



EDUCATIONAL PROGRAM

6B01501 «Informatics and digitalization of education»

Code and classification of the field of education: 6B01 – Педагогические науки

Code and classification of degree: 6B015 – Подготовка учителей по естественно-научным предметам

Group of educational programs: 011 – Подготовка учителей информатики

Level under International Standard Classification of Education (ISCED): 6

Level under National Qualifications Framework (NQF): 6

Level under Sectoral Qualifications Framework (SQF): 6

Education duration: 4 years

Credits volume: 240

Almaty, 2019

Table of contents

List of Abbreviations and Symbols	3
1. Educational Program Description	4
2. Educational Program Purpose and Objectives	6
3. Requirements for Evaluation of the Educational Program Study Results	7
4. Educational Program Passport	10
4.1 General information	10
4.2 Matrix of Correlation of the Educational Program Educational Outcomes with the Formed Competencies	13
4.3. Information on Modules/Courses (if modules are available, it is necessary to select them)	13
5. Curriculum of the educational program	22
6. Additional educational programs	26
7. Developer's Approval Sheet	27

List of Abbreviations and Symbols

BC	Basic Competence
BM	Basic Module
HE	Higher Education
SCES	State Compulsory Educational Standard
EQF	European Qualifications Framework
ETF	European Training Foundation
KSA	Knowledge, skills and abilities
NCC	National Classifier of Classes
NQF	National Qualifications Framework
NQS	National Qualifications System
AHM	All Humanities Module
GM	General Module
EP	Educational Program
GPM	General Professional Module
SQF	Sectoral Qualifications Framework
GEC	General Educational Competence
PS	Professional Standard
PGE	Postgraduate Education
PC	Professional Competence
PM	Professional Module
WG	Working Group
PK	the Republic of Kazakhstan
EO	Educational Outcome
SM	Special Module
QMS	Quality Management System
SEM	Social and Economic Module
T&PE	Technical and Professional Education
T&PPSE	Technical and Professional Education and Post-Secondary Education
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCO	Specialized Agency of United Nations Educational Scientific and Cultural Organization.
Cedefop	European Centre for the Development of Vocational Training
DACUM	English - Developing Curriculum
ECVET	European Credit System for vocational education and training
EQAVET	European Quality Assurance in Vocational Education and Training
ENQA	European Association for Quality Assurance in Higher Education
ESG	Standards and Guidelines for Quality Assurance in the European Higher Education Area
FIBAA	Internationally oriented agency (non-profit foundation) for quality assurance and quality development in higher education (Bonn, Germany)
IQM-HE	Internal Quality Management in Higher Education
TACIS	Technical Assistance for the Commonwealth of Independent States

1. Educational Program Description

The educational program 6B01501 - "Informatics and digitalization of education" is implemented in accordance with the requirements of state standards and regulations in the field of higher education of Kazakhstan.

During the formation of the educational program, the faculty and the Department use evidence-based approaches to planning, methodological support, learning technologies. This helps to preserve the continuity of state standards, standard programs, working curricula and teaching materials. The resulting academic integrity of normative and educational documents ensures effective management of the mechanism of implementation of educational programs.

Guided by the requirements of the standard plan, the content of the catalog of elective courses and the academic calendar, students determine the individual trajectory for each academic year. The logic of the individual plan determines the choice of elective courses, teachers, supervisor, the course and graduation papers. Methodological assistance to students in the formation of individual trajectories provide advisors. The trajectory of training of bachelors is based on the vertical principle of continuity of disciplines, educational programs of educational trajectories is built taking into account the distribution of semesters; division into mandatory and elective components; General education, basic, majoring in disciplines.

The curriculum pays adequate attention and time to the professional component, natural Sciences and mathematics, as well as the disciplines of the humanitarian and socio-economic unit.

In order to fully familiarize with the competencies obtained when choosing an educational program, advisors conduct presentations, consultations, meetings with students in the scientific and educational laboratories of the University. The head of the registration Office and heads of departments are responsible for the work of the advisors service.

One of the basic educational documents is the working curriculum, which is formed on the basis of individual plans of students and regulates the order of development of the educational program. Based on the principles of continuity, continuity and adaptability, the working curriculum contains a list of disciplines, the number of credits, the duration of semesters, types of classes and forms of control.

The study of any discipline, regardless of its academic status, ends with the exam (course work (project)) and the award of credits, the minimum amount of which for the entire period of study is 240 ECTS credits. Of these, 66 credits are allocated to the Humanities and socio-economic unit, and 25 credits to natural Sciences and mathematics.

The working curriculum consists of such blocks as "Natural Sciences and mathematics", "Special and General professional disciplines", including Engineering disciplines and engineering design, and "Humanitarian and socio-economic Sciences".

1.1 Block of natural Sciences and mathematics

– to possess basic knowledge of fundamental mathematical, natural-scientific and technical disciplines that contribute to the formation of a highly educated person with a broad Outlook and a culture of thinking, to have the ability to determine and understand the role of mathematics and computer science in the world, to Express well-founded mathematical judgments, to use mathematics and computer science for the needs inherent in the creative, interested and thinking citizen; understand the role of information processes in society, technical capabilities and prospects of using information technologies in various spheres of human activity;

1.2 Block of humanitarian and socio-economic disciplines

- providing conditions for mastering competent and developed speech, knowledge of native and foreign languages, knowledge in the field of communication technology, communication strategies, skills and constructive dialogue, communication in a multicultural, multi-ethnic and multi-confessional society;
- to have an idea about the ethical, spiritual and cultural values, of the basic laws and forms of regulation of social behavior, about the sociological approaches to personality, to know the traditions and culture of the peoples of Kazakhstan, to know the trend of the development of society, to be able to adequately navigate the various social situations, to think creatively, to be tolerant to the traditions and cultures of other peoples of the world, to have an active life position;
- have the basics of economic knowledge, be competent to have an understanding of the economy.

1.3 Block of general professional and special disciplines

ability to apply information and communication technologies (ICT) in professional activities, own Web, network and multimedia technologies for planning and organization of project activities of future teachers of Informatics, for organization of online forums and seminars, virtual learning environment; use ICT, interactive whiteboards and multimedia projectors for technical support of active learning; to possess skills of information processing of various types, including: to receive, extract and systematize digital, text, graphic and visual, hypermedia information and databases; to apply multimedia resources and media; to possess techniques of information search on the Internet and databases: to find, select and process data from digital and Internet sources; ability to use models and perform object modeling, to own methods of creating multimedia presentations; possess programming skills using modern tools, the development of algorithmic and operational thinking, logical, intellectual and creative abilities of students by means of information and communication technologies.

Sphere of professional activity

The sphere of professional activity of the bachelor on EP 6B01501 - "Informatics and organization of digitalization of education" are educational institutions (primary level of secondary school, teacher training colleges, institutes of advanced training and retraining of teachers, department of education).

Objects of professional activity

The objects of professional activity of graduates are: educational institutions of state and non-state funding, pre-school education organizations, schools, lyceums, gymnasiums, colleges, educational institutions of technical and vocational education; management organizations: public authorities, departments of education.

Types of professional activity

Types of professional activity of graduates are: social and pedagogical, educational, research, organizational and methodical, cultural and educational, industrial and technological, organizational and managerial.

2. Educational Program Purpose and Objectives

The purpose of the educational program is to prepare popular, competitive and highly qualified teachers who are fluent in English, modern teaching methods, technologies in the field of ICT, able to assess and analyze the current state of the industry, with all kinds of competencies for the labor market in education.

EP Purpose:

1. Providing conditions for mastering competent and developed speech, knowledge of native and foreign languages, knowledge in the field of communication technology, communication strategies, skills and constructive dialogue, communication in a multicultural, multi-ethnic and multi-religious society.
2. Possession of basic knowledge of fundamental mathematical, natural-scientific and technical disciplines that contribute to the formation of a highly educated person with a broad Outlook and culture of thinking, have the ability to determine and understand the role of mathematics and computer science in the world, to Express well-founded mathematical judgments, to use mathematics and computer science for the needs inherent in the creative, interested and thinking citizen; to understand the role of information processes in society, technical capabilities and prospects of using information technologies in various spheres of human activity.
3. Ability to apply information and communication technologies (ICT) in professional activities, own Web, network and multimedia technologies for planning and organization of project activities of future teachers of Informatics, for organization of online forums and seminars, virtual learning environment; use ICT, interactive whiteboards and multimedia projectors for technical support of active learning; to possess skills of information processing of various types, including: to receive, extract and systematize digital, text, graphic and visual, hypermedia information and databases; to apply multimedia resources and media; to possess techniques of information search on the Internet and databases: to find, select and process data from digital and Internet sources; ability to use models and perform object modeling, to own methods of creating multimedia presentations; possess programming skills using modern tools, the development of algorithmic and operational thinking, logical, intellectual and creative abilities of students by means of information and communication technologies.
4. Possession of the system of subject, psychological, pedagogical and methodical knowledge, skills and abilities of application of theoretical knowledge in professional activity taking into account concrete social and pedagogical conditions, possession of methods of the organization of innovative activity during teaching of Informatics, possession of knowledge in the field of the theory of pedagogical integration, pedagogical innovation, pedagogical technologies, ability to integrate knowledge from various subject areas at the decision of pedagogical tasks; knowledge of methods of planning and conducting criteria-based assessment in Informatics lessons; knowledge of skills of planning training sessions in inclusive education; providing students with basic knowledge, skills and abilities to work with modern information and communication technologies for their effective use in the conditions of the updated content of education, the implementation of trilingual education, which involves training not only three languages, but also the organization of extracurricular activities of students in three languages (Kazakh, Russian and English), the ability to organize pedagogical cooperation (teacher-student, teacher-teacher, parent), including in terms of specialized training, consolidation of theoretical knowledge in the period of training and pedagogical practices.
5. The idea of ethical, spiritual and cultural values, of the basic laws and forms of regulation of social behavior, about the sociological approaches to personality, to know the traditions and culture of the peoples of Kazakhstan, to know the trend of the development of society, to be able to adequately navigate the various social situations, to think creatively, to be tolerant to the traditions and cultures of other peoples of the world, to have an active life position.

6. Mastering the basics of economic knowledge, be competent to have an understanding of the economy.

3. Requirements for Evaluation of the Educational Program Study Results

The following forms of exams are used as an assessment of study results: computer-based testing, written exam (answers on paper), oral exam, project (passing a course project), practical (open questions on a computer, solving problems on a computer, including in ACM format), comprehensive exam (test/written/oral + others). In accordance with Table 1, the following ratio of exam forms is recommended:

Table 1

№	Exams Form	Recommended ratio, %
1	Computer-based testing	20%
2	Written exam	10%
3	Oral exam	5%
4	Project	30%
5	Practical exam	30%
6	Comprehensive exam	5%

In accordance with the regulations on the score-rating system of assessment of student performance, monitoring is carried out in the course of the current monitoring of progress, interim and final certification.

Current monitoring of progress is carried out in all organizational forms of training (types of training sessions): lecture, seminar, practical training, laboratory work, independent work, control work, consultation, training and industrial practice. Types of current control: operational and boundary.

Operational control of knowledge is carried out in order to objectively assess the quality of the development of the current program material in the academic discipline, the level of formation of General and professional competencies, as well as to stimulate the learning activities of students, monitoring the results of educational activities, preparation for intermediate certification. Forms of operational control are control work, testing, survey, implementation and protection of practical and laboratory work, the implementation of individual sections of the course project (course work), the implementation of abstracts (reports), verification of the performance of independent work, verification of written assignments, individual assignments; preparation of presentations, etc.

Midterm control is carried out with the aim of a comprehensive assessment of the level of development of the program material according to the academic calendar of the University.

Forms, content and evaluation of the current control are determined by the teacher and reflected in the syllabus of the discipline for the student.

The assessment of the current control of progress consists of assessments of the current control in the classroom and extracurricular activities and assessments of the boundary control. The current control is evaluated on a 100% scale.

Verification of educational achievements of students is carried out by types and forms of control.

Educational achievements of students in all types of control are evaluated by point-rating alphabetic system of evaluation of educational achievements of students.

According to the results of the intermediate evaluation of the office of the Registrar (or) is the academic ranking of students.

The order of the intermediate control of students ' progress.

Interim certification of students at the University is carried out in accordance with the academic calendar, work curriculum and training programs developed on the basis of SES and training programs.

The period of interim certification of students is called the examination session. Interim certification of students is carried out in the form of exams, protection of term papers (projects) and reports on professional practice with mandatory assessment.

The form of the exam for each discipline is determined in the working program of the discipline and approved by the Scientific and methodological Council of the University. According to the results of the interim certification of the RR is the academic rating of students.

According to the results of the exam on the discipline, displays the final grade on the discipline in percentage, which is determined by the formula:

$$I_{\text{итог}} \% = \frac{P_1 + P_2}{2} \times 0,6 + \Xi \times 0,4$$

где: P_1 - процентное содержание оценки первого рейтинга;

P_2 - процентное содержание оценки второго рейтинга;

Ξ - процентное содержание экзаменационной оценки.

Итоговая оценка в процентном содержании $I_{\text{итог}} \%$ переводится в итоговую оценку $I_{\text{итог}}$ в цифровом и буквенном эквивалентах по Таблице 1.

Table 1.

Based on alphabetic system	Digital equivalent points'	%-ное содержание	Based on traditional system
A	4,0	95-100	Perfect
A-	3,67	90-94	
B+	3,33	85-89	Good
B	3,0	80-84	Good
B-	2,67	75-79	
C+	2,33	70-74	
C	2,0	65-69	Satisfactory
C-	1,67	60-64	
D+	1,33	55-59	
D	1,0	50-54	
FX	0	25-49	Unsatisfactory with retake

F	0	0-24	Unsatisfactory
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A positive assessment of the interim certification serves as the basis for the offset of loans disbursed in the prescribed amount for the relevant academic discipline and is recorded in the transcript of the student.

If the student receives a final control (exam) grade "unsatisfactory F", the final grade of the discipline is not counted and credits for it are not counted.

To retake the exam with a rating of "unsatisfactory F" on a positive or increase the average score (GPA) student in the next academic period again attends all types of training sessions provided by the working curriculum in this discipline, is admitted and passes the final control. In this case, the student again undergoes the procedure of registration for the academic discipline.

The introduction of the "FX" assessment means that the student has the right to retake the discipline without re-learning the theoretical course.

The "FX" grade is set for students who have less than 20% absenteeism or who have received admission to the final control, but who have received the "unsatisfactory" grade.

In order to improve the GPA student chooses the discipline for re-study or retake on a fee basis. Retake of the discipline in the same academic period is not allowed.

Students take exams in strict accordance with the approved working and individual curriculum, working curricula of disciplines.

The student who disagrees with the result of the exam, submits an appeal no later than the next working day after the final control.

For the period of the examination session (interim certification) by the order of the head of the University created the appeal Commission from among the teachers, whose qualification corresponds to the profile of the appealed disciplines.

The decision of the appeal Commission is made out by the Protocol on the basis of which the examination sheet is made.

Based on the results of examination sessions (results of winter, spring and summer sessions) of the academic period, the Registrar's office calculates the transferable score as a weighted average assessment of the level of educational achievements of the student.

On the Subjects submitted to the state exam: "Algorithms of data structure", "Databases", "Architecture and design" or "Computer networks".

The final certification ends with the defense of the thesis project.

4. Educational Program Passport

4.1 General information

№	Name of the Field	Note
1	Code and classification of the field of education	6B06 – Information and Communication Technologies
2	Code and classification of degree	061 - Information and Communication Technologies
3	Group of educational programs	057 – Information Technologies
4	Educational program name	6B01501 - "Informatics and digitalization of education»
5	Brief description of the program	<p>The sphere of professional activity of graduates are the education and development of children and students in educational institutions, educational institutions and centers; the sphere of science, organizations, institutions and enterprises associated with the use of information and communication technologies.</p> <p>The subject of professional activity of graduates are: the educational process in the unity of its value-targets, content, methods, forms and results; research, innovation, information and analytical activities in the field of computer science, applied mathematics, pedagogy, psychology and teaching methods; technological process of design, implementation and maintenance of software, mathematics, information support; software for computer visualization of science and technology, animation of natural processes, abstract concepts in research and teaching; modern mathematical methods, methods of applied mathematics, computer science to solve problems of science, education, technology, Economics and management.</p> <p>The objects of professional activity of graduates are: educational institutions of state and non-state funding, pre-school education organizations, schools, lyceums, gymnasiums, colleges, educational institutions of technical and vocational education; science organizations: scientific, research centers in the field of computer science, applied mathematics, pedagogy, psychology and teaching methods; management organizations: public authorities, departments of education; organizations of various forms of ownership, using the methods of applied mathematics and computer technology in their work.</p>
6	EP Objective	The purpose of the educational program is to prepare popular, competitive and highly qualified teachers who are fluent in English, modern teaching methods, technologies in the field of ICT, able to assess and analyze the current state of the industry, with all

		kinds of competencies for the labor market in education.
7	Level under ISCED	6
8	Level under National Qualifications Framework (NQF):	6
9	Level under Sectoral Qualifications Framework (SQF):	6
10	<p>List of the educational program competencies:</p> <p>GC1: To know social and ethical values based on public opinion, traditions, customs, social norms and to be guided by them in professional activities; traditions and culture of the peoples of Kazakhstan; human and civil rights and freedoms; fundamentals of the legal system and legislation of Kazakhstan; social trends of the society; basics of physical culture and principles of a healthy lifestyle.</p> <p>GC2: To get an idea about ethical and spiritual values; o sociological approaches to the individual, as well as about the basic laws and forms of regulation of social behavior; the nature of power and political life, political relations and processes, the role of political systems in the life of society and various social groups; about the role of consciousness and self-awareness in the behavior, communication and activities of people, the formation and achievement of personality.</p> <p>GC3: To have an ethical and legal norms of behavior; a system of practical knowledge and skills ensuring the acquisition, development, improvement and activation of psychophysical abilities and qualities, the acquisition, preservation and strengthening of health, the ability to work in a team, correctly defend their point of view, propose new solutions.</p> <p>GC4: The ability to written and oral communication in the state language and the language of international communication; the ability to logically correct, reasoned and clearly build oral and written speech; readiness to use one of the foreign languages</p> <p>GC5: The ability to use modern information technologies, manage information using business applications; use network computer technologies, databases and application packages in their subject area</p> <p>BC1: The ability to actual usage of the state language, the language of international communication and a foreign language in professional activities.</p> <p>BC2: The ability to understand the basics of economic knowledge, scientific ideas about finance, economics.</p> <p>BC3: Ability to apply information and communication technologies (ICT) in professional activities, own Web, network and multimedia technologies for planning and organization of project activities of future teachers of Informatics, for organization of online forums and seminars, virtual learning environment; use ICT, interactive whiteboards and multimedia projectors for technical support of active learning;</p> <p>BC4: Possession of the system of subject, psychological, pedagogical and methodical knowledge, skills and abilities of application of theoretical knowledge in professional activity taking into account specific social and pedagogical conditions, possession of methods of the organization of innovative activity during teaching of Informatics, possession of knowledge in the field of the theory of pedagogical integration, pedagogical innovation, pedagogical technologies, ability to integrate knowledge from various subject areas at the decision of pedagogical tasks;</p> <p>BC5: The ability to use a variety of languages and programming technologies in their professional activities, the main types of algorithms, languages, systems and programming environment; the theory is the development of algorithms, methods and technologies of programming and software development.</p> <p>BC6: The ability to be competent in the choice of mathematical modeling methods for solving specific engineering problems, including the willingness to identify the natural scientific essence of the problems arising in the course of professional activity, as well as the ability to involve the appropriate physical and mathematical apparatus to solve it.</p>	

	<p>BC7: The ability to design architectures of the components of information systems, including the human-machine interface of hardware-software systems, to choose operating systems and methods for protection of information.</p> <p>BC8: The ability to develop information and software information systems based on modern methods and development tools.</p> <p>PC1: Ability to organize the educational process of Informatics lesson, using various forms of active learning;</p> <p>PC2: Ability to apply design and innovation activities in computer science education;</p> <p>PC3: The ability to effectively use ICT for the organization of various activities of students in the development of computer science;</p> <p>PC4: Ability to plan training sessions within the framework of inclusive education; providing students with basic knowledge, skills and abilities to work with modern information and communication technologies;</p> <p>PC5: The ability to apply the elements of probability theory and mathematical statistics underlying the models and methods of data science, to choose the right machine learning methods for solving practical problems.</p> <p>PC6: The ability to have the basics of economic knowledge, to be competent to have an idea in the field of management.</p>	
11	<p>Learning outcomes:</p> <p>LO1: To argue the choice of basic standards, principles and design patterns, methods, tools and programming languages, including the choice of methods and tools for building information security systems of modern ICT</p> <p>LO2: To apply mathematical models and methods of various processes</p> <p>LO3: To design database, software and information system architectures</p> <p>LO4: Own methods and techniques of conducting lessons in computer science; aspects of teaching computer science lessons at school; content and methodological aspects of the organization, planning and teaching of school computer science at different levels of education.</p> <p>LO5: To develop and/or use software, hardware, information, mathematical, functional support of information systems, including algorithms and methods of information security</p> <p>LO6: To demonstrate sociability, initiative and psychological preparedness for work, including when working in a team and making management and technical decisions</p> <p>LO7: Use ICT in everyday life, in education and further pedagogical professional activity</p> <p>LO8: Use network and cloud information resources to search and store information, use ICT to process computer graphics and multimedia.</p>	
12	Study mode	Full time
13	Language of study	English
14	Credits volume	240
15	Academic degree awarded	Bachelor of education in the educational program 6B01501 "Informatics and digitalization of education»
16	Developer(s) and authors:	<p>International Information Technologies University JSC, Information Systems Department:</p> <ul style="list-style-type: none"> - V.V. Serbin, Associate Professor, Ph.D. in Engineering Science - Шарипов Б.Ж., профессор, д.п.н., к.т.н. - Дуйсебекова К.С., ассоциированный профессор, к.ф.-м.н. - Аuezova A., сениор-лектор, магистр

4.2 Матрица соотнесения результатов обучения образовательной программы с формируемыми компетенциями

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8
BC1						V		
BC2						V		
BC3								V
BC4				V			V	
BC5					V			V
BC6		V			V			
BC7	V							
BC8	V		V	V	V			
PC1				V				
PC2							V	
PC3				V				
PC4				V			V	
PC5		V						
PC6						V		

4.3. Information on Modules/Courses (if modules are available, it is necessary to select them)

№	Course Name	Brief Course Description (30-50 words)	Credits Quantity	Formed Competencies (codes)	Prerequisites
Cycle of General Education Course Compulsory Component					
1.	Modern history of Kazakhstan	The course examines the modern history of Kazakhstan as part of the history of mankind, the history of Eurasia and Central Asia. The modern history of Kazakhstan is a period in which a holistic study of historical events, phenomena, facts, processes, the identification of historical patterns that took place on the territory of the Great Steppe in the XX century to the present day is performed.	5	GC1	no
2.	Philosophy	The object of the course is the philosophy as a special form of spiritual studies in its cultural and historical development and modern sound. The main directions and problems of world and national philosophy are studied. Philosophy is a special understanding the world form creating a system of knowledge of the general principles and foundations of human life, about the essential characteristics of the relationship of man to nature, society and spiritual life, in all its main direction.	5	GC1, GC2	Modern history of Kazakhstan
3.	Foreign language	The course includes an intensive English language program, focused on grammar and speaking skills. The course includes topics reflecting the latest advances in information technology, and the terminological dictionary makes them directly relevant to the needs of students.	10	GC4	no

4.	Kazakh (Russian) language	The course occupies a special place in the system of training Bachelors with an engineering education. For students of a technical college, studying professional Kazakh/Russian languages is not only improving skills acquired in school, but also a means of mastering a future specialty.	10	GC4	no
5.	Information and communication technologies	The Information and Communication Technologies course considers as modern methods and means of communication of people in ordinary and professional activities using information technologies for searching, collecting, storing, processing and distributing information.	5	GC5	no
6.	Political science	The course is devoted to general political knowledge for specialties in the field of ICT. It includes political identity, improvement of their political views and communicative competencies. Teaching political knowledge is communicative, interactive, student-oriented, result-oriented and largely dependent on the independent work of students.	2	GC2	no
7.	Sociology	The course includes knowledge of sociological subject areas, research methods and directions. The main sociological theories and the most effective ways to obtain in-depth knowledge of various aspects of our modern society will be discussed in detail during the course. The special importance of this course for students is to develop a sociological imagination, to understand the main concepts of sociology as a science.	2	GC1, GC2	no
8.	Psychology	This course presents psychology issues in a broad educational and social context. Knowledge, skills and abilities obtained and formed as a result of mastering the course content, give students the opportunity to put them into practice in various spheres of life: personal, family, professional, business, public ones, when working with people - representatives of different social groups and age categories. The course is also designed to form the bachelor's ideas about the factors complicating the teaching activities at the present stage of the society development, about the difficulties specific to this activity.	2	GC2, GC3	no
9.	Culturology	The course will become the basis for the study of the whole complex of social sciences and humanities, as well as an addition to the general courses in history and philosophy. The course includes topics such as morphology, semiotics, cultural anatomy; the culture of the nomads of Kazakhstan, the cultural heritage of the proto-Türks, the medieval culture of Central Asia, the formation of the Kazakh culture, the Kazakh culture in the context of globalization, the cultural policy of Kazakhstan, etc.	2	GC2	no
10	Physical Education	The course is dedicated to the formation of the physical culture of an individual and the ability to use the various means of physical culture to preserve and promote health.	8	GC1, GC3	no
Cycle of General Education Course University Component / Elective Component					
11	Economy and green technologies	The course is devoted to the study of the theoretical foundations of detailed ideas about the green economy and finance, the characteristics of the main segments of the green economy in order to develop practical skills in the use of the green economy principles for Kazakhstan.	5	BC2, BC3	Information and communication technologies

Cycle of basic academic courses University component					
12	Professional Kazakh (Russian) language	The course is dedicated to enhance and deepen the knowledge, skills and abilities of the scientific style of speech of the Kazakh / Russian languages, to form professional language competence.	3	BC1	Kazakh/Russian Language
13	Professionally-oriented foreign language	The course is dedicated to the analysis of professional topics: "Computers and Work", "Work in ICT", "Types of Computer Systems", "Computer Basics", "Operating Systems and Graphical Interface", "Text Processing", "Cyberspace: Security and Crime", etc.	3	BC1, GC4	English
14	Physiology of school development	Formation of knowledge and views on the development of society and the physiology of development of schoolchildren	3	BC4	Physical culture
15	Algebra and geometry	The course includes: matrix theory, systems of linear equations, vector theory, analytic geometry, limit and differentiation of one variable functions.	4	BC6	no
16	Mathematical analysis	The purpose of the course is to acquaint students with important branches of calculation and its applications in computer science. During the learning process, students should be familiar with and be able to apply mathematical methods and tools to solve various applied problems. Moreover, they will study the fundamental methods of research of infinitely small variables using analysis based on the theory of differential and integral calculations.	4	BC6, PC5	Algebra and geometry
17	Discrete mathematics	Discrete mathematics is a part of mathematics devoted to the study of discrete objects (here discrete means consisting of separate or unrelated elements). More generally, discrete mathematics is used whenever objects are counted, when relations between finite (or countable) sets are studied, and when processes involving a finite number of steps are analyzed. The main reason for the growing importance of discrete mathematics is that information is stored and processed by computers in a discrete way.	4	BC6	no
18	Theoretical foundations of computer science	To form competence in issues related to the theoretical foundations of information processing with the use of computer technology, to form an idea of the types and structures of data that will help students to identify, formalize and successfully solve practical problems of data processing arising in the course of their professional activity. The course provides basic information about the methods of developing effective algorithms	5	BC3	Information and communication technologies
19	Database	The purpose of the course– to present to students the theoretical foundations of data modeling, principles of design and maintenance of database systems (DBMS), data access control and data protection from destruction. To give practical skills of designing conceptual models, implementation of databases (DB) and interfaces of work with them, and also to develop practical skills of application of this knowledge.	5	BC3	Information and communication technologies
20	Programming 1	Learn how to build algorithms in accordance with the principles of structural programming. Learn the basics of programming for use in solving application problems.	5	BC5	No
21	Programming 2	Basic principles of object-oriented construction of software systems. Concepts of classes, objects, relations between them, and also multilevel OMG model. The object-oriented and generic programming C++ means the standard library STL, standard class	5	BC5	Programming 2

		library, basics of multithreaded and distributed programming.			
22	Programming 3	Develop programs using OOP designs, classes, objects, properties, methods, design events.	5	BC5	Programming 2
23	Pedagogy	The purpose of the discipline: to form students' understanding of pedagogy as a science, to form the ability to analyze and solve pedagogical problems and problems.	5	BC4	No
24	Practical Training	The Practical Training includes detailing the finishing blocks of the generalized scheme, select the necessary classes and methods, define sets of logically related data (data streams), introduce various additional means to ensure visibility and increase the service level of the designed program, develop a generalized algorithm scheme, develop and debug the program, realizing the designed model.	3	BC4	Programming 2
Cycle of basic academic courses Elective component					
25	Inclusive education	The purpose of the discipline is to acquaint students with the basic provisions of the theory of inclusive and integrated learning, conceptual apparatus, scientific and methodological provisions and to give an idea of integrated learning as an important socio-cultural phenomenon of General and special education.	5	BC4	Pedagogy
26	Basics of mechatronics and robotics	The purpose of the discipline is to get acquainted with the basic concepts of mechatronics and robotics, the development of the principles of design, construction and control of robotic systems, the formation of modern ideas and skills in the field of complex automatization of production processes for various purposes with the use of modern flexible automation tools – mechatronic devices and industrial robots.	5	BC5	Physics
27	Methods of teaching Informatics	The main purpose of the course is the methodological training of the future teacher of Informatics, who should be ready to carry out training and education of students taking into account the specifics of the taught subject; to promote socialization, the formation of a General culture of personality, conscious choice and subsequent development of professional educational programs; to use a variety of techniques, methods and means of training; to ensure the level of training of students that meets the requirements of the state educational standard.	5	BC4	Theoretical foundations of computer science
28	Fundamentals of artificial intelligence	The course provides basic information about artificial intelligence, expert systems, logical programming, pattern recognition theory, methods and means of data mining. This course is associated with the study of one of the sections of modern computer science and is designed to form ideas about the basic concepts of artificial intelligence and data mining	5	BC5	Programming 3
29	Computer networks	The course explores network communications from local area networks (LANs) to the global Internet. Standard problems and a number of solutions for each of them are considered with a special focus on the TCP / IP protocol suite. Besides, it will prepare students for real information security operations. Knowledge of the basics to work with networks will refresh students with attention to the problems faced by modern infrastructure.	5	BC3	Physics
30	Computer Systems Architecture	The course presents the basic principles of hardware concepts for computer hardware elements and methods to evaluate computer performance used in	4	BC3	Physics

		computer system design processes from the point of view of an assembler programmer, computer architect, and logic developer. The course contains details of the components necessary to understand the concept of machine computing.			
31	Information Security and Data Protection	The course focuses on the main topic of security introducing students to the main topics of security arising from the design, analysis and implementation of network and distributed systems. Auxiliary topics enable students to explore broader areas where they can apply their newly acquired skills.	5	BC7	Information and communication technologies
32	WEB-дизайн	The course continues web development using PHP, JavaScript and other web technologies when programming information web systems. The course introduces advanced web design methods. Topics include customer expectations, advanced markup language, multimedia technology, usability and accessibility, and web design evaluation methods.	5	BC8, BC3	Information and communication technologies
33	Legal aspects of intellectual property	The course is devoted to the formation of students' knowledge system, based on a consistent study of individual institutions, intellectual property rights, in the development of skills and practical skills in the application of intellectual property law in practice.	5	BC2, GC3	Information and communication technologies
34	Design and development of digital educational resources for schools	The course is devoted to the study of methodological and technological approaches to the design and development of interactive applications for the educational process and the acquisition of practical skills in the field of multimedia applications. The main objectives of the course are: the development of concepts and ideas about interactive applications and opportunities, their application in the educational process; the acquisition of practical skills in the structuring of educational material using hypertext technology, the creation of pedagogical and technological scenarios; development of practical skills in the preparation of text-graphic and multimedia applications; development of a systematic understanding of the principles of design and development of educational interactive applications.	5	BC5	Information and communication technologies; Programming; Computer graphics and web design.
35	Computer video editing and animation	The program is aimed at deepening and expanding students' knowledge on the topics of "Graphic editors", "Computer animation" and "video Editing" and provides for the study of various types of graphics, color models, formats of graphic files, laboratory work in various graphic editors. This course reveals to students the amazing possibilities of computer graphics.	5	BC3	Information and communication technologies
36	Theory and methods of educational work	The course is devoted to the formation of professional and pedagogical competence of future teachers in the knowledge of the basics of the process of education, technology of organization and implementation of educational activities	5	BC4	Pedagogy
Cycle of major academic courses University Component / Elective Component					
37	Pedagogical practice	Practice includes mastering of professional and pedagogical skills, skills and abilities of independent conducting of educational work; consolidation, deepening and enrichment of theoretical knowledge in the field of pedagogics, psychology and profiling subjects; further formation of professional skills,	12	BC4	Pedagogy

		development of professional qualities of the personality of the teacher;			
38	Externship	The practice includes the consolidation of theoretical knowledge in the academic disciplines of the specialty; mastering practical skills, technology of work in the specialty directly in the workplace using a PC, modern software and modern office equipment; evaluation of the achieved commercial results of the introduction of automation in the short and long term, in relation to these specific enterprises; collection of material for diploma projects.	6	BC5, BC8	Information and communication technologies
39	Educational smart technologies	The course includes the formation of students' necessary competence in the field of new information, communication and interactive technologies, in the formation of skills to create their own interactive programs for the visualization of educational material and improve the quality of teaching. The study of the features and main directions of the use of ICT as a means of teaching and learning management at the teacher level, as well as the practical development of methods of organization of educational activities of school students based on ICT. Interactive smart technologies in education.	5	PC1, PC2	Information and communication technologies
40	Olympiad programming	The course allows students to master the basics of information technology, to develop algorithmic thinking and analytical skills, to obtain basic knowledge and skills in the field of algorithmization and programming necessary for successful participation in programming competitions at various levels, promotes professional orientation of students.	5	BC5	Information and communication technologies
41	Mobile learning technologies and augmented reality	Курс предоставляет базовую информацию о виртуальной, дополненной и смешанной реальности, Основные понятия, актуальность и перспективы этих технологий; сформировать умение работать со специализированным программным обеспечением (инструменты дополненной реальности, 3D графические редакторы); научить основам съемки и редактирования 360 видео	5	BC5	Pedagogy
42	Management in education	The course is devoted to the formation of knowledge about the scientific foundations of management in education and management of the development of educational systems; to reveal the essence and characteristics of the main system-forming elements of educational management; to reveal the main problems of management in education;	5	PC6	Pedagogy
43	Innovative technologies in the organization of educational process at school	The course explores how students develop competencies in creating projects on programmable logic controllers; how students learn basic programming languages for programmable logic controllers; and how students master the skills of working with programmable logic controllers;	5	PC1	Pedagogy
44	Digital technologies in education	The course is devoted to research at the intersection of computer science and Humanities. Digital technologies in education involve the use of digitized materials and materials of digital origin and combine methodologies from traditional Humanities with computer science, providing computer tools and opening up new opportunities for data collection and	5	PC1	Information and communication technologies

		visualization, information retrieval, data mining, and statistical analysis.			
45	Fundamentals of scientific activity in the school course of Informatics	The aim of the course is to prepare the student to work as a teacher of Informatics in secondary school for research activities in the school course, providing in-depth study by students of the scientific and psychological and pedagogical foundations of the structure and content of the course of Informatics secondary schools, understanding the methodological ideas inherent in them, education of future teachers the ability to solve the problems of teaching Informatics for scientific activity of the student, the formation of skills of an independent learning process, methodical creativity. The program is intended to give theoretical and practical training to teachers in the field of teaching methods of computer science.	5	BC4, PC2	No
46	Digital resources in education	The course is devoted to the development of the formation of future teachers of special ICT competence in the design of digital educational resources, providing, in particular, the formation of: ICT competencies in the design of lessons using Digital resources in education; ICT competencies in the analysis and selection of ready-made digital educational resources, adequate learning objectives in mathematics, computer science and physics.	5	PC2	Innovative technologies in the organization of educational process at school
47	Pedagogical practice	Practice includes mastering of professional and pedagogical skills, skills and abilities of independent conducting of educational work; consolidation, deepening and enrichment of theoretical knowledge in the field of pedagogics, psychology and profiling subjects; further formation of professional skills, development of professional qualities of the personality of the teacher;	12	BC4	Pedagogy
48	Externship	The practice includes the consolidation of theoretical knowledge in the academic disciplines of the specialty; mastering practical skills, technology of work in the specialty directly in the workplace using a PC, modern software and modern office equipment; evaluation of the achieved commercial results of the introduction of automation in the short and long term, in relation to these specific enterprises; collection of material for diploma projects.	6	BC5, BC8	Innovative technologies in the organization of educational process at school

5. Curriculum of the educational program

№	Course code	Name of the Course (Russian)	Name of the Course (Kazakh)	Name of the Course (English)	Total credits	Semester	Form of control	Total volume of study load	including		
									Classroom	Lectures	Laboratory
1	2	3			4	5	6	7	8	9	10
1 GC	1 General Educational Courses (GC) - 56 credits										
1.1 GC	1.1 Compulsory component - 51 credits										
GC 1	SIK 1101	Современная история Казахстана	Қазақстанның қазіргі тарихы	Modern history of Kazakhstan	5	2	Test	150	60	30	
GC 2	FIL 2102	Философия	Философия	Philosophy	5	4	Test	150	60	30	
GC 3	IYa 1103	Иностранный язык	Шет тілі	Foreign language	10	1, 2	complex	300	120		
GC 4	K(R) Ya 1104	Казахский (русский) язык	Шет тілі	Foreign language	10	1, 2	complex	300	120		
GC 5	IKT 1105	Информационно-коммуникационные технологии (на английском языке)	Ақпараттық-коммуникациялық технологиялар (ағылшын тілінде)	Information and communication technology (in English)	5	1	Test	150	60	15	30
GC 6	Pol 1106	Политология	Саясаттану	Political science	2	3	written	60	30	15	
GC 7	Soz 1107	Социология	Әлеуметтану	Sociology	2	3	written	60	30	15	
GC 8	PI 2108	Психология	Психология	Psychology	2	3	written	60	30	15	
GC 9	Kul 2109	Культурология	Мәдениеттану	Culturology	2	3	written	60	30	15	
GC 10	Fiz 1110	Физическая культура	Дене шынықтыру	Physical Culture	8	1, 2, 3, 4	exam	240	0		
		Итого:			51			1530	540	135	30
	1.2 University component - 5 credits										
GC 11	EZT 4111	Экономика и зеленые технологии	Жасыл технологиялар және экономика	Green technology and economics	5	7	project	150	60	30	
		Итого:			5			150	60	30	0
2 BC	2 Basic Courses (BC) - 112 credits										
2.1 GC	2.1 University component - 56 credits										
BC 1	PK(R) Ya 2201	Профессиональный казахский (русский) язык	Кәсіби-бағытталған шет тілі	Professionally-oriented foreign language	3	5	complex	90	30		

BC 2	POIYa 2202	Профессионально-ориентированный иностранный язык	Кәсіби бағыттағы шет тілі	Professionally-oriented kazakh language	3	6	compl ex	90	30		
BC 3	FRS 1203	Физиология развития школьников	Мектеп оқушыларының даму физиологиясы	Physiology of schoolchildren	3	2	writte n	90	30	15	
BC 4	AG 1204	Алгебра и геометрия	Алгебра және геометрия	Algebra & Geometry	4	1	writte n	120	45	15	
BC 5	MA 2205	Математический анализ	Математикалық талдау	Mathematical Analysis	4	2	writte n	120	45	15	
BC 6	DM 1206	Дискретная математика	Дискреттік математика	Discrete Mathematics	4	1	writte n	120	45	15	
BC 7	TOI 2207	Теоретические основы информатики	Информатиканың теориялық негіздері	Theoretical foundations of computer science	5	3	practic e	150	60	15	30
BC 9	BD 2208	Базы данных	Деректер базасы	Databases	5	4	practic e	150	60	15	30
BC 10	PRO 1209	Программирование 1	Программалау 1	Programming 1	5	1	practic e	150	60	15	30
BC 11	PRO 1210	Программирование 2	Программалау 2	Programming 2	5	2	practic e	150	60	15	30
BC 12	PRO 2211	Программирование 3	Программалау 3	Programming 3	5	3	practic e	150	60	15	30
BC 13	PED 2212	Педагогика	Педагогика	Pedagogy	5	4	practic e	150	60	15	30
BC 8	UP 1213	Учебная практика	Оқу практикасы	Teaching practice	3	2	practic e	90	30		
		Total:			54			1620	615	150	180
БД		2.2 Elective Component - 56 credits									
BC 14	IO 3214	Инклюзивное образование	Инклюзивті білім беру	Inclusive Education	5	5	practic e	150	60	15	30
BC 15	OMR 3215	Основы мехатроники и робототехники	Мехатроника және робототехника негіздері	Fundamentals of Mechatronics and Robotics	5	5	practic e	150	60	15	30
BC 16	MPI 3216	Методика преподавание информатики	Информатика пәнін оқытудың әдістемесі	Teaching Techniques of Informatics	5	6	practic e	150	60	15	30
BC 17	OPI 4217	Основы искусственного интеллекта	Жасанды зияткерлік негіздері	Basics of Artificial Intelligence	5	7					
BC 18	KSC 3218	Компьютерные сети	Компьютерлік желілер	Computer Networks	5	5	test + practic e	150	60	15	30
BC 19	ACS 3219	Архитектура компьютерных систем	Компьютерлік жүйелер сәулеті	Computer Systems Architecture	5	6	test	150	60	15	30
BC 20	IBZI 2220	Информационная безопасность и защита информации	Ақпараттық қауіпсіздік және ақпаратты қорғау	Information Security & Data Protection	5	4	test + practic e	150	60	15	30
BC 21	WB 2221	WEB-дизайн	WEB-дизайн	WEB design	5	4	projec t	150	75	15	30
BC 22	PAI 2222	Правовые аспекты интеллектуальной собственности	Зияткерлік меншіктің құқықтық негіздері	Legal Aspects of Intellectual Property	5	4	test	150	60	15	30
BC 24	PRC 3224	Проектирование и разработка цифровых	Мектепке арналған сандық білім беру ресурстарын	Design and development of digital educational	5	6	practic e	150	60	15	30

		образовательных ресурсов для школы	жобалау және құру	resources for the school							
BC 25	KVA 4225	Компьютерный видеомонтаж и анимация	Компьютерлік бейнемонтаж және анимация	Computer video editing and animation	5	7	project	150	30	15	15
BC 26	TMV 2226	Теория и методика воспитательной работы	Тәрбие беру жұмысының теориясы мен әдістемесі	Theory and methods of educational work	5	3	practice	150	60	15	30
		Total:			60			3960	1530	375	615
3 MC		3. Major Courses (MC) - 60 credits									
3.1 GC		3.1 University component - 18 credits									
MC 1	PP 2301	Педагогическая практика	Педагогикалық практика	Pedagogical practice	12	5, 7	Report	360	0		
MC 2	PP 4302	Преддипломная практика	Диплом алдындағы практика	Undergraduate practice	6	8	Report	180	0		
		Total:			18			540	0	0	0
3.2 ECBC		3.2 Elective Component - 42 credits									
MC 1	OST 1303	Образовательные smart-технологии	Білім берудің smart-технологиялары	Educational Smart Technologies	5	2	project	150	60	15	30
MC 2	OP 2304	Олимпиадное программирование	Олимпиадалық программалау	Olympiad programming	5	3	ACM	150	60	15	30
MC 3	TMO 3305	Технологии мобильного обучения и дополненная реальность	Мобильді білім беру технологиялары және толықтырылған шындық	Mobile learning technologies and augmented reality	5	5	project	150	60	15	30
MC 4	MO 3306	Менеджмент в образовании	Білім берудегі менеджмент	Management in Education	5	5	project	150	60	15	30
MC 5	ITO 3307	Инновационные технологии в организации учебного процесса в школе	Мектеп оқу үрдісін ұйымдастырудың инновациялық технологиялары	Innovative technologies in the organization of the educational process at school	5	6	project	150	60	15	30
MC 6	ZTO 3308	Цифровые технологии в образовании	Білім берудегі сандық технологиялар	Digital technologies in education	5	6	project	150	60	15	30
MC 7	OND 4309	Основы научной деятельности в школьном курсе информатики	Мектеп курсындағы информатика пәнінің ғылыми негіздері	Fundamentals of scientific activity in the computer science school course	5	7	project	150	45	15	30
MC 8	ZRO 4310	Цифровые ресурсы в образовании	Білім берудегі сандық ресурстар	Digital resources in education	5	7	project	150	60	15	30
		Total:			40			1200	465	120	240
		Number of exams									
		Total theoretical training						9000	3210	810	1065
		Sum of credits:			228						
		5. Final examination									

		Написание и защита дипломной работы (проекта) и сдача комплексного экзамена	Дипломдық жұмыстың (жобаның) жазылуы және қорғау, Мамандық бойынша мемлекеттік емтихан	State examination writing and defense of thesis	12	8		360			
		TOTAL			240						

6. Дополнительные образовательные программы

The name of additional educational programs (Minor) with courses	Total amount of credits	Recommended semesters of study	Documents under the results of the development of additional educational programs (Minor)
Network associate	20	4, 5, 6, 7	Certificate from Cisco Networking Academy
Advanced programming in .NET	10	5, 6, 7,	
Advanced programming in Java EE	10	5, 6, 7,	
Machine learning	15	5, 6, 7,	
Applied robotics	15	5, 6, 7,	
BigData	15	5, 6, 7,	
Oracle	15	5, 6, 7,	
SAP	15	5, 6, 7,	SAP Certificate
Multimedia	15	5, 6, 7,	
Mobile	15	5, 6, 7,	
ACM ICPC	15	5, 6, 7,	
Engineering Mathematics	19	4, 5, 5, 5	
Actuarial Mathematics	15	5, 6, 7	
Business process optimization	15	6, 7	
3D modeling	7	6, 7	
App Development	9	5, 6	
Internet of things	13	3, 4, 7	
Public Relations	15	5,6,	
International journalism	15	4,5,6	
Graphic design	12	3,5	

7. Developer's Approval Sheet

Educational program name: 6B01501 «Информатика и организация цифровизации образования»

№ п/п	Position, degree level or academic degree and Full name of the educational program developer	Date	Signature	Note
1	Head of the Department of Information Systems, Associate Professor, Ph.D. in Engineering Science Vasiliy Valeriyevich Serbin	21.05.201 9		
2	Профессор кафедры «Информационные системы», д.п.н., к.т.н. Шарипов Бахыт Жапарович	21.05.201 9		
3	Сениор-лектор, магистр Аuezова А.	21.05.201 9		