MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
M.AUEZOV SOUTH KAZAKHSTAN UNIVERSITY

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UNIVERSITY
1943

EDUCATIONAL PROGRAM

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«AP... of the Board-Rector
D.Zh.Ahmed-Zaki
...025

EDUCATION PROGRAMME

6B01530 – Computer science

Registration Number	6B01500259
Code and Classification of Education	6B01-Pedagogical Science
Code and Classification of Areas of Training	6B015 - Teacher training in natural science subjects
Group of educational programs (EP)	B011- Training of IT teachers
Type of EP	acting
ISCE level	6
NQF level	6
IQF level	6
Language learning	Kazakh, Russian
The complexity of EP	240 credits
Distinctive features of EP	-
Partner University (JEP) -	-
University partner (DDEP) -	-

Shymkent, 2025

Drafters:

Name	Position	Sign
Lesbayev A.U.	Senior teacher, Department of Computer Science	
Nysanov E.A.	Professor of the Department of Computer Science	
Zhaidakbayeva L.K.	Head of Department of Computer Science	
Qalys U.	Student of the group EP-23-5k	
Bulegenova G.R.	Deputy Director for Academic Affairs of School-Lyceum No. 15 named after D.I. Mendeleev	
Abdrimova Z.M.	Senior teacher Department of "Medical Biophysics and Information Technologies" SK	
Utegenov M.K.	Director of the Higher College of New Technologies named M. Utebaev	
Arynbekova A.S.	Director of the South Kazakhstan College of Humanities and Economics	
Khudaibergenov Y.Zh.	Director of the Physics and Mathematics School-Lyceum "Intellect"	

The EP was considered at a meeting of the Academic Quality Commission of Natural Sciences and Pedagogy the Higher School, Minutes # 6 «17» 03 2025 y.

Chairman of the Committee _____ Tursynbaev A.Z.

The EP was considered and recommended for approval at Educational-methodical meeting of M. Auezov SKU
Minutes № 4 «18» 03 2025y.

Chairman of the EMM _____ E.Imangaliyev

The EP was approved by the decision of the Academic Council of the University
Minutes №10 «27» 03 2025 y.

CONTENT

1. CONCEPT OF THE PROGRAM

The mission of the University	We are focuced on generating new competencies, training a leader who translates research thinking and culture.
University Values	•Openness–open to change, innovation and cooperation. • Creativity – generates ideas, develops them and turns them into values. • Academic freedom – free to choose, develop and act. • Partnership – creates trust and support in a relationship where everyone wins. • Social responsibility – ready to fulfill obligations, make decisions and be responsible for their results.
Graduate Model	• Deep subject knowledge, their application and continuous expansion in professional activity. • Information and digital literacy and mobility in rapidly changing conditions. • Research skills, creativity and emotional intelligence. • Entrepreneurship, independence and responsibility for their activities and well-being. • Global and national citizenship, tolerance to cultures and languages.
The uniqueness of the educational program	The educational program combines a strong foundational training in information technologies with the development of advanced pedagogical competencies, which ensures its interdisciplinary uniqueness. The program is aimed at preparing specialists who are capable of working effectively in the educational environment while also mastering modern digital tools that are in high demand in the IT industry. *Key features defining the uniqueness of the program:* *Integration of IT competencies and pedagogy.* Students acquire not only skills in programming, algorithms, databases, digital literacy, and data analysis methods, but also modern teaching technologies, methodologies for teaching computer science, and digital tools for educators. *Practice-oriented learning.* The educational process is based on project-based activities, including the development of digital educational resources, interactive learning materials, educational applications, online courses, and VR/AR modules for the learning process. *Use of modern educational technologies.* The program includes EdTech-related courses such as intelligent tutoring systems, adaptive learning platforms, gamification of learning, and the use of neural networks and big data in education. *Development of universal digital competence for future educators.* Graduates are able to design and implement digital educational solutions, manage educational projects, and apply assessment tools and digital analytics within the educational process.
Academic Integrity and Ethics Policy	The university has taken measures to maintain academic integrity and academic freedom, protection from any type of intolerance and discrimination: • Rules of academic integrity (order No. 212 of October 10, 2022); • Anti-corruption standard (order No. 221 n/a dated 12/07/2021). • Code of Ethics (Order No. 212 of October 10, 2022)
Regulatory and legal	1.Law of the Republic of Kazakhstan “On Education”;

framework for the development of EP	2. Model rules for the activities of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595 with amendments and additions dated December 29, 2021. No. 614 3. Standard rules for admission to training in educational organizations implementing educational programs of higher and postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 600 with amendments and additions dated 06/02/2023. No. 252 4. State mandatory standards for higher and postgraduate education, approved by order of the Ministry of Education and Science of July 20, 2022 No. 2; 5. Rules for organizing the educational process in credit technology of education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152; with changes and additions from 09/23/2022. No. 79 6. Qualification reference book for positions of managers, specialists and other employees, approved by order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated December 30, 2020 No. 553. 7. Methodological recommendations for introducing ECTS principles into the educational process and expanding academic freedom. Appendix to the order of the Minister of Science and Higher Education. of the Republic of Kazakhstan dated February 12, 2024 No. 57 8. Guidelines for the development of educational programs for higher and postgraduate education, Appendix 1 to the order of the Director of the National Center for the Development of Higher Education of the Ministry of Education and Science of the Republic of Kazakhstan dated May 4, 2023 No. 601 n/k
Organization of the educational process	• Implementation of the principles of the Bologna Process • Student-centered learning • Availability • Inclusivity
Quality assurance of the Educational program	• Internal quality assurance system • Involvement of stakeholders in the development of the EP and its evaluation • Systematic monitoring • Updating the content (updating)
Requirements for applicants	They are established in accordance with the Standard Rules for admission to training in educational organizations implementing educational programs of higher and postgraduate education by order of the Ministry of Education and Science of the Republic of Kazakhstan No. 600 dated October 31, 2018, with changes and additions dated June 2, 2023. No. 252
Conditions for the implementation of educational programs (EP) for persons with disabilities and special	For students with SEN (special educational needs) and persons with disabilities (PSI), tactile PVC tiles, specially equipped toilets, a mnemonic diagram, and shower bars have been installed in educational buildings and student dormitories. Special parking spaces have been created. Crawler lift installed. There are desks for people with limited

educational needs(SSN)	mobility (PLM), signs indicating the direction of movement, ramps. In the educational buildings (main building, building No. 8) there are 2 rooms with six working places adapted for users with disorders of the musculoskeletal system (DMS).For visually impaired users, the SARA™ CE Machine (2 pcs.) is available for scanning and reading books. The library website is adapted for the visually impaired. There is a special NVDA audio program with a service. The JIC website http://lib.ukgu.kz/ is open 24/7. An individual differentiated approach is provided for all types of classes and in the organization of the educational process.

2. PASSPORT of the EDUCATIONAL PROGRAMM	
Purpose of the EP	Preparation of the popular teacher in computer science in the framework of the updated educational content.
Tasks of the EP	**-** the formation of socially responsible behavior in society, an understanding of the significance of professional ethical norms and adherence to these norms; - providing basic undergraduate training that allows you to continue learning throughout life, to successfully adapt to changing conditions throughout their professional careers; - ensuring the conditions for acquiring a high general intellectual level of development, mastering literate and developed speech, a culture of thinking and the skills of scientific organization of labor in the field of education using computers and information and communication technologies; - creation of conditions for intellectual, physical, spiritual, aesthetic development to ensure the possibility of their employment in the specialty or continuing education at subsequent levels of education; - Establishing conditions for the development of in-demand knowledge and skills, as well as a conscious attitude towards enhancing the welfare of society and conserving the planet within the framework of the SDGs.
Harmonization of EP	• 6th level of the National Qualifications Framework of the Republic of Kazakhstan; • Dublin descriptors of the 6th level of qualification; • 1 cycle of a Framework for Qualification of the European Higher Education Area); • 6th Level of European Qualification Framework for Life long Learning).
Connection of EP with the professional sphere	Professional Standards: - *"Teacher"* approved by the Ministry of Education of the Republic of Kazakhstan on December 15, 2022, No. 500. - *"Professional Standard for Teachers of Educational Organizations"* approved by the Ministry of Education of the Republic of Kazakhstan on February 24, 2025, No. 31. Sectoral Qualifications Framework for the Education Sector, approved by Protocol No. 2 of the meeting of the Sectoral Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations under the Ministry of Education and Science of the Republic of Kazakhstan.
Name of the degree awarded	After successful completion of this educational program, the graduate is awarded the degree: "Bachelor of Education in the educational program 6B01530 – Informatics"
List of qualifications and positions	Bachelors in the OP "6B01530 - Computer Science" can hold primary positions of a trainee teacher in mathematics and computer science in the centers of pedagogical excellence, departments of education using computers and information and communication technologies, interactive technologies without presenting work

	experience requirements in accordance with qualification requirements. Qualification directory of positions of managers, specialists and other employees approved by the Order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated May 21, 2012 No. 201-o-M.
Field of professional activity	The spheres of professional activity include the field of education, as well as the education and development of children and students in general education organizations, educational institutions and centers; educational organizations, including those with multilingual instruction: schools, lyceums, and gymnasiums.
Objects of professional activity	educational institutions of state and non-state funding; schools, lyceums, gymnasiums; organizations of science: scientific, research centers in the field of mathematics, applied mathematics, pedagogy, psychology and teaching methods; management organizations: state governing bodies, departments of education; organizations of various forms of ownership using methods of mathematics and computer science, applied mathematics and computer science.
Subjects of professional activity	The educational process in the unity of its value-oriented targets, content, methods, forms and results;
Types of professional activity	- educational; - organizational and methodical; - experimental research; - organizational and managerial; - social and pedagogical; - educational.
Learning outcomes	**LO1** - Free to communicate in a professional environment and society in Kazakh, Russian and English, taking into account the principles of academic writing and the culture of academic honesty. **LO2** - Demonstrate socio-cultural, professional development based on the formation of ideological, civic, spiritual and social responsibility, methods of scientific and experimental research. **LO3** - Possess information, computing and financial literacy, the ability to generalize, analyze and perceive information, set a goal and choose ways to achieve it. **LO4** - Collect and analyze scientific and pedagogical information taking into account current development trends and achievements of science, information technology in professional activities. **LO5** - Realize the educational process, taking into account the characteristics and needs of students, determining appropriate teaching methods and assessment tools. **LO6** - Apply algebraic and geometric methods of analysis and optimization to solve applied problems, using computer technologies for data processing. **LO7** - Use modern statistical and mathematical methods for computer modeling, using the MATLAB mathematical package to solve problems in applied mathematics. **LO8** - Use efficient software and computer networks to manage digital resources in a modern multi-user operating system, administering the operating system and software of data networks and underlying network protocols. **LO9** - Create neurons in an artificial intelligence system, having skills in robotics design, assessing the accuracy of the results obtained and testing programs. **LO10** - Create high-level programming projects using the methodological foundations of program development and the capabilities of modern information technologies and development trends. **LO11** - Design a database management system using relational database methods and technologies in various information systems.

	LO12 - Create graphic models, choosing methods and tools of computer graphics and geometric modeling when creating the design of electronic textbooks and pedagogical software tools. **LO13 -** Conduct the educational process using modern methods and technologies of teaching computer science, develop interactive courses and digital educational resources for educational institutions. Foster entrepreneurial skills in students, create innovative software products and services, as well as develop and implement business strategies in the field of information technology.

2. COMPETENCIES OF AN EP GRADUATE

SOFT SKILLS. Behavioral skills and personality qualities	
SS 1. Competence in managing one's own literacy	SS1.1. The ability of self-learn, self-develop and constantly update their knowledge within the chosen trajectory and in an interdisciplinary environment. SS1.2. The ability to express thoughts, feelings, facts and opinions in the professional field. SS1.3. The ability for mobility in the modern world and critical thinking.
SS 2. Language competence	SS2.1. The ability to build communication programs in the state, Russian and foreign languages. SS2.2. The ability for interpersonal social and professional communication in the conditions of intercultural communication.
SS 3. Mathematical Competence and Competence in the field of Science	SS3.1. The ability and willingness to apply the educational potential, experience and personal qualities acquired during the study of mathematical, natural science, technical disciplines at the university to solve professional problems.
SS 4. Digital competence, technological literacy	SS4.1. The ability to demonstrate and develop information literacy through the mastery and use of modern information and communication technologies in all areas of their lives and professional activities. SS4.2. The ability to use various types of information and communication technologies: Internet resources, cloud and mobile services for searching, storing, protecting and disseminating information.
SS 5. Personal, social and academic competencies	SS5.1. The ability for physical self-improvement and focus on a healthy lifestyle to ensure full-fledged social and professional activities through the methods and means of physical culture. SS5.2. Knowledge of the Rules of pedagogical ethics. SS5.3 The ability to build a personal educational trajectory throughout life for self-development, career growth and professional success. SS5.4. The ability to successfully interact in a variety of socio-cultural contexts during study, work, home and leisure.
SS 6. Entrepreneurial competence	SS6.1. The ability to be creative and entrepreneurial in a variety of environments. SS6.2. The ability to work in a mode of uncertainty and rapidly changing task conditions, make decisions, allocate resources and manage your time. SS6.3. The ability to work with consumer requests.
SS 7. Cultural awareness and ability to express yourself	SS7.1. The ability to show worldview, civil and moral positions. SS7.2. The ability to be tolerant of the traditions and culture of other peoples of the world, to have high spiritual qualities.
PROFESSIONAL COMPETENCIES (HARDSKILLS).	
Theoretical knowledge and practical skills specific to this field	PC-1.The ability to master knowledge in the field of pedagogy, psychology, pedagogical innovation, pedagogical technologies, to be able to innovate, strive for excellence in pedagogical skills, show initiative and diligence; the ability to master knowledge in the field of psychological and pedagogical sciences, to analyze the significance of human development and the physiology of the development of schoolchildren; their application in psychological and pedagogical sciences.pedagogical practice.
	PC-2. Knowledge of the basics of mathematical analysis and modeling

	methods, theoretical and experimental research; readiness to use the main directions of school mathematical education with updated content; scientifically substantiate the mathematical concepts of the course that are studied at school. To use basic knowledge of computer science in research, to apply modern information technologies in their teaching activities: the construction of computer training programs, their use in professional activities.
	PC-3. Apply basic knowledge of computer science and optimization methods in research activities, and use modern information and telecommunication technologies in pedagogical practice: develop computer-based educational programs and apply them in professional activities; possess fundamental knowledge of artificial intelligence and digital educational platforms such as kundelik.kz, bilimland.kz, and e-learning.
	PC-4. The ability to demonstrate professional values (commitment to the profession of a teacher, citizenship, compliance with professional ethics, responsibility, proactivity). Performs his professional activity on the basis of respect and responsibility, honesty and fairness.
	PC-5.Be able to apply knowledge about the development of intelligent robots
	PC-6. Skills in organizing pedagogical cooperation (teacher-student, teacher-teacher, teacher-parent); Ability to quickly and correctly make decisions in non-standard situations;

3.1 Matrix for correlating learning outcomes in the EP as a whole with the competencies being developed

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12	LO13
SS 1	+	+	+										
SS 2	+												
SS 3					+	+	+			+			+
SS 4				+	+	+	+			+		+	+
SS 5									+			+	
SS 6								+			+	+	+
SS 7											+		
PC 1			+	+	+	+	+	+	+	+			
PC 2			+	+	+	+	+	+	+	+			
PC 3			+	+	+	+	+	+	+	+		+	+
PC 4			+	+	+	+	+	+	+	+			
PC 5					+	+			+				
PC 6							+						

4. MATRIX OF THE INFLUENCE OF MODULES AND DISCIPLINES ON THE FORMATION OF LEARNING OUTCOMES AND INFORMATION ON LABOR INTENSITY

Module name	CYCLE		Component Name	Brief course description (30-50 words)	Number of credits	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12	LO13
Fundumentals of the Public Sciences	GED	OC	History of Kazakhstan/	**The purpose** of the discipline is formation of an objective idea of the history of Kazakhstan based on a deep understanding and scientific analysis of the main stages, patterns and originality of the historical development of Kazakhstan. **Contents:** Ancient people and the formation of nomadic civilization. Turkic civilization and the great steppe. Kazakh Khanate. Kazakhstan in the era of modern times. Kazakhstan as part of the Soviet administrative-command system. Declaration of Independence of Kazakhstan. State system, socio-political development, foreign policy and international relations of the Republic of Kazakhstan. Methods and techniques of historical description for the analysis of the causes and consequences of events in the history of Kazakhstan.	5		V											
	GED	OC	Philosophy	**Purpose:**The formation of a holistic idea among students about philosophy as a special form of knowledge of the world, about its main sections, problems and methods of studying them in the context of future professional activity. And also the formation of philosophical reflection, introspection and moral self-regulation among students. **Content:** Emergence of a culture of thinking. Subject and method of philosophy. Fundamentals of philosophical understanding of the world: questions of consciousness, spirit and language. Being. Ontology and metaphysics. Cognition and creativity. Education, science, technology and technology. Human philosophy and the world of values. Ethics. Philosophy of values. The subject of aesthetics as a field of philosophical knowledge. Philosophy of freedom. Philosophy of art. Society and culture. Philosophy of history. Philosophy of religion. "Mangilik El" and "Modernization of Public Consciousness" are a new Kazakhstan philosophy.	5		V											
Socio-Political knowledges	GED	OC	Social and Political Studies	**Purpose:** The goal of forming knowledge about social and political activities, explaining social and political processes and phenomena. **Content:** Consideration of the system of socio-ethical values of the society. Ways to use social, political, cultural, psychological institutions, features of youth policy in the modernization of Kazakhstani society and solve conflict situations in society and professional environment based on them. To study the methods of analysis and interpretation of political institutions and processes, ideas about politics, power, state and civil society, to understand and use the methods and methods of sociological, comparative analysis, to understand the meaning and content of the political situation in the modern world. Analysis and classification of the main political institutions. Socialization, Identity, and Deviant Behavior: The Role of an Inclusive Approach	4		V											
	GED	OC	Cultural Studies	**Purpose:** the formation of scientific knowledge of history, modern	4		V		V									

			and Psychology	trends, current problems and methods for the development of culture and psychology, the skills of a systematic analysis of psychological phenomena. **Contents:** Morphology, language, semiotics, anatomy of culture. Culture of nomads, proto-Turks, Turks. Medieval culture of Central Asia. Kazakh culture at the turn of the XVIII - XIX centuries, XX century. Cultural policy of Kazakhstan. State Program "Cultural Heritage". National consciousness, motivation. Emotions, intellect. The will of man, the psychology of self-regulation. Individual typological features. Values, interests, norms are the spiritual basis. The meaning of life, professional self-determination, health. Communication of the individual and groups. Socio-psychological conflict. Models of behavior in conflict. · Socio-psychological foundations and the development of inclusive culture in modern society. Psychological characteristics and conditions for the professional adaptation of persons with disabilities. Psychological support and tolerance as a pathway to the social integration of people with disabilities. Socio-psychological barriers to interaction between individuals with typical and impaired development in modern society.														
Socio-ethnic Development	GED	UC	Ecosystem and Law	**Purpose:** Formation of integrated knowledge in the field of economics, law, ecology and life safety, research methods to achieve sustainable development of society. **Contents:** Fundamentals of safe interaction between man and nature, productivity of ecosystems and the biosphere. Improving the competitiveness of entrepreneurial activity of society, business and the national economy in conditions of limited resources within the framework of sustainable development goals of Kazakhstan. Systemic understanding of environmental issues and principles of sustainable development. Knowledge and observance of Kazakhstan's rights, duties and guarantees of subjects, state regulation public relations to ensure social progress. Inclusion is a strategy of international law. Legal foundations of artificial intelligence.	5	V	V											
	BD	EC	Abay Studies	**Purpose:** based on the creativity of A. Kunanbayev, the preservation of the «national code» and in the project «Kazakhtanu». **Contents:** historical overview of the history of Kazakhstan and Kazakh literature of the XIX-XX centuries. Studies of Abai's legacy of the XX-XXI century. Chronology of Abai's creativity. Abai is a great poet, ethnographer, founder of Kazakh written literature. Abai is the compiler of the code of laws «The Position of Karamola», social significance. Abai is a thinker, religious scholar, and philosopher. The role of Abai in education and science, the concept of a «Holistic person». «Words of Edification» by Abai, an epic novel by M. Auyezov «The Way of Abai». K. Tokayev «Abai and Kazakhstan in the XXI century», role, significance.	3	V	V											
	BD	EC	Muhtar Studies	**Purpose:** Formation of a historical, literary idea of M. Auezov's work in the context of literary history, patriotism and cultural and spiritual position.		V	V												

				Development of artistic thinking, skills of independent research activity. **Content:** The life and creative path of M. Auezov Semipalatinsk, Tashkent, St. Petersburg periods. M. Auezov's activity in the magazines «Sholpan», «Abai». M. Auezov's journalism. An artistic review of the short stories "Korgansyzdyn kuni", "Kyr suretteri", "Okagan azamat", "Kokserek", the play Enlik-Kebek and the stories "Kili Zaman", "Karash-Karash" okigasy", the monograph "Abai Kunanbayev", the epic novel "Abai Zholy".																
	BD	EC	Basics of Financial Literacy	The **purpose** of the discipline is to study personal and family financial resources, which are critical to achieving financial well-being. **Contents** of the discipline. Financial planning and consumer safety. Basic methods and techniques for effective spending and saving money. Protecting and investing your own financial resources. The role and significance of personal finance, its capabilities for achieving financial stability. Filtering out a lot of dubious financial information. Incentives for independent management of responsibilities and optimal financial capabilities of the consumer. Making smart financial decisions when building a professional career.		V	V												
	BD	EC	Foundations of Anticorrupsion Culture	**Purpose:** formation of an anti-corruption worldview, strong moral foundations of a personality, civic position, stable skills of anti-corruption behavior. **Content:** Overcoming legal nihilism, formation of the basics of students' legal culture in the field of anti-corruption legislation. Formation of a conscious perception/attitude towards corruption.Moral rejection of corrupt behavior, corrupt morality and ethics. Development of skills necessary to fight corruption.Development of anti-corruption standards of conduct. Anticorruption propaganda, dissemination of lawfulness and respect for the law. Activities aimed at understanding the nature of corruption, awareness of social damage caused by its manifestation, ability to defend one's position with arguments, seeking ways to overcome manifestation of corruption. The Use of AI in Combating Corruption		V	V												
	BD	EC	Fundamentals of artificial intelligence	**Objective**: To develop competencies in the use of knowledge and practical application of artificial intelligence tools and methods, in alignment with the priorities of the AI-Sana program. **Contents**: Introduction to Artificial Intelligence (AI). Development of practical skills and abilities, including: using AI tools; working with large language models (LLMs); utilizing no-code AI platforms; employing generative AI tools; image recognition; natural language processing (NLP); and data visualization through AI. Understanding the application of AI in various fields and exploring its potential through the integration of AI-Sana program approaches.										V	V	V			
						V													
Communication and Physical Training/	GED	OC	Kazakh (Russian) language	**Purpose:** formation of communicative competence using the Kazakh (Russian) language in the socio-cultural, professional and public life, improvement of the ability to write academic texts.	10	V													

				Contents: Levels A1, A2, B1, B2-1, B2-2 (B2, C1 Russian language) are presented in the form of cognitive-linguocultural complexes, consisting of spheres, themes, sub-themes and typical situations of communication of the international standard: social, social-cultural, educational and professional, modeled by forms: oral and written communication, written speech works, listening. Demonstration of understanding of the language material in the texts on the educational program, knowledge of terminology and development of critical thinking.													
	GED	OC	Foreign Language	**Purpose:** The aim is a formation of students' intercultural and communicative competence in the process of foreign language education at a sufficient level A2 and a level of basic sufficiency B1. Student reaches B2level of common European competence if the language level at the start is higher than B1level of common European competence **The contents:** Levels A1, A2, B1, B2 are presented in the form of cognitive-linguocultural complexes, consisting of spheres, themes, sub-themes and typical situations of international standard's communication: social, social - cultural, educational and professional, modeled by forms: oral and written communication, written speech works, listening. Demonstration of language material understands in texts on educational program, knowledge of terminology and critical thinking development.	10		V											
	GED	OC	Physical Training	**Objective**: the formation of social and personal competencies and the ability to purposefully use the means and methods of physical culture that ensure the preservation and strengthening of health in preparation for professional activity; to the persistent transfer of physical exertion, neuropsychic stresses and adverse factors in future work. **Content**: Implementation of physical culture and health and training programs. A complex of general development and special exercises. Sports (gymnastics, sports and outdoor games, athletics, etc.). Control and self-control during classes, insurance and self-insurance. Refereeing competitions. Means of professionally applied physical training. Modern health-improving systems: the breathing system according to A. Strelnikova, K. Buteyko, K. Dinaiki, joint gymnastics according to Bubnovsky.	8	V												
	BD	HsC	Professionally Oriented Foreign Language	**Purpose:** The discipline examines the basic concepts and terms of computer science. **Contents:** the content of the computer science course in English; techniques for annotating, referencing and translating literature in the specialty; the use of special professionally-oriented material in the computer science lesson is discussed; the analysis of texts in English is carried out; examples of the use of English in professional activities are given	3													
	GED	OC	Information and Communication Technologies	**Purpose:** 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. Development of new «digital» thinking, acquisition of knowledge and skills in the use of modern information and communication technologies in various activities **Content:** Introduction and architecture of computer systems. Software. Operating systems. Human-computer interaction. Database systems. Data	5			V								V		

				analysis. Data management. Networks and Telecommunications. Cybersecurity. Internet technologies. Cloud and Mobile technologies. Multimedia technologies. Smart technology. E-technologies. Electronic business. Electronic government.															
									V	V									
Basics of Pedagogical Skills	BD	HsC	Modern Pedagogy	**Purpose:** The aim is to equip future teachers with professional competencies on the theoretical and methodological foundations of modern pedagogical science, the technology of organizing the pedagogical process, the formation of students' readiness to design and construct the educational process based on information and communication technologies based on the laws and scientific principles of Cyberpedagogy. **Content:** The genesis of pedagogical science, regularities and principles of a holistic pedagogical process. Fundamentals of the theory of education and didactics. Problems of modern school management. Scientific principles and regularities of Cyberpedagogy, methodology and technology for managing the educational process based on information and communication technologies, methods of distance learning and blended learning. Artificial Intelligence in Modern Education and Its Benefits. Opportunities and Risks of Using Artificial Intelligence.	5					V									
	BD	HsC	Inclusive Education	**Purpose:** The aim is familiarization with modern world and domestic theories of inclusive education, the formation of future teachers' professional competencies in the design and organization of inclusive education. **Content:** Social significance and features of inclusive education. Patterns, principles and models of inclusive education, legal documents regulating the activities of inclusive education in a mass school. Approaches and technologies for organizing inclusive education in educational institutions. Methods of psychological and pedagogical support and creating a comfortable environment for inclusive education of children with special educational needs. Problems of creating an inclusive educational environment.	4				V	V	V						V	V
	PD	HsC	Workshop of Special Disciplines	Objective: To develop students' professional practical skills and competencies in the field of computer science, and to enhance their ability to apply specialized disciplines to solve educational, methodological, project, and research tasks. The practicum is aimed at consolidating theoretical knowledge, developing the ability to apply it in real-world professional activities, and preparing students for pedagogical, scientific, and project work. Content: Practical mastery of methods and technologies in computer science: Programming in modern languages; Working with algorithms and data structures; Developing and testing software. Application of specialized disciplines in teaching computer science: Methods of teaching computer science; Lesson planning and design of digital educational resources; Use of information and communication technologies (ICT) in education. Working with modern software and tools: Database management systems; Web	4													

				development; Fundamentals of working with big data and artificial intelligence. Project work: Development of mini-projects for creating software solutions; Development of educational and methodological materials; Teamwork on IT projects. Research skills: Fundamentals of scientific research in the field of computer science; Data collection, processing, and analysis; Preparation of scientific publications and reports.															
						V	V		V										
Fundamentals of Psycho-Pedagogical Sciences	BD	HsC	Fundamentsls of General and Age Psychology	**Purpose:** development of psychological thinking of students on the basis of studying and mastering knowledge of various mental phenomena, taking into account the age-related characteristics of the development of the human psyche. **Contents:** introduction to psychology. Consciousness. Personality. Activity. cognitive processes. Psychology of will, emotions, feelings. Temperament. Character. Capabilities. Structure, functions, laws of the psyche, cognitive processes, conditions, factors, mechanisms of development of the psyche in ontogenesis. Methodological foundations of developmental psychology, concepts, categories, mechanisms, nature of age-related transformations. Features, causes and factors, conditions and prospects for the positive development of the personality at different age stages of the development of the human psyche.	4	V	V		V										
	BD	HsC	Physiology of Schoolchildren Development	**Purpose:** is to give the future teacher up-to-date information about the anatomical and physiological features of the body of children and adolescents, its relationship with the environment, to equip with knowledge about the laws underlying the preservation and strengthening of the health of schoolchildren, maintaining their high efficiency in various types of educational activities. **Content:** The growth and development of the body. The development of the nervous system, the formation of higher nervous activity and its formation in the process of child development; features of the development of sensory; endocrine; musculoskeletal system; respiratory system; digestive; blood and cardiovascular system. The basics of protecting the health of schoolchildren, familiarization with the rules of a healthy lifestyle.	4				V	V								
	BD	HsC	Theory and Methodology of Educational Work	**Purpose:** the formation of professional competencies of future teachers in the design, construction and organization of upbringing work at school. **Content**: The essence and features of the upbringing process, upbringing work, systems of upbringing of the school and class. Functions and content of the class teacher. Skills in planning upbringing work at school and in the classroom, organizing a class team and individual upbringing work with students. Skills of pedagogical support, work with difficult and gifted children, methods of cooperation with parents of students. Career guidance work with students. Methods for diagnosing the effectiveness of upbringing work.	4				V	V								
	BD	HsC	Psychological and Pedagogical Assessment (2nd year Pedagogical	Objective: Familiarization with the content of the psychological and pedagogical work of the class teacher. To get acquainted with the documentation and activities of the class teacher regarding psychological and pedagogical support of the educational process. To familiarize with the	2				V	V									V

			Practice)	documentation of the psychological and pedagogical work of the subject teacher and the content of their activities. Monitoring and compiling a psychological and pedagogical characteristic of the group. Conducting a psychological and pedagogical analysis of the lesson															
Methodical fundamentals of teaching computer science	PD	HsC	Methods of Teaching and Assesment in Informatics	**Purpose:** the purpose of studying the discipline is theoretical and practical training of students in the field of modern methods of teaching propaedeutic and basic computer science courses in the main school and specialized courses at the senior level, the acquisition of practical skills for effective educational and educational work in General and specialized schools; the development of creative potential necessary for teaching computer science in the conditions of differentiation of schools. **Content:** Computer science as a field of education.Methods of teaching computer science as a sphere of pedagogical science. Documents regulating computer science education. Content and structure of school education in computer science. Didactic principles and methods of teaching computer science. Organization of computer science education in modern schools. Extracurricular and extracurricular work in computer science. Organization of students ' work in the computer science room. Computer science course software. Basic concepts of computer science and methods of teaching it. Task system as a means of teaching computer science. Methods of teaching the introductory course in Informatics. Methods of teaching the basic course of school Informatics. Differentiated computer science education at the senior school level. Health and safety issues when working with computer equipment. Methods of developing and promoting IT startups.	6			V	V	V								
	PD	EC	Introduction to the Specialty	**Purpose:** familiarization of students with the concept and structure of the information society, ways of presenting information, principles of operation and organization of personal computer devices. **Content**: regularities in development of Informatics , communication of Informatics with production, interrelation of development of Informatics with development of other Sciences are considered, the basic methods of knowledge at the empirical and theoretical level are described.	4	V													
	PD	EC	Fundamentals of academic writing	**Purpose:** to teach how to maintain, install and eliminate errors of network devices and network software, i.e. the ability to install, configure and maintain operating systems and network devices of an infocommunication system, to ensure the network security of the organization; **Content:** to determine, simulate the logical and physical structure of the database, to install, configure, deploy, maintain, optimize the functioning of databases and DBMS, to monitor, manage and analyze big data in storage, to ensure the information security of the database;				V			V							
	PD	EC	Theoretical Fundamentals of Computer Science	Objective: To provide students with fundamental knowledge of the theoretical foundations of computer science, to develop their skills in applying basic concepts and methods in the field of information processing, storage, and transmission, and to prepare them for pedagogical activities related to teaching computer science.	4			V			V							

				Content: Information and its properties: The concept of information. Types and properties of information. Quantitative and qualitative characteristics of information. Processes of acquiring, transmitting, storing, and processing information. Theoretical models of data and algorithms: Data structures: sets, lists, trees, graphs. Basic algorithmic constructs and problem-solving methods. The concept of computability and algorithmic solvability. Fundamentals of algorithm theory: Definition of an algorithm. Formalization of concepts: Turing machines, recursive functions. Limits of computability. The concept of unsolvable problems.Information theory and coding: Units of information measurement. Shannon entropy. Basics of coding and data compression. Information protection and error correction. Fundamentals of mathematical logic: Propositions, logical operations, logical formulas. Basics of constructing proofs. Boolean algebra and its applications in computer science. Automata theory and formal languages: Automata and transducers. Regular expressions and finite automata. Context-free grammars and pushdown automata. Modeling and formalization of problems: Building mathematical models. Abstraction and idealization in modeling. Solving problems using formal models. Methodology of teaching the theoretical foundations of computer science: Specifics of teaching theoretical sections of computer science. Didactic tools and methods for teaching theoretical aspects of computer science.														
	PD	EC	Theoretical Problems of Informatics	Objective: To develop in students a comprehensive scientific understanding of the fundamental concepts, theories, and directions in the evolution of computer science as a discipline, as well as to enhance their ability to apply theoretical knowledge to solve pedagogical tasks in the field of computer science education. Content: Historical and philosophical foundations of computer science: the formation and development of the discipline. Key concepts of computer science: information, algorithm, computation, complexity, automation. Theoretical models of computation: Turing machines, automata, formal grammars and languages. Fundamentals of information theory and coding. Theoretical foundations of programming and algorithm analysis. Issues of artificial intelligence and machine learning in the context of computer science theory. Ethical and philosophical aspects of information technology development. Challenges in knowledge formalization and the construction of artificial intelligence systems. Modern scientific trends in computer science and their pedagogical interpretation. Methodological foundations of teaching computer science based on its theoretical issues.				V	V	V								V
	PD	EC	Pedagogical Research	**Purpose**: to acquire skills in searching for, critically selecting knowledge from various sources, and using research findings to develop one's pedagogical thinking and practice. Students will be able to: understand the nature of pedagogy and its main terminology; recognize the central areas of research in pedagogy and understand the difference between everyday thinking and scientific knowledge; distinguish cultural representations of				V	V	V								V

				human nature and their significance for the teacher's work; accept changes in the field of education, considering the perspectives of their development.															
	PD	EC	Action Research	**Purpose**: Improvement of practice and problem-solving in a specific context through a systematic cycle of inquiry, action, and reflection. **Content**: Basics of Action Research, Action Research methodology, Action Research cycle, data collection methods in Action Research, data analysis and interpretation, writing an Action Research report, critical perspectives of Action Research. Action Research is a practice-oriented approach, so during the learning process, case studies, practical assignments, and projects are often used.				V	V	V								V
	PD	EC	Research, Development and Innovation of Computer Science	Objective: to develop a research-oriented and growth mindset, the ability to design, update, and apply innovative teaching approaches and technologies in the context of ongoing changes in society and the educational environment. Students will be able to: develop their own teaching skills through research-based approaches; apply critical thinking when collecting and using data for software development; participate in scientific research and/or foster collaboration between universities and stakeholders; document their own research activities and present results using various forms of communication.				V	V	V								V
	PD	EC	Lesson Study	The goal is to prepare future educators to use Lesson Study in their professional activities for the continuous improvement of their practice and enhancement of student learning. It should equip them with the skills of collaboration, analysis, and critical reflection necessary for the successful implementation of this methodology. **Content**: Introduction to Lesson Study, the Lesson Study cycle, key elements of successful Lesson Study, practical application of Lesson Study, planning a research lesson, lesson observation, reflection, development of tools for Lesson Study.				V	V	V								
	BD	HsC	Introduction to the teaching profession (pedagogical practice, 1st year)	**Purpose:** During the internship, students become familiar with the organization of work and analyze the educational and methodological activities of the teacher; the tasks, content, and organization of pedagogical work at the school; they visit classrooms, familiarize themselves with their equipment and layout, apply the knowledge gained during theoretical training, complete independent work, and acquire computer skills. A report will be prepared based on the results of the internship.	1						V	V						
Fundamentals of mathematical and natural sciences	PD	EC	Mathematical Analysis	Purpose: formation of students' skills in conducting classical fundamental training in mathematical analysis Content:Application of the acquired knowledge in solving real practical problems, advanced methods of solving mathematical problems are considered. Before studying this course, it is recommended to have good knowledge in mathematical analysis 1-2, solve double, triple, curved, surface integrals, and study the differences between them; •choose suitable mathematical methods for solving problems; •use an understandable scientific language to formulate the basic concepts of the course.	4						V	V						

	PD	EC	Analysis of One Variable Function	Purpose: - Mastering the basic parts of mathematical analysis. - providing theoretical knowledge of the mathematics course - quality assurance, depth of knowledge. Content:The discipline presents an introduction to analysis, indefinite and definite integral, concepts and differential calculus of functions of many variables, methods for calculating double, triple, curved surface integrals. The basic concepts of numerical, functional and power series are given							V	V						
	BD	EC	Algebra and Geometry	Purpose: - Mastering the basic parts of mathematical analysis. - providing theoretical knowledge of the mathematics course - quality assurance, depth of knowledge. Content:The discipline presents an introduction to analysis, indefinite and definite integral, concepts and differential calculus of functions of many variables, methods for calculating double, triple, curved surface integrals. The basic concepts of numerical, functional and power series are given	4						V	V						
	BD	EC	Linear Algebra	Purpose: to introduce students to the range of problems of classical and modern algebra; to clarify the role of algebraic concepts in relation to other mathematical disciplines; Content:Solve problems by section: -At the heart of the theory of matrices and determinants; -Solving systems of linear equations; -Vector algebra; - Algebraic line and surface of the 1st and 2nd order; - Linear spaces. - understand and create mathematical arguments; - think clearly, consistently and logically in order to analyze mathematical problems;							V	V			**V**			
	PD	EC	Numerical Optimization Methods	**Objective**: To form future computer science educators' knowledge of numerical methods and optimization techniques, to develop skills in applying these methods to solve practical problems, and to prepare them for teaching students the basics of algorithmization, mathematical modeling, and optimization approaches. **Content**: Introduction to numerical methods: the concept of a numerical method; computational errors: sources, classification, estimation. Basic numerical methods: solving nonlinear equations: bisection method, Newton's method, simple iteration method; solving systems of linear algebraic equations: Gaussian method, the method of elimination, iterative methods; interpolation and approximation of functions: Lagrange polynomials, splines; numerical integration and differentiation: rectangle, trapezoidal, and Simpson's methods. Optimization methods: basic concepts of optimization: optimality criteria, types of problems; methods of one-dimensional optimization: golden section method, Newton's method; methods of multidimensional optimization: gradient and non-gradient methods; setting and solving applied optimization problems. Software implementation of numerical methods: algorithmization of numerical methods; implementation and debugging of programs for numerical problem-solving; analysis of algorithm efficiency. Pedagogical aspects: teaching methodology for numerical methods and optimization in schools; development of assignments and projects for students. Numerical methods	4						V	V			V			

				for unconditional and conditional optimization. Optimization problems. Classification of optimization problems and methods. Solving optimization problems with computer mathematics systems.															
	PD	EC	Introduction to Computational Mathematics	Objective: to form students with sufficient theoretical knowledge and practical skills on the use of computational mathematics methods in production activities, including their software implementation on computers. Content:Demonstration of general scientific basic knowledge of natural sciences, mathematics and computer science, understanding of basic facts, concepts, principles of theories related to applied mathematics and computer science; Demonstrate knowledge of the theory of numerical methods; -Use the studied methods to solve computational problems.							V	V					V	
	PD	EC	Modeling Applied Mathematics Tasks in MatLab	Purpose: to form an idea of the properties of applied specified graphic and printed packages. The study of the basics of design, construction of algorithms, three-dimensional graphic animations and the application of mathematical calculations using the MATLAB environment. Features of working with computer calculations, conducting modern computer calculations. Content:Use modern statistical and mathematical methods for modeling. Apply the MATLAB mathematical package in solving mathematical modeling problems; consider the use of modern statistical packages for solving mathematical modeling problems;	4							V					V	V	V
	PD	EC	Scientific Research in Computer Modeling and Information Technologies	Purpose: to familiarize students with the basic concepts and means of modeling systems; to provide students with an understanding of the general principles and theoretical foundations of simulation modeling; to introduce modern methods of computer modeling of processes and systems Content: Discuss the concepts of system modeling and system modeling tools. The classical (inductive) approach. Mathematical schemes of systems modeling. Formalization and algorithmization of system functioning processes. Neural network modeling of systems. Functioning of neural networks in learning and generalization modes. Modeling of systems using typical machine circuits.															
	PD	EC	**Pedagogical Approaches (3rd year Pedagogical Practice)/Dual**	**Purpose**: to gain professional experience and develop pedagogical skills in real educational settings. Students will have the opportunity to apply their knowledge and skills in real-life situations and familiarize themselves with the methodologies and approaches used in professional practice. As part of the internship, students conduct lessons, organize extracurricular activities, and participate in teamwork.	4									V	V				
Hardware and software of a personal electronic computer	BD	EC	Operating Systems	**Purpose:** Mastering the concepts of operating systems, the basic principles of designing and building operating systems; **Contents:** The fundamental principles of OS design are considered; principles of computer resource management; principles of virtualization and mobility of modern operating systems; the ability to implement basic algorithms for planning and synchronizing processes and flows; OS installation skills, user working environment settings, connection and configuration of hardware devices, disk and file system management,	5									V	V				

				network settings.management.															
	BD	EC	System Administration of Operating Systems	**Purpose:** Formation of basic concepts, knowledge and skills in the organization of the functioning of modern operating systems, namely, the ability to create and use effective software to manage computing resources in multi-user operating systems; **Contents:** Obtaining basic, theoretical knowledge in the field of modern operating systems, the principles of organization of input/output and multi-program work, and the acquisition of practical skills of OS administration.									V	V	V			
	PD	EC	Basics of Robotics and IT Technology	**Purpose:** To form knowledge about the history of robotics and the basics of students' knowledge; to master the basic techniques and design of robots related to perception, planning, responses. **Content:*** Ability to work in the LEGO® MINDSTORMS® Education EV3 and LEGO® Digital Designer programs; * application of theoretical knowledge gained in the disciplines of mathematics, physics, geometry and computer science in robotics systems; * apply the knowledge gained in group and project tasks; * synthesis of information obtained from several sources.	4								V		V			
	PD	EC	Automatic Control Theory	**Purpose:** To provide students with basic knowledge of the principles of building, modeling, and analyzing automatic control systems, as well as to develop skills in applying this knowledge to solve problems in educational practice and scientific research in the fields of computer science and educational technologies. **Content**: Introduction to the theory of automatic control: Key concepts: control system, controlled object, regulators. Examples of automated systems in education and computer science. Mathematical models of dynamic systems: Descriptions of systems: differential equations, transfer functions, block diagrams. Transition from physical processes to mathematical models. Analysis of linear control systems: Concept of stability. Frequency and time characteristics of systems. Stability criteria: root locus method, Hurwitz and Nyquist criteria. Quality of control processes: Control quality indicators. Control optimization methods. System characteristic correction. Modeling and research of automatic control systems: Computer models of dynamic systems. Simulation software tools (e.g., MATLAB/Simulink). Basics of the theory of nonlinear and discrete control systems: Features of nonlinear systems. Principles of building discrete systems. Application of control theory in educational informatics: Models of adaptive learning. Intelligent tutoring systems. Examples of automated knowledge assessment.														
													V		V	V		
Basics of programming and databases	BD	EC	Programming Language C++	**Purpose**: To develop students' theoretical knowledge and practical skills in the area of structural and object-oriented programming in C++, which are necessary for solving problems in pedagogical activities, teaching computer science, and developing educational software. **Content:** Introduction to programming and the C++ language: History and	6								V		V	V		

				features of the language. Compilers, development environments, program structure in C++. Basic language constructs: Variables, data types, input/output operators. Conditional operators and loops. Arrays and strings. Functions: Declaration, definition, and invocation of functions. Function parameters, return values. Recursion. Data structures: Structures, unions, enumerations. File handling. Pointers and dynamic memory: The concept of a pointer. Dynamic memory allocation. Working with arrays through pointers. Fundamentals of object-oriented programming (OOP): Classes and objects. Encapsulation, inheritance, polymorphism. Constructors and destructors. Templates and standard libraries: Function and class templates. Basics of using the Standard Template Library (STL): vectors, lists, dictionaries.															
	BD	EC	High-Level Programming Languages	Purpose: To provide students with both fundamental and advanced knowledge of high-level programming languages, their structure, features, and applications, as well as to develop practical skills in software development and methodologies for teaching programming in an educational environment. Content: Introduction to Programming Languages: History and classification of programming languages. The concept of syntax and semantics of a language. Main programming paradigms (imperative, object-oriented, functional, logic programming). Structure of High-Level Programming Languages: Variables, data types, operators. Conditional statements and loops. Functions and procedures. Modules and libraries. Object-Oriented Programming: Classes and objects. Inheritance, encapsulation, polymorphism. Coding Standards and Code Management: Code styling. Program documentation. Working with version control systems (e.g., Git). Practical Work with Programming Languages: Basics of Python: syntax, libraries, application development. Basics of C#: data structures, interface development. Basics of JavaScript: scripting for web applications. Use of game-based and project-based methods. Project Activities: Development of educational projects.									V		V	V		
	BD	EC	Programming Language C#	Purpose: To equip students with both fundamental and advanced knowledge and skills in software development using the C# programming language, to develop their abilities in designing, creating, and debugging applications of varying complexity, and to prepare future educators for effective teaching of programming fundamentals in an educational environment. Content: Introduction to Programming in C#: History and features of the C# language. Structure of a C# program. Working with integrated development environments (Visual Studio and similar tools). Basic Syntax of the Language: Data types, variables, operators. Control structures (conditions, loops). Methods and parameter passing. Data Structures and Collections: Arrays, lists, dictionaries. Enums and structures. Basics of Object-Oriented Programming: Classes and objects. Encapsulation, inheritance,	5								V		V	V		

				polymorphism. Abstraction and interfaces. Exception Handling and File Operations: Exceptions: catching and handling errors. Basics of data input and output. Working with text files. Graphical User Interface Development: Basics of Windows Forms or WPF. Creating simple graphical applications.															
	BD	EC	Programming in PHP	Objective: To develop students' professional competencies in the design, development, and maintenance of web applications using the PHP programming language, as well as to enhance their teaching skills in programming and web technologies. Content: Introduction to PHP: History of the language. Development environment and web server configuration. PHP Syntax Basics: Variables, data types, operators. Conditional statements and loops. Functions and scope. Working with Forms and User Input: Processing POST and GET data. Data security. Arrays and Strings in PHP: Working with arrays. Core string manipulation functions. Object-Oriented Programming in PHP: Classes, objects, inheritance, and encapsulation. File and Session Handling: Reading and writing files. Working with sessions and cookies. Database Interaction: Basics of SQL. Connecting to MySQL databases using PHP (PDO, MySQLi). Fundamentals of database design. Web Application Development Basics: Building dynamic websites. MVC (Model-View-Controller) principles. Introduction to frameworks (e.g., Laravel). Web Application Security: Authentication and authorization. Protection against attacks (SQL injection, XSS, CSRF).									V		V	V		
	BD	EC	Programming in Python	Objective: The aim is to provide students with theoretical knowledge and practical skills in Python programming for solving problems in computer science, data science, software development, and automation of computational processes. Students will master the basic concepts of algorithm design, data structures, and principles of object-oriented programming, as well as gain hands-on experience using Python for data analysis, working with libraries, and creating programs of varying complexity, including graphics processing and game development. Content: Introduction to Python: History of development, language features, setting up the development environment. Basic Syntax: Variables, data types, operators, input and output operations. Conditional Statements and Loops: Branching constructs (if, elif, else), loops (for, while), control flow statements (break, continue, pass). Functions and Modules: Defining and using functions, arguments and return values, principles of code modularity, importing standard and user-defined modules. Data Structures: Lists, tuples, sets, dictionaries, and operations on them.Object-Oriented Programming (OOP): Classes and objects, encapsulation, inheritance, polymorphism. File Handling: Reading from and writing to files, working with text and binary data. Exceptions: Error handling using try-except constructs. Python Libraries: Introduction to popular libraries (e.g., NumPy, Pandas,	6								V	V	V	V		

				Matplotlib, Tkinter). Basics of Software Application Development: Designing, testing, and debugging programs. Working with PyGame: Creating an application window. Handling events (keyboard and mouse input). Drawing primitives: lines, circles, rectangles. Working with images and animations. Sounds and music in games. Game mechanics: object movement, collision detection, managing speed and time (timers, FPS), implementing simple game loops. Project Development: Game design: idea, storyline, graphics. Stages of creating a game using PyGame. Development of mini-games.																
	BD	EC	Programming in Arduino	Objective: Mastering the basics of software development for microcontroller systems based on the Arduino platform; developing skills in designing, programming, and debugging embedded devices, as well as the ability to apply acquired knowledge to solve practical problems in the fields of automation, robotics, and the Internet of Things (IoT). Content: Introduction to Arduino: History and concept of Arduino. Hardware components of the platform: microcontrollers, boards, expansion modules. Arduino IDE development environment. Basics of Arduino programming: Program (sketch) structure. Basic constructs of the C/C++ language: variables, operators, functions. Working with loops, conditions, arrays. Data input/output: Digital and analog inputs/outputs. Controlling LEDs, buttons, relays. Working with analog sensors (temperature, light, humidity, etc.). Working with modules and sensors: Communication interfaces: I2C, SPI, UART. Connecting modules: displays, motors, Bluetooth, Wi-Fi modules. Basics of working with servos and stepper motors. Embedded systems design: Developing electrical connection schemes. Basics of prototyping on a breadboard. Debugging and testing hardware-software systems. Programming for IoT tasks: Sending and receiving data over the network. Interaction with cloud services. Examples of creating smart devices. Project activity: Implementation of mini-projects: process automation, smart home, robotics. Defense of the final project.									V		V	V		
	PD	EC	Programming Tasks of High Difficulty	Purpose: To develop deep knowledge and practical skills in solving problems of increased algorithmic and computational complexity. To enhance competencies in the design, optimization, and implementation of effective software solutions for complex applied and scientific tasks. To teach methods for assessing the complexity of algorithms, selecting optimal strategies and programming technologies for working with large data volumes, limited resources, and high performance requirements. Content: Introduction to high-complexity problems: Classification of complex problems: NP-complete, NP-hard problems. Problem formulation and analysis of requirements for software solutions. Methods for designing efficient algorithms: Dynamic programming. Use of AI in modeling problems with dynamic programming. Greedy algorithms. Divide and conquer, branch and bound method. Graph algorithms, game theory,	4								V		V	V		

				combinatorial methods. Optimization of software solutions: Code profiling and performance analysis. Memory and runtime optimization. Parallel and distributed programming. Use of specialized libraries and tools: Libraries for high-performance computing (e.g., OpenMP, MPI, CUDA). Tools for working with big data. Solving applied high-complexity problems: Pattern recognition, machine learning. Cryptography, information security. Optimization problems in logistics, finance, and medicine. Project activity: Development of a software solution for a specific complex problem. Evaluation of results and project defense.																
	PD	EC	Solving Non-Standard Tasks	Objective: To develop professional competencies in students in the areas of searching, analyzing, and solving non-standard tasks, as well as to foster creative thinking, logic, algorithmic culture, and the readiness to apply these skills in pedagogical practice. Content: Concept of a non-standard task: Classification of tasks by level of complexity and non-standardness. The difference between standard and non-standard tasks. The role of non-standard tasks in the development of thinking. Methods for solving non-standard tasks: Heuristic techniques (analysis of conditions, introduction of auxiliary elements, trial and error). Use of analogies, generalizations, induction, and d eduction. The method of invariants, the method of extreme cases. Types of non-standard tasks: Logical tasks. Combinatorial tasks. Proof tasks. Tasks for constructing algorithms. Game and competition tasks. Algorithmic and creative thinking: Development of algorithmic thinking in the context of non-standard tasks. Creative approaches to finding solutions. Application of non-standard tasks in pedagogy: Using non-standard tasks in informatics lessons. Organization of extracurricular activities (competitions, clubs). Practical activities: Solving non-standard tasks of varying difficulty levels. Developing one's own non-standard tasks for educational purposes. Designing methods for using non-standard tasks in the educational process.										V	V	V	V
	BD	EC	Databases and Information Systems	Purpose: to study the theoretical foundations of modern databases, the principles of database development and tools for working with them, to familiarize students with the necessary knowledge and skills of working with databases in various information systems. Content: Discuss the basics of design, development and programming. In addition, we will also discuss advanced and new topics (stored procedures, data warehouses, and so on). Demonstrate knowledge on the theory, methods and technologies of relational databases and their development; Create Internet-oriented database systems; Understand application problems and current trends in database technologies. Create a software project for the selected DBMS	5										V	V	V	V
	BD	EC	Creating and Managing Databases	Objective: to review the principles, theories and practices in the field of data organization and management for practical application. Content: Well-designed database systems are at the heart of the provided and functionally rich Web-based applications that are revolutionizing enterprises today. Demonstrate: -developing logical database schemas in the third normal form										V	V	V		V

				using entity relationship diagrams for simple, defined systems; -use a database management system -create data model schemas using entity relationship diagrams (ER).															
Information security and network technology	PD	EC	Methodology of Organizing Project Activities in Computer Science and Robotics	The purpose of teaching the discipline is to familiarize with organizational, technical, algorithmic and other methods and means of protecting computer information, with legislation and standards in this area, with modern cryptosystems. Content: The purpose of the study is based on the generalization and systematization of scientific and methodological works in the field of preparing students for project activities and works on educational robotics projects to offer elements of the content of methodological training of future computer science teachers to organize project activities in the field of robotics.	4			V	V					V				V
	PD	EC	Robotics in Education	Objective: to master the basic techniques and design of robots related to perception, planning, responses. designing robots for various tasks; using sensors and motors in robotics systems; Contents: Introduction to ARDUINO Robotics. A lantern with your own hands. control of simple robots; Sound sensor (microphone). LED control button. Buttons work.Introduction to the photoresistor.Photoresistor LED. LED potentiometer. LCD display with I2C module. Temperature and humidity sensor + LCD. Sudatchik + pump.The system of self-government. Design and programming of electric vehicles and automobiles.									V		V			
	BD	EC	Computer Systems and Networks	Objectives: to achieve the following learning outcomes: the formation of students" fundamental knowledge on the basics of data transmission network software and basic network protocols, as well as in the development of skills for the application of this knowledge; Content:Discuss components and models of the Internet and other computer networks. Principles and structure of IP addressing and fundamentals of concepts, media and Ethernet operations. Explain network technologies, explain how devices access local and remote network resources, implement basic network communication	5								V	V				
	BD	EC	Network Security	Objective: to achieve the following learning outcomes: formation of basic principles of organization and functioning of computer and telecommunication systems for various purposes; Formation of knowledge for the construction, configuration and administration of computer systems and networks. Contents::-Describe the equipment routers. -Explain how switching works in the network of small and medium-sized businesses. -Configure monitoring tools available for small and medium-sized business networks. - configure the initial settings on the network device.														
													V		V			
Personal computer software in education	PD	EC	Technology of Programming in Java	Purpose: the pedagogical practice in the last year is the completion of the previous practice on the organization of the educational process at school and is aimed at acquiring knowledge, skills and management skills of the entire pedagogical process and conducting practical work on the diploma project. Visiting and analyzing the lessons of teachers, subject teachers and	4								V		V			

				other trainees, studying the program, textbooks, teaching aids and visual aids, equipment used by the subject teacher, development of lesson planning of their own pedagogical activities, lesson summaries on the subject at various degrees of study, electronic materials for educational purposes, conducting lessons on the subject of specialty.														
	PD	EC	Web Services and Programming	Purpose: To create a conceptual representation of the components of a Web page using technologies and programming languages to create a website (HTML, CSS, JavaScript, PHP, CGI) and further publication on the Internet. Content: Discuss the work of the Internet. The principle of packet switching. TCP/IP protocol. HTML language. Web sites and Web pages. HTML formatting tags. Using a frame in HTML frames. The selector and description are the basis of CSS. Logical formatting technology. Embedding in an HTML document. Elements of the JavaScript language: syntax, constant, variable and letter.							V		V				V	V
	BD	EC	Basics of Multimedia Technologies	Purpose: future teachers should work with multimedia technologies when teaching computer science. The means of pedagogical programs, electronic textbooks, to create Web design sites, they must use animation, zaukovye, interactive multimedia, visual, pedagogical capabilities of Macromedi Flash programs. Content: Means of pedagogical programs, electronic textbooks, to create Web designs, Web sites, they must use animation, science, interactive multimedia, visual, pedagogical capabilities of Macromedi Flash programs. To create Flash movies in HTML format, should export any graphic editors on the internet. The use of AI in the preparation of instructional materials.	4						V		V				V	V
	BD	EC	Multimedia and Internet Technology	Purpose: formation of students" scientific ideas about the essence and functions of modern multimedia systems and technologies, their place and role in the system of information systems and technologies, mastering practical skills of effective use of multimedia technologies in solving real practical problems Content: The technologies of creating Internet projects using HTML5, JavaScript, etc., software for creating Internet applications are considered.Be able to:- implement multimedia technologies in the educational process												V	V	
	PD	EC	Computer Graphics Programming Technology	Purpose: computer graphic editors, animation capabilities of the program creation of graphic objects Photo Shop, CorelDRAW when creating design, electronic textbooks and pedagogical software Content: Demonstrate skills in working with graphics libraries and in modern graphics packages and systems Selection of methods and means of computer graphics and geometric modeling; fundamentals of vector and raster graphics; theoretical aspects of fractal graphics; basic methods of computer geometry;	5											V	V	
	PD	EC	Design and Interface	Purpose: computer graphic editors, animation capabilities of the program creation of graphic objects Photo Shop, CorelDRAW when creating design, electronic textbooks and pedagogical software. Content:Introduction to interface design and interaction experience. prototyping, interaction design and information architecture. Interface design, navigation and information design. Visualization, graphic design. Demonstrate algorithmic and mathematical foundations of constructing realistic scenes; issues of implementing computer graphics algorithms using computers;								V	V				V	

	PD	EC	Fundamentals of 3D Modeling	Goal:Formation and development of students" intellectual and practical competencies in the field of creating spatial models mastering the elements of the basic pre-professional skills of a specialist in three-dimensional modeling. demonstrate algorithms of three - dimensional modeling and software . Content:Formation and development of students" intellectual and practical competencies in the field of creating spatial models mastering the elements of the basic pre-professional skills of a specialist in three-dimensional modeling. Practice a positive attitude to three-dimensional modeling algorithms and an idea of the main tools of 3D modeling software.	4							V	V				V	
	PD	EC	Engineering Graphics	Purpose: To study the laws and rules for the execution of drawings with graphic information of various types and content, the basics of graphical representation of information, methods of graphical modeling of geometric objects, rules for the development and design of design documentation, graphical models of phenomena and processes. Content:studies the laws and rules for the execution of drawings with graphic information of various types and content, the basics of graphical representation of information, methods of graphical modeling of geometric objects, rules for the development and design of design documentation, graphical models of phenomena and processes.									V			V		V
	PD	EC	Development and Application of Mobile Applications	Purpose: to teach how to develop applications for small portable devices, such as PDAs, smartphones or cell phones Content:Setting up the development environment. The necessary tools with which you want to start getting acquainted with Android. Basics of developing mobile application interfaces. Fundamentals of multi-window application development. Working with databases, graphics and animation. Game development. Using libraries Using smartphone capabilities in applications. develop applications for small portable devices such as PDAs, smartphones or cell phones.	5								V			V		V
	PD	EC	Programming in Android	Purpose: formation of knowledge, skills and abilities of using information technologies in educational activities Content:To demonstrate the creation of applications for the corporate sector, programmers need to know Java and Eclipse technologies, as well as the basics of the Android mobile architecture.use the AndroidSDK toolkit(code.google.com/android /) The following are considered: global trends in world education Digitalization of education accelerates the process of information processing, transforms the nature of mental activity, automates human labor.				V	V	V							V	V
	PD	EC	Digital Technologies in Education	Objective: to understand the structure and organization of digital educational environments, their importance in modern education, as well as to master the principles, methods, means and tools of their design and implementation. Content:The ability to use modern digital technologies in education; able to develop, implement and maintain information systems for various purposes in educational institutions with the necessary competencies, able to generate and implement innovative ideas in their professional activities; apply digital learning tools in a dynamically changing environment	5			V	V	V							V	V
	PD	EC	E-Education	Purpose: To equip students with the knowledge and skills necessary for the effective use of modern information and communication technologies (ICT) in the educational process. Students should study the basics of developing				V	V	V							V	

				and using electronic educational resources, distance learning systems, and master the methods of implementing and adapting digital technologies in teaching practice. Content: Fundamentals of E-Learning: History and evolution of e-learning, features and advantages of using ICT in education. Distance and Blended Learning: Types of educational models, organization of distance learning, key principles of blended learning. Electronic Educational Resources: Types of educational resources (video lessons, e-textbooks, tests, simulators, etc.), their creation and use. Platforms and Tools for Online Learning: Study of various platforms (Moodle, Google Classroom, Zoom, Microsoft Teams, etc.), creation and setup of courses, webinars, and assessments. Development of Educational Materials: Designing multimedia and interactive materials, creating educational videos, tests, assignments, and other types of content. Monitoring and Assessment of the Educational Process Using ICT: Methods of tracking student performance, analyzing learning outcomes through electronic systems. Ethics and Security in E-Learning: Issues of data protection, privacy, digital security, as well as ethical considerations related to the use of technologies in education.															
	PD	HsC	Production (4th Pedagogical Practice)	**Purpose:** Deepening theoretical knowledge in general scientific, cultural, psychological and pedagogical, methodological and basic and professional disciplines, as well as clarifying knowledge in disciplines in the course of practice, the formation of pedagogical skills and competencies. **Content:** Knowledge of all the main actions of the teacher and the class teacher in the system of integrity using the experience of teachers-methodologists; mastering the basics of work of students with parents; mastering the deep psychological and pedagogical methods of the individual in unity through the study and analysis of the educational situation, mastering the methods of analysis and introspection of various forms of educational work.	10					V	V	V	V		V			
Module of Acquisition of New Professional Competencies	BD	EC	Subjects in the Additional Educational Program	**Purpose:** Additional educational program (Minor) -a set of disciplines and modules and other types of educational work, determined by the student to study in order to form additional competencies	12				V	V							V	
Final Certification	PD	HsC	Research and Innovation in Education (pedagogical practice, 4th year)	**Purpose:** During the internship, the following tasks are carried out: the trainee collects factual material sufficient for the completion of the thesis, taking into account its specifics and topic; performs a set of research, theoretical, and practical tasks as defined by the individual internship assignment, receiving guidance from the supervisor; and writes an internship report.	8	V					V					V	V	
			Writing and Defendinig a Thesis, a Graduate Work, or	**Purpose:** Selection of research topics and planning of research work. Substantiation of the relevance of the chosen topic, definition, purpose and main objectives, object and subject of study. Formulation of the study hypothesis. Drawing up a schedule of work on the thesis. Selection and	8				V					V	V	V	V	

			Preparing and Passing a Comprehensive Exam	study of the main literary sources. Conducting experiments, processing their results, analysis. The expected results of the study. Writing, design and defense of the thesis.															
total					**240**														

5. SUMMARY TABLE REFLECTING THE VOLUME OF DISBURSED LOANS BY EP MODULES

Year of study	Semester	Number of mastered modules	Number of disciplines studied			Number of credits KZ								Total hours	Total credits KZ	Number	
			CC	HsC	EC	Theoretical training	Physical education	Introduction to the teaching profession (pedagogical practice)	Psychological and Pedagogical Assessment (Pedagogical)	Pedagogical Approaches (Pedagogical Practice)/Dual	Production (Pedagogical Practice)	Research and Innovation in Education (pedagogical practice)	Final certification			exam	offset
1	1	5	19	-	9	28	2							900	30	6	1
	2	3	15	5	7	27	2	1						900	30	5	2
2	3	6	4	8	13	25	2							810	27	5	2
	4	6	-	7	22	29	2		2					990	33	6	3
3	5	7	5	10	13	28								840	28	6	0
	6	3	-	-	29	29				3				960	32	3	2
4	7	6	-	4	30	34					10			1320	44	6	3
	8	2	-	-	-	-						8	8	480	16	1	1
total		**14**	**43**	**34**	**123**	**200**	**8**	**1**	**2**	**3**	**10**	**8**	**8**	**7200**	**240**	**38**	**14**

6. STRATEGIES, TEACHING METHODS AND ARTIFICIAL INTELLIGENCE, MONITORING AND ASSESSMENT

Learning strategies	**Student–centered learning:** The student is the center of teaching/learning and an active participant in the learning and decision-making process. **Practice-oriented training**: orientation to the development of practical skills.
Teaching methods	Conducting lectures, seminars, various types of practices with: • the use of innovative technologies: • problem-based learning; • case study; • work in a group and creative groups; • discussions and dialogues, intellectual games, olympiads, quizzes; • reflection methods, projects, benchmarking; • Bloom's taxonomies; • presentations; • * rational and creative use of information sources: • * multimedia training programs; • * electronic textbooks; • * digital resources. • * machine learning methods Organization of independent work of students, individual consultations.
Monitoring and evaluation of the achievability of learning outcomes	**Current control** on each topic of the discipline, control of knowledge in classroom and extracurricular classes (*according to syllabus*). Assessment forms: • survey in the classroom; • testing on the topics of the discipline; • control works; • protection of independent creative works; • discussions; • trainings; • colloquiums; • essays, etc. **Boundary control** at least twice during one academic period within the framework of one academic discipline. **Intermediate certification** is carried out in accordance with the working curriculum, academic calendar. Forms of holding: • exam in the form of testing; • oral examination; • written exam; • combined exam; • project protection; • protection of practice reports. **Final state certification**.

7 EDUCATIONAL AND RESOURCE SUPPORT FOR EP

Information Resource Center	There are 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC) in the structure of the EIC. The network infrastructure of the EIC is based on 180 computers with Internet access, 110 automated work places, 6 interactive whiteboards, 2 video doubles, 1 video conferencing system, 3 A-4, 3 format scanners. EIC software - AIBS "IRBIS-64" under MS Windows (basic set of 6 modules), stand-alone server for uninterrupted operation in the IRBIS system. The library fund is reflected in the electronic catalog available to users on the site http://lib.ukgu.kz on-line 24 hours 7 days a week. Thematic databases of their own generation have been created: "Almamater", "Proceedings of SKSU scientists", "Electronic archive". Online access from any device in 24/7 mode via an external link http://articles.ukgu.kz/ru/pps. Working with catalogs in electronic form. EC consists of 9 databases: "Books", "Articles", "Periodicals", "Proceedings of the teaching staff of SKSU", "Rare Books", "Electronic Fund", "SKGU in Print", "Readers", "SKR". The EIC provides its users with 3 options for accessing its own electronic information resources: from the “Electronic Catalog” terminals in the catalog hall and in the EIC subdivisions; through the information network of the university for faculties and departments; remotely on the library website http://lib.ukgu.kz/. Open access to international and republican resources: "SpringerLink", "Polpred", "Web of Science", "EBSCO", "Epigraph", to electronic versions of scientific journals in the public domain, "Zan", "RMEB", "Adebiet" , Digital library "Aknurpress", "Smart-kitap", "Kitap.kz", etc. For people with special needs and disabilities, the library website has been adapted to the work of visually impaired users.
Material and technical base	The material and technical base of the Department of Informatics includes the following classrooms and computer classes for undergraduate students: - there are 3 computer classes for laboratory work, one of them with an interactive whiteboard; - lecture halls; - STEM center. *Practice bases for students* 1. Shymkent, Gymnasium school No. 26 named after Zhambyl, Shymkent 2. Shymkent, SMCE "Higher College of New Technologies” named after Manap Utebayev" 3. Shymkent, secondary school No. 79 4. Shymkent, KazTilDamu LLP 5. Shymkent, South Kazakhstan Humanitarian and Economic College 6. Shymkent, specialized boarding school No. 2 with instruction in three languages 7. Shymkent, Lyceum school No. 15 named after D.I.Mendeleev

APPROVAL SHEET

under the Educational program "6B01530 – Computer science"

DAA Director _____ Naukenova A.S.

Director of DAN _____ Nazarbek U.B.