

"APPROVED"

Acting Chairman of the Board- Rector

\_\_\_\_\_ K.Nurmanbetov

D.h.sc., Academician Kozhamzharova D.P.

"\_\_\_" \_\_\_\_\_ 2024

**EDUCATIONAL PROGRAM****6B01522 – Physics-Informatics**

Registration number	6 B01500065
Code and Classification of Education	6B01 Educational Sciences
Code and Classification of Areas of Training	6B015 Training of teachers in natural sciences
Group of Educational Programs (EP)	B010 Physics teacher training
Type of EP	acting
ISCE level	6
NQF level	6
IQF level	6
Language learning	Kazakh, Russian, English
The complexity of EP	240 credits
Distinctive features of EP	-
Partner University (JEP)	-
University partner (DDEP)	-

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The Educational Program was considered at a meeting of the Academic Committee on Pedagogical Sciences of the Higher School,

Minutes# \_\_\_\_\_ " \_\_\_\_\_ " \_\_\_\_\_ 2024y.

Chairman of the Committee \_\_\_\_\_ A. Z.Tursynbaev

Considered and recommended for approval at a meeting of the Educational and Methodological Council of SKU named after M. Auezov,

Minutes#. \_\_\_\_\_ " \_\_\_\_\_ " \_\_\_\_\_ 2024y.

Chairman of the EMM \_\_\_\_\_ K.R.Sarykulov

The Educational Program was approved by the decision of the Academic Council of the University

Minutes# \_\_\_\_\_ " \_\_\_\_\_ " \_\_\_\_\_ 2024y.

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## 1. Concept of the program

<b>Mission of the University</b>	We are focused on generating new competencies, training a leader who translates research thinking and culture.
<b>University Values</b>	<ul style="list-style-type: none"> <li>– Openness - open to change, innovation and cooperation.</li> <li>– Creativity - generates ideas, develops them and turns them into values</li> <li>– Academic freedom - free to choose, develop and act.</li> <li>– Partnership - creates trust and support in a relationship where everyone wins.</li> <li>– Social responsibility - ready to fulfill obligations, make decisions and be responsible for their results.</li> </ul>
<b>Graduate Model</b>	<ul style="list-style-type: none"> <li>– Deep subject knowledge, their application and continuous expansion in professional activity</li> <li>– Information and digital literacy and mobility</li> <li>– Research skills, creativity and emotional intelligence</li> <li>– Entrepreneurship, independence and responsibility for their activities and well-being</li> <li>– Global and national citizenship, tolerance to cultures and languages</li> </ul>
<b>Uniqueness of the EP</b>	<p>Orientation to the professional and social order through the formation of professional competencies related to the necessary types of research, practical and entrepreneurial activities, adjusted to the requirements of stakeholders.</p> <p>The uniqueness of EP 6B01522 - Physics-Informatics lies in the fact that graduates are universal specialists with competencies with the ability to teach physics and computer science in secondary and secondary specialized educational institutions; and able to solve the problems of professional activity using ICT. This EP is needed by the Republic of Kazakhstan, in which more than 40% of schools are small. In addition, the use of e-learning technologies is the main trend of modern education.</p>
<b>Academic Integrity and Ethics Policy</b>	<p>The university has taken measures to maintain academic integrity and academic freedom, protection from any type of intolerance and discrimination:</p> <ul style="list-style-type: none"> <li>• Rules of academic integrity (order No. 212 of October 10, 2022);</li> <li>• Anti-corruption standard (order No. 221 n/a dated 12/07/2021).</li> <li>• Code of Ethics (Order No. 212 of October 10, 2022)</li> </ul>
<b>Regulatory and legal framework for the development of EP</b>	<ol style="list-style-type: none"> <li>1. Law of the Republic of Kazakhstan “On Education”;</li> <li>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</li> <li>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</li> <li>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;</li> </ol>

	<p>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</p> <p>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.</p> <p>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</p> <p>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</p>
<b>Organization of the educational process</b>	<ul style="list-style-type: none"> <li>– Implementation of the principles of the Bologna Process</li> <li>– Student-centered learning</li> <li>– Availability</li> <li>– Inclusivity</li> </ul>
<b>Quality assurance of EP</b>	<ul style="list-style-type: none"> <li>– Internal quality assurance system</li> <li>– Involvement of stakeholders in the development of the EP and its evaluation</li> <li>– Systematic monitoring</li> <li>– Updating the content (updating)</li> </ul>
<b>Requirements for applicants</b>	<p style="color: red;">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</p>
<b>Conditions for the implementation of educational programs (EP) for persons with disabilities and special educational needs (SSN)</b>	<p>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 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 <a href="http://lib.ukgu.kz/">http://lib.ukgu.kz/</a> is open 24/7.</p> <p>An individual differentiated approach is provided for all types of classes and in the organization of the educational process.</p>

## 2. PASSPORT of EP

<b>Purpose of the EP</b>	Training of teachers of physics and computer science who are able to form knowledge, skills and skills of intellectual and moral development of students' personality, demonstrating professional values
<b>Tasks of the EP</b>	<ul style="list-style-type: none"> <li>- meeting the needs of the individual in intellectual, cultural and moral development through higher education;</li> <li>- training of bachelors capable of adapting and successfully mastering related areas of professional activity, as well as advanced training, training in additional education programs and continuing education in a master's program;</li> <li>- acquisition of competence and experience of creative activity in the field of physics and informatics and methods of their teaching;</li> <li>- meeting the needs of society for qualified specialists in the field of education and teaching of physics and computer science, able to integrate academic values with entrepreneurial ideas;</li> <li>- providing conditions for acquiring a high general intellectual level of development, mastering literate and developed speech, a culture of thinking and skills in the scientific organization of labor in the field of education;</li> <li>- the formation of socially responsible behavior in society, understanding the importance of professional ethical standards and following these standards;</li> <li>- creation of conditions for intellectual, physical, spiritual, aesthetic development to ensure the possibility of their employment in their specialty</li> </ul>
<b>Harmonization of EP</b>	<ul style="list-style-type: none"> <li>• 6th level of National framework qualifications of RK;</li> <li>• Dublin descriptors of 6 skill level;</li> <li>• one cycle of a Framework for Qualification of the European Higher Education Area;</li> <li>• 6th level of The European Qualification Framework for lifelong learning</li> </ul>
<b>Connection of EP with the professional sphere</b>	Professional standard "Pedagogue", approved by the order of acting. Minister of Education of the Republic of Kazakhstan dated December 15, 2022 No. 500. Registered with the Ministry of Justice of the Republic of Kazakhstan on December 19, 2022 No. 31149
<b>Name of the degree awarded</b>	After the successful completion of this EP, the graduate is awarded the degree of "Bachelor of Pedagogical Sciences in the educational program 6B01522-Physics-Informatics"
<b>List of qualifications and positions</b>	Methodologist, instructor, tutor, pedagogue, team leader, manager in education. Qualification guide for managers, specialists and other employees, approved by order of the Acting Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated October 25, 2017 No. 360.
<b>Field of professional activity</b>	The area of professional activity is the area of <ul style="list-style-type: none"> <li>- education;</li> <li>- science.</li> </ul>
<b>Objects of professional activity</b>	The objects of professional activity of graduates are educational organizations and institutions of various forms of ownership, centers for the development of pedagogical education at the universities of the Republic of Kazakhstan.
<b>Subjects of professional activity</b>	<ul style="list-style-type: none"> <li>- the educational process in the unity of its value-target guidelines, content, methods, forms and results;</li> <li>- research, innovation, information and analytical activities in the field of physics, computer science and methods of their education, pedagogy and psychology.</li> </ul>
<b>Types of professional activity</b>	<ul style="list-style-type: none"> <li>- educational;</li> <li>- training;</li> <li>- educating;</li> <li>- methodical;</li> </ul>

	<ul style="list-style-type: none"> <li>- research;</li> <li>- socialandcommunicative.</li> </ul>
<p><b>Learning out comes</b></p>	<p><b>LO1.</b> Communicate freely in a professional environment and society in Kazakh, Russian and English,adhering to the principles of academic writing and a culture of academic integrity.</p> <p><b>LO2.</b> Demonstrate socio-cultural, professional development based on the formation of ideological, civil, spiritual and social responsibility, methods of scientific and experimental research.</p> <p><b>LO3.</b> Possess information and computational literacy, the ability to generalize, analyze and perceive information, set a goal and choose ways to achieve it.</p> <p><b>LO4.</b> Design lesson plans that take into account the characteristics and needs of students, and identify appropriate teaching methods and assessment tools.</p> <p><b>LO5.</b>Manage the behavior of students, motivating their educational and cognitive activities, based on the methodology of educational work and modern concepts of education.</p> <p><b>LO6.</b> Carry out pedagogical activities in educational institutions, taking into account the characteristics and needs of students, the patterns of their age and individual development.</p> <p><b>LO7.</b> Explain the laws and theories of physics and astronomy, applying them to solve problems in professional activities and in everyday life.</p> <p><b>LO8.</b> Apply methods for building databases and their management systems, using the basics of object-oriented programming and programming technologies.</p> <p><b>RO9.</b> Create information systems aimed at solving specific practical problems.</p> <p><b>RO10.</b> Solve practical problems and problems of physics and computer science using the mathematical apparatus and methods of statistical data analysis.</p> <p><b>RO11.</b> Carry out research work on the methodology of teaching physics and computer science, based on modern trends in their development and involving students in this activity.</p> <p><b>RO12.</b> Ability to work in a team, plan and implement professional continuing education in formal, non-formal, informal forms.</p>

### 3. Competencies of an EP graduate

<b>GENERAL COMPETENCIES (SOFTSKILLS). Behavioral skills and personal qualities</b>	
<b>GC 1. Competence in managing one's literacy</b>	<p><b>GC 1.1.</b> Ability self-learning, self-development and constant update their knowledge within selected trajectory and under conditions interdisciplinarity.</p> <p><b>GC 1.2.</b> Ability to express thoughts, feelings, facts and opinions in professional sphere.</p> <p><b>GC 1.3.</b> With the ability to mobility in modern world and critical thinking .</p>
<b>GC 2. Language competence</b>	<p><b>OK2.1.</b> Ability line up programs communications on state, Russian and foreign languages .</p> <p><b>OK2.2.</b> Ability to interpersonal _ social and professional communication in conditions of intercultural communication .</p>
<b>GC 3. Mathematical competence and competence in the field of science</b>	<p><b>OK3.1.</b> 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 determine ways to control and evaluate the solution of professional problems, the development of mathematical and natural science thinking;</p>
<b>GC 4. Digital competence, technological literacy</b>	<p><b>OK4.1.</b> Ability to confidently and critically use modern information and digital technologies for work, leisure and communications;</p> <p><b>OK4.2.</b> With the ability to master the skills of using, recovering, evaluating, storing, producing, presenting and exchanging information through a computer, communicating and participating in networks using the Internet in the field of professional activity;</p>
<b>GC 5. Personal, social and educational competencies</b>	<p><b>OK5.1.</b> The ability to own social and ethical values based on public opinion, traditions, customs, norms and focus on them in their professional activities;</p> <p><b>OK5.2.</b> The ability to know the cultures of the peoples of Kazakhstan and observe their traditions; observe the basics of the legal system and legislation of Kazakhstan, know the trends in the social development of society;</p> <p><b>OK5.3.</b> Ability to navigate in various social situations; be able to find compromises, correlate their opinion with the opinion of the team; own the norms of business ethics, ethical and legal standards of conduct; strive for professional and personal growth;</p> <p><b>OK5.4.</b> Ability to work in a team, correctly defend one's point of view, offer new solutions; demonstrate tolerance towards other individuals.</p>
<b>GC 6. Entrepreneurial competence</b>	<p><b>OK6 .1.</b>Ability exercise creativity and demonstrate entrepreneurial skills.</p> <p><b>OK6 .2.</b>Ability to manage projects to achieve professional goals.</p> <p><b>OK6 .3.</b>Ability work with requests consumer.</p>
<b>GC 7. Cultural awareness and self-expression</b>	<p><b>OK7.1.</b>The ability to know and understand the traditions and culture of the peoples of Kazakhstan.</p> <p><b>OK7.2.</b>Ability be tolerant of traditions and culture others peoples peace, be aware of the attitudes of tolerant behavior; to be not subject to prejudice, to have high spiritual qualities, formed as an intelligent person.</p>
<b>PROFESSIONAL COMPETENCIES (HARDSKILLS).</b>	
Theoretical knowledge and practical skills specific to this field	<b>PC1.</b> The ability to conduct scientific research in a chosen field of education and methods of teaching physics and computer science using information technology.
	<b>PC2.</b> The ability to apply knowledge of physics and computer science in educational activities, and knowledge of modern problems of their teaching methods and their latest achievements in their pedagogical and research activities.
	<b>PC3.</b> The ability to apply modern methods and technologies for organizing and implementing the educational process in physics and computer science at various educational levels in secondary and secondary specialized educational

	institutions, including when teaching gifted students and students with special needs.
	<b>PC4.</b> The ability to design, organize and analyze pedagogical activities, ensuring the consistency of the presentation of the material and interdisciplinary links between physics and computer science and other disciplines.
	<b>PC5.</b> The ability to apply various research methods in the chosen subject area: experimental methods, statistical methods for processing experimental data, methods of theoretical physics, computational methods, methods of mathematical and computer modeling of objects and processes.
	<b>PC 6 .</b> The ability to perform professional and pedagogical functions to ensure the effective organization and management of the pedagogical process of teaching physics and computer science to students in educational institutions of secondary education.
	<b>PC 7 .</b> Abilitycheck the technical condition of computing equipment and carry out the necessary preventive procedures, connect and configure computer modules and peripheral equipment.
	<b>PC 8 .</b> The ability to possess knowledge in the field of physics, skills and abilities to conduct physical experiments, process measurement results, observe physical phenomena and explain them.
	<b>PC 9 .</b> The ability to systematize, generalize and disseminate methodological experience (domestic and foreign) in the field of methods of teaching physics and computer science.

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

	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12
GC 1	+	+	+		+			+			+	
GC 2			+	+		+			+			
GC 3		+	+		+							
GC 4			+			+		+	+	+		
GC 5	+	+	+	+		+	+				+	
GC 6		+					+		+	+	+	
GC 7	+				+				+			
PC 1			+					+		+		
PC 2			+	+		+				+	+	
PC 3	+	+	+	+	+	+						
PC 4		+	+	+	+			+	+		+	
PC 5			+		+		+			+		
PC 6		+	+	+		+	+					
PC 7			+		+	+			+			
GC 1			+				+	+		+		
GC 2		+			+	+	+		+		+	
GC 3	+		+			+	+				+	



2		GED	OC	Philosophy	<p><b>Purpose:</b> formation of a holistic view of philosophy as a special form of knowledge of the world, its main sections, problems and methods of studying them in the context of future professional activity. Formation of philosophical reflection, skills of introspection and moral self-regulation.</p> <p><b>Content:</b> the emergence of a culture of thinking. The subject and method of philosophy. Fundamentals of philosophical understanding of the world: questions of consciousness, spirit and language. Being. Ontology and metaphysics. Knowledge and creativity. Education, science, engineering and technology. Philosophy of man 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" is a new Kazakh philosophy</p>	5												
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3	Socio-political knowledge	GED	OC	Sociology and political studies	<p><b>Purpose</b> : the formation of knowledge about socio-political activities, the explanation of socio-political processes and phenomena.</p> <p><b>Content</b>: consideration of the socio-ethical values of societies. Understanding the features of social, political, cultural, psychological institutions in the context of their role in the modernization of Kazakhstani society. Making decisions to resolve conflict situations in society, including professional society. Studies of political institutions and processes, methods of analysis and interpretation of ideas about politics, power, state and civil society, understand and apply the methods and techniques of sociological, comparative analysis, understand the essence and content of the political situation in the modern world. Analysis and classification of the main political institutions.</p>	4		+	+									
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6		BD	EC	Abay Studies	<p><b>Purpose:</b> preservation of the "national code" in the project "Kazakhstan" based on the work of A. Kunanbaev</p> <p><b>Contents:</b> historical review of the history of Kazakhstan and Kazakh literature of the 19th-20th centuries. Studies of the heritage of Abai in the XX-XXI centuries. Chronology of Abay's creativity.</p> <p>Abai is a great poet, ethnographer, founder of Kazakh written literature. Abay is the compiler of the Code of Laws "The Regulations of Karamola", social significance. Abai is a thinker, religious scholar, philosopher. The role of Abai in education and science, the concept of the "Whole Man". "Words of Edification" by Abai, epic novel by M. Auezov "The Way of Abai". K. Tokaev "Abai and Kazakhstan in the XXI century", role, significance .</p>	3		+	+									
7				Mukhtar Studies	<p><b>Purpose:</b> the formation of a historical, literary understanding of the work of M. Auezov in the context of the history of literature, patriotism and cultural and spiritual position. Development of artistic thinking, skills of independent research activity.</p> <p><b>Contents:</b> life and career of M. Auezov Semipalatinsk, Tashkent, St. Petersburg periods. The activities of M. Auezov in the magazines "Sholpan", "Abai". Publicism M. Auezov. An artistic review of the stories "Korgansyzydyn kyni", "Kyr suretteri", "Okyfan azamat", "Kokserek", the play Enlik-Kebek and the stories "Kyly zaman", epics "Abay Zholy".</p>		+	+										

8				<p>Basics of financial literacy</p> <p><b>The purpose</b> of the discipline is to study personal and family financial resources, which are critical to achieving financial well-being.</p> <p><b>Contents</b> 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.</p>		+	+									
9			Service to Society	<p><b>Purpose:</b> the formation of socially significant skills and competencies based on the assimilation of academic programs, carrying out socially useful activities related to the disciplines studied at the university.</p> <p><b>Content.</b> The concept and meaning of Service learning, the history of the formation and development of the concept of Service Learning. Key components of Service Learning, socially useful activity in the children's and youth environment, organization of volunteer movement in the world and Kazakhstan practice, profile orientation of Service Learning. International practice of learning through socially useful activities. General principles and methodology for the development of social projects. Methods of analysis of implemented social projects.</p>		+	+									+

10				<p>Fundamentals of Anti-Corruption Culture</p>	<p><b>Purpose:</b> formation of an anti-corruption worldview, strong moral foundations of the individual, citizenship, sustainable skills of anti-corruption behavior.</p> <p><b>Content:</b> overcoming legal nihilism, the formation of the foundations of the legal culture of students in the field of anti-corruption legislation. Formation of conscious perception, attitude to corruption. Moral rejection of corrupt behavior, corrupt morality, ethics. Mastering the skills necessary to counteract corruption. Creation of an anti-corruption standard of conduct. Anti-corruption propaganda, dissemination of ideas of legality, respect for the law. Activities aimed at understanding the nature of corruption, awareness of social losses from its manifestations, the ability to reasonably defend one's position, look for ways to overcome manifestations of corruption</p>		+	+									
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11	Communication and Physical Training	GED	OC	Kazakh (Russian) language	<p><b>Purpose:</b> the formation of communicative competence using the Kazakh (Russian) language in the socio-cultural, professional sphere and public life, improving the ability to write academic texts.</p> <p><b>Content:</b> levels A1, A2, B1, B2-1, B2-2 (B2, C1 Russian) are presented in the form of cognitive – linguo cultural complexes, consisting of spheres, topics, subtopics and typical situations of communication of the international standard: social, domestic, social - cultural, educational and professional, modeled forms: oral and written communication, written speech works, listening . Demonstration of understanding of the language material in texts on the educational program, knowledge of terminology and development of critical thinking.</p>	10		+	+									
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12		GED	OC	Foreign language	<p><b>Purpose:</b> formation intercultural and communicative competencies students in progress foreign language education on sufficient level A2 and level basic sufficiency B1. Oh wobbly reaches level B2 of the pan-European competencies at availability linguistic level on start higher level B1 of the pan-European competencies</p> <p><b>Content.</b> levels A1, A2, B1, B2 are presented in the form of cognitive – linguo culture logical complexes, consisting of spheres, topics, sub - themes and typical situations of communication of the international standard : written communication, written speech works, listening comprehension . Demonstration of understanding of the language material in texts on the educational program, knowledge of terminology and development of critical thinking .</p>	10		+	+									
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13		GED	OC	Physical Training	<p><b>Purpose:</b> formation of social and personal competencies and the ability to purposefully use the means and methods of physical culture, ensuring the preservation, strengthening of health in order to prepare for professional activities; to the persistent transfer of physical exertion, neuro psychic stress and adverse factors in future work.</p> <p><b>Content:</b> implementation of physical culture and health and training programs. A complex of general developmental and special exercises. In sports (gymnastics, sports and outdoor games, athletics , etc. ) . To control and self-control in the process of training, insurance and self-insurance. Competition judging. From the means of professionally applied physical training. Modern health systems: with the respiratory system according to A. Strelnikova, K. Buteyko, K. Dineika, articular gymnastics according to Bubnovsky.</p>	8												
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1 4		BD	HsC	Professional Kazakh (Russian) language.	<p><b>Purpose:</b> to provide professionally oriented language training for a specialist who is able to adequately build communication in professionally significant situations and who knows the norms of the language for special purposes.</p> <p><b>Contents:</b> Professional language and its components. Professional terminology as the main feature of the scientific style. Scientific vocabulary and scientific constructions in educational and professional and scientific and professional fields. Algorithm of work on the analysis and production of scientific texts in the specialty. Production of scientific and professional texts. Fundamentals of business communication and documentation in the framework of future professional activities.</p>	3	+											
1 5		BD	HsC	Professionally oriented foreign language	<p><b>Purpose:</b> study of the concepts and terms of physical science and professionally oriented material.</p> <p><b>Content:</b> the basic concepts and terms of physical science are considered, the content of the physics course in English; methods of annotating, summarizing and translating literature in the specialty; the use of special professionally-oriented material in the physics lesson is discussed; analysis of texts in English is carried out; examples of the use of English in professional activities are given.</p>	3	+											

16		GED	OC	Information and Communication Technologies	<p><b>Target:</b> 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.</p> <p><b>Contents:</b> Introduction and architecture of computer systems. Software. OS. Human interaction with computers. Database systems. Database management. Networks and telecommunications. Cyber defense. Internet technologies. Cloud and mobile technologies. multimedia technologies. Smart technologies. Electronic technologies. Electronic business. Electronic control.</p>	5			+					+				
17	Fundamentals of pedagogical excellence	BD	HsC	Pedagogy and Cyberpedagogy	<p><b>Purpose:</b> formation of readiness for systematic design and construction of the educational process in distance learning based on information technologies that provide a rational, efficient and comfortable educational process.</p> <p><b>Content:</b> introduces modern methods of teaching and educating the younger generation and developing abilities, learning skills. Considers modern cyberspace and its impact on the minds and behavior of young people. Forms skills in mastering modern information computer and digital learning technologies, pedagogical cyber technologies. It characterizes the cyber security of students, the creation of students' immunity to the negative influences of cyberspace .</p>	5			+	+	+	+						

18		BD	HsC	Inclusive Education	<p><b>Purpose:</b> preparation for the organization of educational activities with special needs, using inclusive technologies</p> <p><b>Content:</b> examines the models and legal foundations for the organization of inclusive education. She studies the conditions for organizing inclusive education for various categories of children with disabilities. Characterizes the inclusion of children with sensory, motor, intellectual disabilities, emotional-volitional sphere in the general educational process. Introduces the organization of psychological and pedagogical support for children with disabilities. Instills critical thinking skills in managing inclusive processes in education.</p>	4											
19		PD	HsC	Workshop of Special Disciplines	<p><b>Purpose:</b> to develop students' skills and abilities in solving problems of qualification testing, based on basic knowledge</p> <p><b>Content:</b>the discipline deals with methods for solving typical problems of qualification testing in the field of physics and computer science; the use of the laws of physics for solving practical problems is shown, examples of composing and solving problems are given.</p>	4											

20		BD	HsC	Teaching Practice	<p><b>Purpose:</b> development of general cultural and improvement of professional competencies of students.</p> <p><b>Content:</b> to familiarize students with the school, class and organization of educational work with students; collection of information about the activities of the educational institution, the professional activities of the teacher; analysis of the structure and content of state obligatory standards, model programs of a subject; normative documents that determine the content of education under the updated program; familiarization with various types of extracurricular activities; analysis of the educational work of the class teacher; attendance at classes and events held by the class teacher; compilation of a report</p>	1												
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21	Fundamentals of Psychological and Pedagogical Sciences	BD	HsC	Fundamentals of General and Age Psychology	<p><b>Purpose:</b> 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.</p> <p><b>Contents:</b> 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.</p>	4												
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22		BD	HsC	Physiology of Schoolchildren Development	<p><b>Purpose:</b> to teach future teachers to know the age-related anatomical and physiological characteristics of the body of children and adolescents and to give an idea of the ways of forming a healthy lifestyle.</p> <p><b>Content:</b> knowledge and understanding of the main patterns of ontogenesis, theories and provisions of the physiology of the development of schoolchildren: the development of the musculoskeletal system, nervous, sensory, endocrine, cardiovascular, respiratory, digestive, excretory systems, social factors in the development of children and their application in solving problems, setting, performing, analyzing and formulating a conclusion when performing practical work in a group and individually.</p>	4					+	+					
23		BD	HsC	Theory and Methodology of Educational Work	<p><b>Purpose:</b> the formation of professional and pedagogical competence of future teachers in the knowledge of the basics of the educational process, the technology of organization and implementation of educational activities.</p> <p><b>Content:</b> knowledge and understanding of general issues of the theory and methodology of education; basic theories of education and personality development; regularities and principles, forms and methods of education; the ability to identify topical problems of modern theory and practice of education; ability to education and self-education; to form motivational and methodological readiness for the implementation of educational activities.</p>	4					+						+

24		BD	HsC	Psycho-pedagogical Practice	<p><b>Purpose:</b> to introduce the student to the social environment of the organization of education in order to acquire the competencies necessary for successful adaptation to the profession of a teacher.</p> <p><b>Content:</b> familiarization with the methodology for studying the psychological and pedagogical characteristics of a group of students; participation in the psychological and pedagogical analysis of the lesson (educational event) of the psychological and pedagogical study of the class and individual students; familiarization with the structure of psychological observation and ways of interaction between the teacher and the subjects of the pedagogical process; analysis and planning of the educational process in psychological aspects; evaluate the results of the educational process and carry out its reflection</p>	2												
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25	Methodological Basics of Teaching	BD	EC	Introduction to Specialty	<p><b>Purpose:</b> to form students' understanding of computer science and physics and their research methods, contributing to the formation of the foundations of the professional culture of the future teacher.</p> <p><b>Content:</b> subject, tasks and patterns of development physics and informatics, connection of physics and informatics with production and development of other sciences; analysis and evaluation of modern problems of physics and informatics; basic methods of cognition at the empirical and theoretical level; disclosure of the essence of pedagogical activity, its social role and educational functions; determination of professionally significant qualities of a teacher's personality; opportunities for professional and personal growth of the teacher and his creative self-realization.</p>	4								+	+			
26				Fundamentals of Academic Writing	<p><b>Purpose:</b> mastering the rules for designing and creating academic content and documents used in professional activities.</p> <p><b>Content:</b>the ability to draw up scientific reports, articles and theses, correspondence and contracts, as well as research papers and essays, to search for information; work with sources, make references to the works of other authors, know the values and norms of academic ethics, types and types of plagiarism, citation methods.</p>		+		+									+

27		PD	HsC	Teaching and Assessment in Physics	<p><b>Purpose:</b> to acquaint students with the basics of the professional activity of a physics teacher</p> <p><b>Content:</b> the tasks and the modern concept of teaching physics at school are considered; forms of organization of training sessions; methods and techniques of teaching physics; types of control of knowledge and skills; the structure and content of the assessment; principles, methods, tasks and means of knowledge assessment; issues of planning and organizing the processes of assessing the educational achievements of students.</p>	6				+		+				+	
28		PD	HsC	Educational and Methodical (Pedagogical) Practice	<p><b>Purpose:</b> establishing links between theoretical knowledge obtained in the study of social, psychological, pedagogical and special disciplines and practice.</p> <p><b>Content:</b> familiarization of students with the school, class and organization of educational work with students; visiting lessons and educational hours of teachers in the assigned class; conduct a psychological and pedagogical analysis of the lesson; conduct lessons on the subject, applying interdisciplinary knowledge (in pedagogy, psychology, methodology and other disciplines); create and select didactic materials for the classes using modern digital, smart and stem technologies, learning strategies; drawing up a psychological and pedagogical characteristics of the student's personality; drawing up a report reflecting the results of educational activities.</p>	2			+		+						+

29	Fundamentals of Professional Activity	PD	EC	Teaching and Assessment in Informatics	<p><b>Purpose:</b> to acquaint students with the basics of the professional activity of a computer science teacher</p> <p><b>Contents:</b> Informatics as a field of education. MPI as a sphere of pedagogical science. Documents regulating the teaching of informatics. The content and structure of school education in informatics. Didactic principles and MPI. Organization of teaching informatics in modern schools. Extracurricular and extracurricular work in computer science. Organization of work of students in the computer science classroom. Computer science course software. Basic concepts of informatics and methods of its teaching. The system of tasks as a means of teaching informatics. Differentiated teaching of computer science at the senior level</p>	4					+	+	+				
30				Organization and Planning of Scientific Research In Physics	<p><b>Purpose:</b> acquaintance with the methodological foundations of working with natural science material, forming an integrated approach to teaching students natural science disciplines at school.</p> <p><b>Content:</b> the basics of the content, material equipment, methods, forms of working with natural science material in high school and the specifics of its selection and construction are outlined; reveals the essence of an integrated approach in teaching natural sciences; examples of developed integrated classes in natural sciences using the project, research method of teaching, as well as digital technologies of home-made equipment are given.</p>											+	

31		PD	EC	Theory and Practice of Educational Physical Experiment	<p><b>Purpose:</b> to state the methodology and technique of an educational physical experiment, its goals and objectives.</p> <p><b>Content:</b> the discipline analyzes the experimental method of teaching physics; structure and tasks of scientific and educational physical experiment; didactic functions and requirements for educational physical experiment and its features. Requirements for the technique and technology of its implementation. Topics of laboratory classes; principles of completing physics classrooms with educational equipment; Principles of operation of devices necessary for setting up an experiment.</p>	4												
32				Methods of Teaching Natural Science Disciplines in a Small Schools	<p><b>Purpose:</b> familiarization of students with the methodological foundations of working with natural science material, forming an integrated approach to teaching students natural science disciplines at school.</p> <p><b>Content:</b> the basics of the content, material equipment, methods, forms of working with natural science material in high school and the specifics of its selection and construction are outlined; reveals the essence of an integrated approach in teaching natural sciences; examples of developed integrated classes in natural sciences using the project, research method of teaching, as well as digital technologies of home-made equipment are given.</p>													

33		PD	EC	Methods of Solving Tasks in Physics in Secondary School	<p><b>Purpose:</b> to acquaint students with the methods and ways of solving problems in physics.</p> <p><b>Content:</b> the discipline deals with the types and structure of physical problems; methods of their use in the educational process; analyzes the methodology for solving problems of various types, general and particular algorithms for solving standard problems; methods for solving problems from various sections of the school physics course and algorithms for solving them; examples of transformation of standard tasks into creative ones are given.</p>	4												
34		PD	EC	Methods of Solving Olympiad Tasks in Physics	<p><b>Purpose:</b> study of approaches to solving non-standard problems of physics.</p> <p><b>Content:</b> the methodological foundations of learning to solve physics problems are considered; main types of tasks, methods for their solution; examples of solving original and experimental problems used in various competitions in physics. The possibility of different approaches to solving problems is shown, and that the application of the law of conservation of energy makes it easier to solve the problem, to look at it from a more general position.</p>													

35		PD		Teaching and Educational Pedagogical Practice	<p><b>Purpose:</b> the formation of professional pedagogical competencies related to the implementation of the educational process, the acquisition by students of the experience of pedagogical activity.</p> <p><b>Content:</b> implementation of educational, extracurricular, educational work at school .activities as a subject teacher; organization of independent, individual work of students in the classroom in the conditions of pedagogical practice and diagnostic activity; introduction of integrative knowledge in pedagogy, psychology and private methods into the educational process teaching the subject; creation of didactic materials using modern and digital technologies ; the use of criteria-based assessment of students' educational achievements</p>	4					+						
36	Basis of Subject Training	BD	EC	Mechanics	<p><b>Purpose:</b>to teach students to describe and predict the movement of bodies, based on the laws and methods of mechanics</p> <p><b>Contents:</b> the concepts, laws and methods of classical mechanics, the construction of physical models are considered; the motion of the planets is studied, based on the kinematic and dynamic methods of describing mechanical systems; shows the application of the principles of mechanics and conservation laws to describe and predict the motions of bodies; examples of solving practical problems of physics are given; the determination of physical quantities using experimental setups and digital technologies is discussed.</p>	5						+			+		

37		BD	EC	Experimenta l Mechanics	<p><b>Purpose:</b> to form students' skills in the experimental description of mechanical phenomena, based on the laws and methods of classical mechanics</p> <p><b>Content:</b> The discipline has a practical focus and approaches mechanics through demonstrations, experiments and computer experiments conducted in the classroom and at home. It discusses the methodology for conducting the experiment and processing its results; the laws of mechanics are stated and experiments are analyzed in various sections of mechanics, and having practical applications .</p>												
38		BD	EC	Molecular Physics and Thermody namics	<p><b>Purpose:</b> to form students' ideas about the patterns of physical phenomena due to the atomic and molecular structure of matter.</p> <p><b>Contents:</b> the fundamentals of the molecular-kinetic theory of gas, the main models of molecular physics and their regularities, the statistical regularities of macrosystems, the basics of the theory of heat capacity, transfer phenomena, the beginning of thermodynamics, the properties of liquids, solids and phase transitions are considered; the assessment of the main parameters of thermodynamic systems is carried out, the solution of problems, laboratory work and the practical application of laws are analyzed.</p>	7											

39		BD	EC	Thermodynamics and Kinetics	<p><b>Purpose:</b> to form students' ideas about the methods of thermodynamics and kinetics for the analysis of processes in substances with an atomic and molecular structure.</p> <p><b>Contents:</b> the equilibrium properties of macroscopic systems are considered, the principles of thermodynamics and their consequences and practical application, the use of thermodynamic potentials in specific problems of equilibrium theory; problems related to the chemical equilibrium of reactions in a gas mixture and in solutions are solved , the rates of simple chemical reactions are determined.</p>													
40		BD	EC	Electricity and Magnetism	<p><b>Purpose:</b> to form students' ideas about the laws of electromagnetism based on their practical application.</p> <p><b>Contents:</b> the basic concepts of electromagnetism are considered: charge, electric and magnetic field, their intensity and potential, current, electromagnetic oscillations and waves; outlines the basic laws and theorems of electromagnetism, the classification of substances according to magnetic susceptibility; an assessment of the main parameters in the interaction of substances with electromagnetic fields and the application of the laws of electromagnetism to solve practical problems are given.</p>	5												

41		BD	EC	Electromagnetism Practice	<p><b>Purpose:</b> to form students' skills in the practical application of the laws of electromagnetism.</p> <p><b>Contents:</b> electromagnetic fields, electromagnetic radiation, controlled waves, resonance, acoustic analogues, electromagnetic forces and energy are considered; problem solving, methods of conducting experiments are analyzed; practical applications of electromagnetic phenomena are explained: wired, wireless, optical communications, electromagnetic device circuits, microwave communications, radar, antennas, generators, motors and sensors, optical and acoustic devices, generation and transmission of electricity.</p>												
42		BD	EC	Fundamentals of Optics	<p><b>Purpose:</b> to form students' ideas about the laws of optical radiation and their application in practice.</p> <p><b>Content:</b> the physical foundations of the phenomena associated with the interaction of light with matter are considered; main experimental results in the field of optical phenomena; the basic laws of geometric and wave optics, methods for solving problems of optics, the principles of operation and the design of modern experimental equipment for the study of optical phenomena and matter using optical methods are analyzed.</p>	5											

43		BD	EC	Applied Optics	<p><b>Purpose:</b> to form students' skills in the practical application of the laws of optics.</p> <p><b>Contents:</b> the foundations of modern optics, the law of light propagation and image formation, the properties of optical radiation, its interaction with matter are considered; characteristics of optical systems, their element base; the basic principles of construction and operation of the simplest optical systems are shown; examples are given of determining the characteristics of an optical system and assessing the influence of an element of an optical system on image formation.</p>								+			+		
44		BD	EC	Physics of Atom and Atomic Nucleus	<p><b>Purpose:</b> mastering by students the basic knowledge of nuclear physics and the assimilation of its methods for their use in professional activities</p> <p><b>Contents:</b> the basic concepts of atomic, nuclear physics and elementary particle physics are considered; orders of physical quantities used; basic experiments and main experimental results; experimental methods of atomic and nuclear physics are analyzed; explains the use of the laws of atomic and nuclear physics in solving practical problems and conducting laboratory work.</p>	5							+			+		

45		BD	EC	Introduction to Applied Nuclear Physics	<p><b>Purpose:</b> to show students the application of the laws and methods of nuclear physics research in practice</p> <p><b>Contents:</b> the main provisions and concepts in the field of nuclear physics and elementary particle physics, the main phenomena and processes in microphysics, their role in the evolution of the Universe are considered; the possibility of applied use of these phenomena and processes; sections concerning the structure of the nucleus, the laws of radioactive decays and nuclear reactions, the basic properties of elementary particles and fundamental interactions</p>												
46		BD	EC	General Astronomy	<p><b>Purpose:</b> to form students' understanding of the Universe, the essence of the phenomena observed in it and the importance of astronomy in practical human activities.</p> <p><b>Content:</b> describes the evolution of ideas about the structure and development of the Universe; the main experimental facts, the laws of astronomy are stated; methods of astronomical research and their role in understanding the structure and dynamics of evolutionary processes in the Universe; methods of teaching astronomy in secondary educational institutions; the structure of astronomical instruments and the solution of problems of practical astronomy are explained .</p>	4											

47		BD	EC	General Astrophysics Course.	<p><b>Purpose:</b> to familiarize students with the main characteristics of astronomical instruments, methods of practical astrophysics and the main tasks of astrophysics</p> <p><b>Contents:</b> describes galactic and extragalactic astronomy; formation and evolution of galaxies; the principles of cosmology and cosmogony are analyzed; considers the birth, life and death of stars; presents modern ideas about the origin and early evolution of the solar system; explains the origin of the planets and life in the universe; and solving problems of practical astrophysics .</p>													
48		BD	EC	Physics in STEM	<p><b>Purpose:</b> to provide insight into concepts and contemporary issues in STEM education nationally and globally.</p> <p><b>Content.</b> Definition and principles of STEM education. Features and conditions for the implementation of STEM education. Strategies for integrated STEM learning based on a critical review of the history, methods, and theories of integrated STEM learning through contemporary research. Teaching science, technology, mathematics and engineering in secondary schools in STEM education settings.</p>	4												

49		BD	EC	History of Physics	<p><b>Purpose:</b> formation of knowledge about the stages of development of physics and the evolution of scientific concepts .</p> <p><b>Contents:</b> the main stages in the development of the science of physics are outlined; the main factors that determine the development of physics at each of the stages, stimulating the development of certain areas in the development of science, are considered; the relationship between the development of physics and technology and other sciences, their mutual influence is shown; the role of specific discoveries and research in the development of physics and technology is assessed.</p>			+										
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52		BD	HsC	Analytical Geometry	<p><b>Purpose:</b> familiarization of students with the basic concepts and methods of modern analytic geometry.</p> <p><b>Content:</b> vector algebra is being studied; considers the transformation of Cartesian rectangular coordinates, the main ways of describing geometric objects by algebraic methods; linear images are described, as well as the theory of second-order images. Examples of the use of the studied concepts in physics and technology are given.</p>													
53		BD	HsC	Theory of Probability and Mathematical Statistics	<p><b>Purpose:</b> to study the patterns of random events and random variables, properties and basic operations on them, elements of statistics.</p> <p><b>Contents:</b> the study of combinatorics, probability, a random variable and its characteristics, conditional probability, the law of large numbers, elements of mathematical statistics. Analysis of methods for solving problems for finding probability, methods for collecting, processing and analyzing statistical data .</p>	4												

54		BD	HsC	Differential and Integral Equations	<p><b>Purpose</b> :to form students' knowledge about the theory of differential and integral equations and the basic techniques for solving practical problems</p> <p><b>Content</b>: problems leading to differential equations are considered, differential equations of the first order, integrable in quadratures; equations that are not solved with respect to the derivative, differential equations of higher orders, which allow lowering the order, are stated; linear homogeneous and non-homogeneous differential equations of higher orders. The main methods for integrating systems of differential equations, some methods for solving integral equations are given.</p>													
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55	Fundamentals of programming and databases	BD	EC	Data base and information systems	<p><b>Purpose:</b> formation of conceptual ideas about the basic principles of building a database; database management systems; mathematical models describing the database; about the principles of design, practical development of methods for creating databases and their subsequent operation.</p> <p><b>Contents:</b> Basic concepts. The history of the origin and development of the database. Classification. IS architecture. Types of information systems. database models. Attribute. Tuple. Relations (tables), Normal forms. Primary and foreign keys. Operations of relational algebra. Database life cycle. Planning and designDB. Application Development. Conceptual database design. Entity Link Model (ERD). Organization of the interface for data processing. Creation of design applications and their editing. Search for information from the fund provided. SQL query language. Organization of accounting.</p>	5			+					+	+			
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5 6		BD	EC	<p>Creating and Managing Databases</p>	<p><b>Purpose:</b> to study the theoretical foundations of modern databases, the principles of developing databases and tools for working with them, to acquaint students with the necessary knowledge and skills to work with databases in various information systems.</p> <p><b>Content:</b> Master the theoretical foundations of modern databases, the principles of database development and tools for working with them, be able to work with databases in various DBMS, be able to apply databases in solving practical problems. Discuss the basics of design, development, and programming. Advanced and new topics (stored procedures, data stores, and so on). Demonstrate knowledge of the theory, methods and technologies of relational databases and their development; Create database systems oriented to the Internet; Understand application challenges and current trends in database technology. Create a project for the selected DBMS.</p>				+					+	+			
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57		PD	EC	<p>Object-Oriented Programming in Borland C++ Environment</p>	<p><b>Purpose:</b> Formation of ideas about the methodology for developing programs, technologies used in software; teaching C ++ in all the main features of the object-oriented language and its use in program development</p> <p><b>Contents:</b> C++ is a procedural language, but it deals in detail with the features of object-oriented programming. About the main organizations used in object-oriented programming: class, object, event, properties and methods</p> <p>These concepts are: an object is a variable whose structure is described by a class type; event-change of object state; properties - characteristics (parameters) of the object; command method or procedure, a function that searches for members of a class. A class is a user-defined type. In object-oriented programming, the principles of inheritance, encapsulation, and polymorphism are implemented for a class. The language also has a special constructor for dealing with memory, the destructor function.</p>	4												
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58		PD	EC	Object Oriented Programming in Borland Delphi Environment	<p><b>Purpose:</b> Programming language in the Borland Delphi-PASCAL environment. The study of its object-oriented extension using and further deepening the knowledge gained by students in the previous semester in the PASCAL programming language. Learn how to create simple Windows applications using the capabilities of Borland's object-oriented programming language Delphi, get used to work based on the knowledge gained</p> <p><b>Content:</b> Knowledge of the basics of object-oriented programming, algorithmization and data description tools, as well as programming technologies . Object-oriented programming is a powerful tool that allows you to model objects in the real world, as well as create virtual objects that exist only in an electronic environment .Use of modern ready-made class libraries, technologies and tools. Creating a project in the Borland programming language Delphi.</p>				+					+	+			
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59		PD	EC	Web services and programming	<p><b>Purpose:</b> Creation of a conceptual representation of the components of a Web page using technologies and programming languages to create a site ( HTML, CSS, JavaScript, PHP, CGI ) and further publication on the Internet.</p> <p><b>Contents:</b> Introduction to the Internet, WWW Service. The structure of a Web document. HTML formatting tags. Using a List in HTML. Tables in HTML. Links in an HTML document. Using a Form in HTML. Using a Frame in HTML Adding styles to an HTML document. Introduction to CSS. Interactive web -document interface. Introduction to JavaScript. Operators in JavaScript. Introduction to PHP. Working with RNR. Loading PHP/ Apache. Working with Denver . CGI technology.</p>	4			+					+	+			
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60		PD	EC	Technology of Programming in Java	<p><b>Purpose:</b> gaining knowledge about the modern object-oriented programming language Java and mastering the basic programming techniques, gaining practical skills in developing programs in the Java language. <b>Contents:</b> Introduction to Java programming. Data types. Working with Classes in the Java Language. Use the basic concepts of developing enterprise applications in the Java programming language.</p> <ul style="list-style-type: none"> <li>-use integrated development environments (IDEs and application servers to develop and deploy JavaEE;</li> <li>- define a web application , explain its design and how it works, using a basic vocabulary of common computing terms such as value, constant, variable, classes, objects, attributes, constructors, methods, and parameters;</li> <li>- describe Java technologies EE;</li> <li>- write Java applications, demonstrating significant programming ability;</li> </ul>				+					+	+			
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6 1		PD	EC	Information Security in Computer Systems	<p><b>Purpose:</b> the acquisition of practical skills and teaching the theoretical foundations of the use of information systems in information systems, teaching students the systematic organization of processes, methods and means of implementing data protection, acquiring practical skills in information protection for the design and use of information systems.</p> <p><b>Content:</b>The study of organizational, technical, algorithmic and other methods and means of protecting computer information .Development of modern cryptosystems with the application of legislation and standards in this area .Analysis of the main OS security models, network management, multi-level protection of corporate networks, information protection in networks, mastering the requirements for information security systems</p>	4												
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62		PD	EC	Cryptograph y and Data Encryption	<p><b>Purpose:</b> knowledge of encryption algorithms, the ability to implement standard cryptosystems in a programming language, the skills to combine various methods of information protection. Demonstrate knowledge of the basics of modern cryptography and tasks related to information security problems; study of formal and classical cryptosystems; the main tasks of cryptanalysis; applications of mathematical modeling in cryptography .</p> <p><b>Contents:</b> Introduction. Modern cryptography and tasks related to information security problems. Fundamentals of Cryptology, Cryptography and Cryptographic Analysis. Role of cryptographic protocol sin the general task of ensuring information security. Traditional historical ciphers. Substitution ciphers and permutation ciphers. Formal definition of a cryptosystem. classical cryptosystems. The main tasks of cryptanalysis. Principles of construction of modern symmetric cryptographic systems. Modern block ciphers. Composite ciphers. Attacks on block ciphers. Public key cryptosystems. Applications of mathematical modeling in cryptography. Prospects for the development of cryptology, cryptography and cryptographic analysis.</p>													
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63	Physical Fundamentals of Modern high Technologies	PD	EC	Introduction to Nanotechnology	<p><b>Purpose:</b> formation of basic knowledge and business skills that allow one to navigate in the areas of terminology and nanotechnology as a set of technological methods used for research, design and production of materials, devices and systems</p> <p><b>Content:</b>the discipline deals with problems, actual tasks of nanotechnologies; physical principles of size effects manifested in the properties of nanostructures; information about the properties of nanostructures and experimental methods for obtaining nanostructures; examples of solving problems in the field of nanotechnology and their practical application are presented.</p>	5			+					+				
64		PD	EC	Introduction to nano electronics	<p><b>Purpose:</b> study of fundamental principles and physical effects of nanotechnology.</p> <p><b>Contents:</b> problems, actual tasks of nanotechnology are considered; physical principles of size effects that manifest themselves in the properties of nanostructures; fundamental differences in the properties of various substances in the transition from ordinary to nanometer sizes; experimental methods for obtaining nanostructures and information about the properties of nanostructures; examples of solving problems in the field of nanotechnology and their practical use are given.</p>				+					+				

65		PD	EC	Introduction to Robotics	<p><b>Purpose:</b> to introduce the history of the development of robotics and the basic knowledge of students</p> <p><b>Contents:</b> Introduction to ARDUINO robotics. Lantern with their own hands. Sound sensor (microphone). LED control button. Robot buttons. Introduction to the photoresistor. Photoresistor LED. Potentiometer LED. LCD display with I2C module. Temperature and humidity sensor + LCD. Sudatchik + pump. With a system of self-government. Design and programming of electric vehicles and robomobiles. Skillwork VLEGO, MINDSTORMS, Education EV3 and LEGODigitDesigner.</p>	5			+					+	+			
66		PD	EC	Fundamentals of IT Technology	<p><b>Purpose:</b> preparing students for the creation and effective use of electronic educational publications in the educational process.</p> <p><b>Content:</b> Familiarity with software for the development of e-learning materials. Create a template. Media technologies in development electronic means learning. Review of existing eLearning development software funds. Role electronic teaching funds in d remote education.</p>			+					+	+				

67		PD		Industrial Pedagogical Practice I	<p><b>Purpose:</b> preparing students for professional teaching activities, familiarizing them with educational work at school and with advanced pedagogical experience.</p> <p><b>Content:</b> collection of information about the activities of the educational institution and the professional activities of the teacher. Analysis of normative documents that determine the content of education under the updated program. Acquaintance with advanced pedagogical experience, the experience of a subject teacher, methods of teaching computer science and physics (observation and analysis of lessons, study of the thematic and lesson plans of the teacher, a plan for conducting optional classes and extracurricular activities. Working with an electronic journal and diaries of students. The use of digital and other modern technologies in conducting classes. Carrying out extracurricular educational work with students.</p>	10												
68	Modern Problems of Education	PD	EC	New Approaches to Teaching Physics	<p><b>Purpose:</b> to acquaint with modern methods and technologies necessary to ensure the quality of teaching physics.</p> <p><b>Content:</b> the current state of methodological science is outlined, new approaches to teaching physics at school, the principles actively used in the educational process; modern diagnostic methods are considered; new technologies for teaching physics and informatics; modern methods and technologies for organizing educational activities; analyzes various methodological theories, existing didactic problems; the practical expediency and effectiveness of theories are determined.</p>	4				+	+						+	

69		PD	EC	Conceptual Fundamentals for Updating General Education Content	<p><b>Purpose:</b> improving the pedagogical skills of future teachers in the context of updating the content of general education</p> <p><b>Content:</b> the development of the spiral form of education is outlined; development of educational policy in the field of pedagogical measurements, basic principles and approaches for its implementation at school; the terms and definitions of the criteria-based assessment system are presented; considers active methods and techniques of teaching and learning, as well as the implementation of the values of the national idea "Mangilik El" through the content of academic subjects; practical recommendations are given for planning, organizing and managing the processes of formative and summative assessment of students' educational achievements.</p>													
70		PD	EC	Computer methods in physics	<p><b>Purpose:</b> use of computer methods in physical processes, information processing. In today's complex operating environment, application packages for word processing, graphical information visualization, etc.</p> <p><b>Content:</b> The discipline deals with a general idea of the MATLAB programming environment; formatting two- and three-dimensional graphs; work with graphs and construction of special graphs of the MathCAD and MATLAB systems; animation and analysis of physical phenomena in the MATLAB system; solving physics problems in Pascal language, in the programming environment MathCAD and MATLAB.</p>	4												

71		PD	EC	Modeling of physical processes	<p><b>Purpose:</b> the use of computer methods to build mathematical models of physical phenomena analysis of results.</p> <p><b>Contents:</b> The discipline outlines methods for constructing mathematical models of physical phenomena, their qualitative analysis, the development of algorithms for solving equations that make up the essence of the phenomenon model; an analysis of the basics of computer modeling is carried out; considers visualization and work with packages for modeling molecular dynamics; principles of conducting a computer experiment and analysis of its results; problem solving using software packages.</p>				+					+	+		
72		PD	HsC	Industrial Pedagogical Practice II	<p><b>Purpose:</b> the inclusion of students in practical pedagogical activities, the formation of students' professional skills and abilities of independent conduct of educational work with students.</p> <p><b>Content:</b> acquaintance with the educational institution, with the teaching staff, with school documentation, with the lesson schedule, with school reporting forms, with a class journal, didactic materials and technical equipment for computer science and physics classrooms. The study of the pedagogical and psychological characteristics of students in the class. Conducting and analyzing lessons in computer science and physics, assessing students' educational achievements using criteria-based assessment, making and using visual aids. Acquisition of practical skills and teaching skills and experience of independent professional activity.</p>	5						+				+	



**5.Summary table reflecting the volume of disbursed loans by EP modules**

Course of training	Semester	Amount of the mastered modules	Amount of the studied disciplines			Amount of KZ credits							Total in hours	Total KZ credits	Amount	
			Compulsory component	University component	Optional component	Theoretical training	Physical education	Training practice	Production practice	Pre-diploma practice	Final attestation	Theoretical training			Exam	diff. offset
1	1	5	5		2	28	2						900	thirty	6	1
	2	3	4	1	2	27	2	1					900	thirty	5	2
2	3	6	2	5	2	27	2			1			900	thirty	6	3
	4	6	1	4	3	26	2			2			900	thirty	6	2
3	5	5	1	2	4	22				2		6	900	thirty	6	2
	6	4		1	4	26				4			900	thirty	4	1
4	7	5		2	7	33			10				1290	43	7	2
	8	2		2	1				4	5	8		510	17	4	
	9															
Total		15	9	18	22	189	8	1	14	14	8	6	7200	2 40	44	13

## 6.Strategies, teaching methods and artificial intelligence, monitoring and assessment

<p><b>Learning strategies</b></p>	<p>Student–centered learning: The student is the center of teaching/learning and an active participant in the learning and decision-making process.</p> <p>Practice-oriented training: orientation to the development of practical skills.</p>
<p><b>Teaching methods</b></p>	<p>Conducting lectures, seminars, various types of practices with:</p> <ul style="list-style-type: none"> <li>• the use of innovative technologies;</li> <li>• problem-based learning;</li> <li>• case study;</li> <li>• work in a group and creative groups;</li> <li>• discussions and dialogues, intellectual games, olympiads, quizzes;</li> <li>• reflection methods, projects, benchmarking;</li> <li>• Bloom's taxonomies;</li> <li>• presentations;</li> <li>• * rational and creative use of information sources:</li> <li>• * multimedia training programs;</li> <li>• * electronic textbooks;</li> <li>• * digital resources.</li> <li>• * machine learning methods</li> </ul> <p>Organization of independent work of students, individual consultations.</p>
<p><b>Monitoring and evaluation of the achievability of learning outcomes</b></p>	<p>Current control on each topic of the discipline, control of knowledge in classroom and extracurricular classes (according to syllabus).</p> <p>Assessment forms:</p> <ul style="list-style-type: none"> <li>• survey in the classroom;</li> <li>• testing on the topics of the academic discipline;</li> <li>• control works;</li> <li>• protection of independent creative works;</li> <li>• discussions;</li> <li>• trainings;</li> <li>• colloquiums;</li> <li>• essays, etc.</li> </ul> <p>Boundary control at least twice during one academic period within the framework of one academic discipline.</p> <p>Intermediate certification is carried out in accordance with the working curriculum, academic calendar.</p> <p>Forms of conducting:</p> <ul style="list-style-type: none"> <li>• exam in the form of testing;</li> <li>• oral examination;</li> <li>• written exam;</li> <li>• combined exam;</li> <li>• project defense;</li> <li>• protection of practice reports.</li> </ul> <p>Final state certification.</p>

## 5. EDUCATIONAL AND RESOURCE SUPPORT OF THE EP

<p><b>Information Resource Center</b></p>	<p>The structure of the OIC includes 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The network infrastructure of the OIC is based on 180 computers with Internet access, 110 workstations, 6 interactive whiteboards, 2 video doubles, 1 videoconferencing system, 3 A-4 format scanners, OIC software - AIBS "IRBIS- 64 " under MSWindows(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 <a href="http://lib.ukgu.kz">http://lib.ukgu.kz</a> online 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 24/7 via external link<a href="http://articles.ukgu.kz/ru/ppp">http://articles.ukgu.kz/ru/ppp</a> . Catalogs are processed electronically. EC consists of 9 databases: "Books", "Articles", "Periodicals", "Proceedings of the teaching staff of SKU", "Rare Books", "Electronic Fund", "SKU in Print", "Readers" and "SKR". The OIC provides its users with 3 options for accessing its own electronic information resources: from the “Electronic Catalog” terminals in the catalog hall and divisions of the OIC; through the information network of the university for faculties and departments; remotely on the library website <a href="http://lib.ukgu.kz/">http://lib.ukgu.kz/</a>. Access to international and republican resources is open: SpringerLink, Plenipotentiary, Web of Science, EVSCO, Epigraph, electronic versions of scientific journals in open access, Zan, RMEB, Adebiet , Digital library "Aknurpress", "Smart-kitar", "Kitar.kz", etc. For people with <i>special needs</i> and disabilities, the library website has been adapted to the work of visually impaired users</p>
<p><b>Material and technical base</b></p>	<p>For the preparation of bachelors in this direction, there is an appropriate material and technical base of the specialty, that is, classrooms, laboratories, a computer class that meet the requirements of the State Educational Standard. The Department of Physics includes 9 classrooms (215, 219, 222, 224, 226, 228, 230, 232, 215) in building No. 7, with a total area of 328,3 m<sup>2</sup>. Room 219 ( 74,4 m<sup>2</sup>) is an auditorium where various types of classes are held. Room 228 ( 51,8 m<sup>2</sup>) is the teaching room. Room 215, the area 35 m<sup>2</sup>is a utility room. Room 222 ( 35,7 m<sup>2</sup>) computer class, where 13 computers are installed. Room 226 ( 28,4 m<sup>2</sup>) Laboratory of Mechanics and Molecular Physics. 224 ( 26,1 m<sup>2</sup>) room laboratory of Electromagnetism. Room 230 ( 34,7 m<sup>2</sup>) Laboratory of TSE and astronomy. Room 232 ( 42,2 m<sup>2</sup>) Laboratory of Optics, Atomic and Nuclear Physics (an interactive whiteboard is installed here).</p>

**APPROVAL SHEET**

on the educational program 6B01522 - Physics-Informatics

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