Term | 1 |
| Credits count | 5 |
| Lections | 15hours |

| | |
|---|---|
| Practical and seminar classes | 15hours |
| Laboratory works | 15hours |
| Independent work of a student under the guidance of a teacher | 35hours |
| Independent work of the student | 70hours |
| Total | 150hours |
| Knowledge control form | Examination |

## Short description of discipline
*The discipline introduces students to the basic concepts in the field of cryptographic protection of information, the history of the development of cryptographic protection, its types and principles of construction. The practical component of the discipline is aimed at developing the skills of using techniques and methods of cryptographic data protection, conducting cryptanalysis, and implementing mathematical modeling of data protection in cryptography. The discipline also covers the issues of using specialized tools for backup and data encryption.*

## Purpose of studying of the discipline
*To study software for protecting information on computers and networks, to familiarize with software protection against unauthorized access, to protect information in open networks, to study the issues of ensuring information security when connected to the Internet, to familiarize with cryptographic information security tools, to consider the classification of cryptoalgorithms, to study the work with symmetric cryptoalgorithms, asymmetric cryptoalgorithms, as well as to teach electronic digital signature technologies.*

## Learning Outcomes
*ON8 Conduct and design experiments in the field of classical branches of mathematics and computer science.*
*ON10 Draw conclusions from the materials studied and demonstrate the desire for professional self-improvement by showing leadership qualities.*

## Prerequisites
*Databases and Information Systems*

## Postrequisites
*Professional  (pedagogical)*

# Pregraduation practice

| | |
|---|---|
| Discipline cycle | Profiling discipline |
| Discipline component | Electives |
| SubjectID | 30628 (3013916) |
| Course | 4 |
| Term | 2 |
| Credits count | 15 |
| Undergraduate practice | 450hours |
| Total | 450hours |
| 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
*Formation and consolidation of students` skills in performing scientific and methodological research work, completion of writing a thesis (project).*

## Learning Outcomes
*ON8 Conduct and design experiments in the field of classical branches of mathematics and computer science.*
*ON9 Formulate and analyze emerging problems using statistical and applied mathematical methods.*
*ON10 Draw conclusions from the materials studied and demonstrate the desire for professional self-improvement by showing leadership qualities.*

## Prerequisites
*Basic and profile disciplines of the EP*

## Postrequisites
*Final examination*

# Final examination

Writing and defending a thesis or preparing and passing a comprehensive exam.

# Graduate work

| | |
|---|---|
| Credits count | 8 |

# Final examination

| | |
|---|---|
| Credits count | 8 |

# 4. Summary table on the scope of the educational program

## «6B01502 - Mathematics-Informatics»

| Name of discipline | Cycle/ Compone nt | Term | Number of credits | Total hours | Lec | SPL | LC | IWST | IWS | Knowledge control form |
|---|---|---|---|---|---|---|---|---|---|---|
| Module 1. Fundamentals of social and humanitarian knowledge | | | | | | | | | | |
| Foreign language | GER/CC | 1 | 5 | 150 | | 45 | | 35 | 70 | Examination |
| Kazakh language | GER/CC | 1 | 5 | 150 | | 45 | | 35 | 70 | Examination |
| The module of socio-political knowledge (sociology, political science, cultural studies, psychology) | GER/CC | 1 | 8 | 240 | 30 | 45 | | 55 | 110 | Examination |
| Russian language | GER/CC | 1 | 5 | 150 | | 45 | | 35 | 70 | Examination |
| Physical Culture | GER/CC | 1 | 2 | 60 | | 60 | | | | Differentiated attestation |
| Kazakh language | GER/CC | 2 | 5 | 150 | | 45 | | 35 | 70 | Examination |
| Foreign language | GER/CC | 2 | 5 | 150 | | 45 | | 35 | 70 | Examination |
| Bases of economics, law and ecological knowledge | GER/US | 2 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Russian language | GER/CC | 2 | 5 | 150 | | 45 | | 35 | 70 | Examination |
| Physical Culture | GER/CC | 2 | 2 | 60 | | 60 | | | | Differentiated attestation |
| History of Kazakhstan | GER/CC | 3 | 5 | 150 | 30 | 15 | | 35 | 70 | Examination |
| Physical Culture | GER/CC | 3 | 2 | 60 | | 60 | | | | Differentiated attestation |
| Information and communication technology | GER/CC | 4 | 5 | 150 | 15 | 15 | 15 | 35 | 70 | Examination |
| Physical Culture | GER/CC | 4 | 2 | 60 | | 60 | | | | Differentiated attestation |
| World of Abai | BS/US | 4 | 3 | 90 | 15 | 15 | | 20 | 40 | Examination |
| Philosophy | GER/CC | 6 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Module 2. Psychological-pedagogical and methodological training of personnel | | | | | | | | | | |
| Age psychology and physiology | BS/US | 1 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Pedagogy | BS/US | 2 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Inclusive education | BS/US | 3 | 3 | 90 | 15 | 15 | | 20 | 40 | Examination |
| Technologies of the updated content of education and criteria assessment | BS/US | 3 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Pedagogical practice | BS/US | 4 | 3 | 90 | | | | | | Total mark on practice |
| Pedagogical practice (psychological and pedagogical) | BS/US | 4 | 2 | 60 | | | | | | Total mark on practice |
| Theory and methodology of teaching mathematics | BS/US | 4 | 5 | 150 | 30 | 15 | | 35 | 70 | Examination |
| Information and communication technologies in the specialized school | BS/CCh | 5 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Methods of using ICT in the educational process | BS/CCh | 5 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Teaching Techniques of Informatics | BS/CCh | 5 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |

| Subject | Code | Sem | Cr | Hours | | | | | | Form of control |
|---|---|---|---|---|---|---|---|---|---|---|
| Pedagogical practice | BS/US | 6 | 5 | 150 | | | | | | Total mark on practice |
| **Module 3. Foundational level of preparation** | | | | | | | | | | |
| Introduction to the profession of a teacher of mathematics and computer science | BS/US | 1 | 3 | 90 | 15 | 15 | | 20 | 40 | Examination |
| Mathematical analysis 1 | BS/US | 2 | 5 | 150 | 30 | 15 | | 35 | 70 | Examination |
| Training practice | BS/US | 2 | 2 | 60 | | | | | | Total mark on practice |
| Elementary mathematic | BS/US | 2 | 3 | 90 | 0 | 30 | | 20 | 40 | Examination |
| Algebra and number theory | BS/CCh | 3 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Analitic geometry | BS/US | 3 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Vector and Euclidean space | BS/CCh | 3 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Linear algebra | BS/CCh | 3 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Mathematical analysis 2 | BS/US | 3 | 5 | 150 | 30 | 15 | | 35 | 70 | Examination |
| Theoretical basics of informatics | BS/US | 4 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| **Module 4. Theoretical and methodological level of preparation** | | | | | | | | | | |
| Multiple integrals | BS/CCh | 4 | 5 | 150 | 30 | 15 | | 35 | 70 | Examination |
| Mathematical analysis 3 | BS/CCh | 4 | 5 | 150 | 30 | 15 | | 35 | 70 | Examination |
| Theory of functions of several variables | BS/CCh | 4 | 5 | 150 | 30 | 15 | | 35 | 70 | Examination |
| Multimedia Processing Technology | BS/CCh | 5 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Forms and methods of STEM learning | BS/CCh | 5 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Electronic educational resources | BS/CCh | 5 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Mathematical logic | AS/CCh | 5 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Mathematical logic and discrete mathematics | AS/CCh | 5 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Applied graph theory | AS/CCh | 5 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Practician of mathematical problems solution | AS/CCh | 6 | 5 | 150 | | 45 | | 35 | 70 | Examination |
| And practical for solving trigonomeyric problems | AS/CCh | 6 | 5 | 150 | | 45 | | 35 | 70 | Examination |
| Solving parametric equations and inequalities | AS/CCh | 6 | 5 | 150 | | 45 | | 35 | 70 | Examination |
| Geometric construction tasks | AS/CCh | 7 | 6 | 180 | 30 | 30 | | 40 | 80 | Examination |
| Methods of geometric problems solution | AS/CCh | 7 | 6 | 180 | 30 | 30 | | 40 | 80 | Examination |
| Problem-based approach in teaching geometry | AS/CCh | 7 | 6 | 180 | 30 | 30 | | 40 | 80 | Examination |
| Professional  (pedagogical) | AS/CCh | 8 | 15 | 450 | | | | | | Total mark on practice |
| **Module 5. Fundamentals of Computer science and Robotics** | | | | | | | | | | |
| Python Programming | BS/US | 5 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| Fundamentals of frontend development | BS/CCh | 6 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| Java  Programming | BS/CCh | 6 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fundamentals of Web Development | BS/CCh | 6 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| Basics of Internet Technologies | BS/CCh | 6 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| C# Programming | BS/CCh | 6 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| C++ Programming | BS/CCh | 6 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| Databases and Information Systems | AS/CCh | 6 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| Corporate information systems | AS/CCh | 6 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| Modern database management system | AS/CCh | 6 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| Active teaching methods in math lessons | AS/CCh | 7 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| Educational robotics at school | AS/CCh | 7 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| Object-oriented programming in C++/C# | AS/CCh | 7 | 6 | 180 | 15 | 45 | 0 | 40 | 80 | Examination |
| Object-oriented programming in Java | AS/CCh | 7 | 6 | 180 | 15 | 45 | 0 | 40 | 80 | Examination |
| Object Oriented Programming in Python | AS/CCh | 7 | 6 | 180 | 15 | 45 | 0 | 40 | 80 | Examination |
| Programming mobile applications in Java | AS/CCh | 7 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| Programming of mobile devices | AS/CCh | 7 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| Mobile app development | AS/CCh | 7 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| Digital tools and services for educational content creation | AS/CCh | 7 | 5 | 150 | 15 | | 30 | 35 | 70 | Examination |
| **Module 6. Research** | | | | | | | | | | |
| Differential and integral calculations in tasks of the physics and mathematics equations | BS/CCh | 5 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Differential eguation | BS/CCh | 5 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Non-standardt asks of school geometry | BS/CCh | 5 | 5 | 150 | 15 | 30 | | 35 | 70 | Examinaation |
| Theory of possibility and mathematical statistics | AS/US | 5 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Academic writing and the basics of scientific research | BS/CCh | 7 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| The laws of probability and methods of statistical data processing | BS/CCh | 7 | 5 | 150 | | 45 | | 35 | 70 | Examination |
| Management in education | BS/CCh | 7 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Applied programs in mathematics | BS/CCh | 7 | 5 | 150 | 15 | 30 | | 35 | 70 | Examination |
| Solving non-standard problems | BS/CCh | 7 | 5 | 150 | | 45 | | 35 | 70 | Examination |
| Olympiad and competitiv problems solution | BS/CCh | 7 | 5 | 150 | | 45 | | 35 | 70 | Examination |
| Data protection | AS/CCh | 7 | 5 | 150 | 15 | 15 | 15 | 35 | 70 | Examination |
| Information security in computer networks | AS/CCh | 7 | 5 | 150 | 15 | 15 | 15 | 35 | 70 | Examination |
| Cryptographic methods of information protection | AS/CCh | 7 | 5 | 150 | 15 | 15 | 15 | 35 | 70 | Examination |
| Pregraduation practice | AS/CCh | 8 | 15 | 450 | | | | | | Total mark on practice |
| **Final examination** | | | | | | | | | | |
| Graduate work | | 8 | 8 | 240 | | | | | | |

| Final examination | | 8 | 8 | 240 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|