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MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN

M. AUEZOV SOUTH KAZAKHSTAN UNIVERSITY

«APPROVED»
Chairman of the Board - Rector
AUEZOV D.Zh.Ahmed-Zaki
«26» 03 2026y.

EDUCATIONAL PROGRAM

7M01522-Physics and computer science with the basics of STEM learning

Registration number	7M01500255
Code and Classification of Education	7M01Pedagogical sciences
Code and Classification of Areas of Training	7M015 Teacher training in natural sciences subjects
Group of educational programs (EP)	M011 Teachers training in physics
Type of EP	innovation
ISCE level	7
NQF level	7
IQF level	7
Language of learning	Kazakh Russian English
The complexity of EP	120 credits
Distinctive features of EP	-
Partner university (JEP)	-
University partner (DDEP)	-

Shymkent , 2026

Developers:

Full Name	Position	signature
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The educational program has been updated taking into account the new model of inclusive education and agreed with the City department of employment and social protection.

Deputy Head of the Department of Employment and Social Protection of Shymkent _____ K.Kaldykarayev

The EP was considered at a meeting of the Academic Quality Committee of the «Natural Sciences and Pedagogics» Higher School,

Minutes # 6 «23» 02 2026 y.

Chairman of the Academic Quality Committee _____ A.Z. Tursynbayev

The EP was considered and recommended for approval at Educational-methodical meeting of M. Auezov SKU , Minutes # 4 «27» 02 2026 y.

Chairman of the EMM _____ E. Imangaliev

The EP was approved by the decision of the Academic Council of the University

Minutes # 14 «26» 03 2026y.

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1. Concept of the Educational program

University mission	Generation of new competencies, preparation of a leader who translates research and entrepreneurial 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 in choice, development and action.** • Partnership - creates trust and support in relationships where everyone wins. • Social responsibility - ready to fulfill obligations, make decisions and be responsible for their results.
Model of graduate	• Deep subject knowledge, its application and constant expansion in professional activities. • Information and digital literacy and mobility in a rapidly changing environment. • Research skills, creativity and emotional intelligence. • Entrepreneurship, independence and responsibility for self-activity and well-being. • Global and national citizenship, tolerance for cultures and languages.
Alignment of the Educational Program with the Sustainable Development Goals (SDGs)	**SDG 4. Quality Education** The programme prepares qualified teachers proficient in modern physics teaching methods, digital technologies, and the STEM approach. **SDG 5. Gender Equality** The programme ensures equal access to STEM education and promotes women's participation in physics, computer science, and digital technologies. **SDG 8. Decent Work and Economic Growth** The development of professional, research, and digital competencies enhances graduates' competitiveness and professional mobility. **SDG 9. Industry, Innovation and Infrastructure** The integration of physics, computer science, and engineering design develops skills in creating digital resources, computer models, and innovative STEM projects. **SDG 10. Reduced Inequalities** Inclusive and distance-learning technologies expand access to quality physics and STEM education for different categories of learners. **SDG 17. Partnerships for the Goals** Cooperation with schools, research organisations, and IT companies facilitates joint research and innovative STEM projects.
Uniquenessof EP	• Orientation to the regional labor market and social order through the formation of professional competencies of the graduate, adjusted to the requirements of stakeholders. • Practice orientation and emphasis on the development of critical thinking and entrepreneurship, the formation of a wide range of skills that will allow you to be functionally literate and competitive in any life situation and be in demand in the labor market.
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. 8 n/a dated 08/01/2025). • Code of Ethics (Order No. 212 of October 10, 2022)

Regulatory and legal framework for the development of EP	1.Law of the Republic of Kazakhstan "On Education"; 2. «Model Rules for the Activities of Organisations of Higher and Postgraduate Education», approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated June 24, 2024. No. 307; 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 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 26, 2024. No. 372; 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 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated March 04, 2025. No. 90; 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 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated April 29, 2024. No. 203; 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 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated June 20, 2024. No. 207; 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 н/к
Organization of educational process	• Implementation principles Bologna process • With a student centered education • Availability • Inclusiveness
Quality assurance of EP	– 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 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 26, 2024. No. 372
Conditions for the	For students with SEN (special educational needs) and persons

implementation of educational programs (EP) for persons with disabilities and special educational needs(SSN)	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 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 program

Purpose of the OP	Training of highly qualified masters who are able to design and implement physics education based on a STEM approach, integrate digital and innovative technologies, conduct pedagogical research and apply their results to improve educational practice.
OP Tasks	– meeting the needs of the individual in intellectual, cultural and moral development by obtaining higher postgraduate education; - training of masters, teachers of physics, capable of successfully mastering related areas of professional activity, as well as advanced training, training in additional education programs and continuing education in doctoral studies; – meeting the needs of society in qualified specialists in the field of education and teaching physics in universities that are able to integrate academic values with entrepreneurial ideas; - development of a favorable educational environment for the implementation of professional, cultural and linguistic needs of students ; – formation of a deep professional understanding of fundamental problems and practical methods for their solution in the field of physics and methods of teaching physics and its applications in scientific and pedagogical activities; - the formation of professional ability to plan and independently conduct effective scientific and pedagogical work, as well as to critically evaluate its results; - the formation of the ability to adapt and apply general methods of solution to the solution of non-standard problems; - preparation for professional activities at a university, research institute, in production or doctoral studies; - 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	• 7th level National offrameworkRK qualifications; • Dublin descriptors of7 skill levels; • 2 cycleof Framework for Qualification of the European Higher Education Area; • Level 7 of theEuropeanQualificationframeworkforlifelonglearning.
Connectionof EPwith the professional sphere	Professional standard "Teacher", approved by the order Minister of Education of the Republic of Kazakhstan dated February 24, 2025 No. 31. Professional standard "Teacher", approved by the order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated November 20, 2023 No. 591.
Name of the degree awarded	After successful completion of this educational program, the graduate is awarded the degree: Master of Pedagogical Sciences in the educational program “7M01522-Physics and Informatics with the basics of STEM education”.
Scrollqualifications and positions	Masters of EP 7M01522-Physics and Computer Science with the basics of STEM education can hold the positions of assistant teacher, teacher, senior teacher of physics and computer science in universities, colleges, teacher-researcher and teacher-master in secondary and secondary specialized educational institutions, and researcher in scientific - research institutions.

Sphere of professional activity	– area of education, - social sphere for the development of children and young people in general education and higher education organizations, educational institutions and centers, – scientific activity and entrepreneurship in the field of education, – fields of physics and computer science, physics and computer science in education and in production.
Objects of professional activity	– higher, secondary and secondary specialized educational institutions (universities, colleges, educational institutions of technical and vocational education, lyceums, school gymnasiums), – management organizations: state educational authorities, departments of education; – research organizations.
Subjects of professional activity	- the educational process in the unity of its value-target guidelines, content, methods, forms and results; –scientific and pedagogical, innovative, informational and analytical activities in the field of methods of teaching physics and informatics.
Types of professional activity	*pedagogical and educational:* – organization of the educational process at different levels of the education system (organization of the process of education and upbringing, design and management of the pedagogical process, diagnostics, correction, prediction of the results of pedagogical activity); – preparation and conduct of classes in physics and informatics; – management of scientific work of students; – conducting optional classes in physics and informatics; – organization of cultural and leisure work with young students in the field of education, development of programs, methods and technologies for educational work in the field of physics and computer science, as well as its scientific and technical achievements. *research* : – conducting scientific research on the problems posed in the field of education; - selection of the necessary research methods; – formulation of new tasks arising in the course of scientific research; – work with scientific literature using new information technologies, tracking scientific periodicals; – analysis of the received scientific information using modern computer technology. *scientific and innovative* : – application of the results of scientific research in innovative activities; – development of new methods of scientific and pedagogical activity; – participation in the formulation of new tasks and the development of new methodological approaches in scientific and innovative research; – processing and analysis of the received data with the help of modern information technologies. *organizational and managerial* : – participation in the organization of research and scientific and innovative work; – participation in the organization of seminars, conferences; – preparation of abstracts, writing and design of scientific articles; – participation in the preparation of applications for grant competitions and the preparation of scientific and pedagogical projects, reports and patents.

Learning Outcomes	**LO1** Analyze and evaluate contemporary scientific and pedagogical concepts and trends in the development of physics and STEM education, and justify the selection of effective strategies for teaching physics in accordance with current educational needs. **LO2** Design and justify the physics education process based on student-centered, competency-based, and inclusive approaches, taking into account learners' individual educational needs. **LO3** Develop and integrate teaching and methodological materials, experimental, research, and STEM-based physics tasks using digital technologies and modern educational resources. **LO4** Develop, apply, and evaluate modern systems and tools for criterion-based assessment of learning outcomes in physics, interpret the obtained data, and use them to improve the educational process. **LO5** Research and interpret physical phenomena and processes, model physical systems, analyze experimental data, and apply the obtained results to the design and improvement of physics education. **LO6** Design and implement interdisciplinary STEM projects integrating physics, mathematics, computer science, engineering technologies, and robotics, and evaluate their educational and practical effectiveness. **LO7** Conduct and interpret pedagogical research in the fields of physics education and STEM education; apply methods for data collection, processing, and statistical analysis; and develop evidence-based recommendations for improving educational practice and physics teaching methodology. **LO8** Carry out professional and academic interaction with students, teachers, employers, and the scientific community; present and substantiate the results of pedagogical and research activities; comply with academic ethics standards; and plan professional development.

3. Competencies of a graduate of the EP

GENERAL COMPETENCIES (SOFTSKILLS). Behavioral skills and personal qualities	
GC 1.Competence in managing one's literacy	GC 1.1. Strive for professional and personal growth throughout life. GC 1.2. Constantly update own knowledge within the chosen trajectory and in an interdisciplinary environment, carry out further learning with a high degree of independence and self-regulation. GC 1.3. To be capable of reflection, an objective assessment of one's achievements, an awareness of the need to form new competencies and continue education in doctoral studies.
GC 2. Language competence	GC 2.1. The ability of possessing a sufficient level of communication in the professional field in the state, Russian and foreign languages for negotiating and business correspondence. GC 2.2. The ability of mastering the skills of mediation and intercultural understanding.
GC 3. Mathematical Competence and Competence in the field of Science	GC 3.1. The ability to interpret the methods of mathematical analysis and modeling for solving applied problems in the field of study. GC 3.2. The ability to plan the setting of scientific experiments, integrate and implement the results of scientific research in the professional field. GC 3.3. The ability to analyze and comprehend modern methods of pedagogical and psychological science and apply them in pedagogical activity.
GC 4. Digital competence, technological literacy	GC 4.1. The ability to confidently use modern information and digital technologies, artificial intelligence systems for work, leisure and communications. GC 4.2. Proficiency in the use, recovery, evaluation, storage, production, presentation and exchange of information in a wide range of digital devices. GC 4.3. Ability to confidently use global information resources and apply technological literacy in research and computational and analytical activities.
GC 5. Personal, social and educational competencies	GC 5.1. Possession of the norms of business ethics, social and ethical values and focus on them in professional activities. GC 5.2. Formation of a personality capable of mobility in the modern world, critical thinking and physical self-improvement. GC 5.3. Ability to work in a team, correctly, clearly and reasonably defend one's position during discussions and make decisions of a professional nature. GC 5.4. Ability to adequately navigate in various social spheres of activity and in conditions of uncertainty. GC 5.5. Ability to find compromises, correlate own opinion with the opinion of the team.
GC 6. Entrepreneurial competence	GC 6.1. The manifestation of leadership qualities and the ability to have a positive impact on others, to lead a team. GC 6.2. The ability to create conditions for the development of creative and entrepreneurial skills of the team. GC 6.3. The ability to work in a mode of uncertainty and rapidly changing task conditions, make decisions, respond to changing working conditions, allocate resources and manage your time.

	GC 6.4. Ability to work with consumer needs.
GC 7. Cultural awareness and self-expression	GC 7.1. The ability to show worldview, civil and moral positions. GC 7.2. The ability to be tolerant of the traditions and culture of the peoples of the world, to have high spiritual qualities.
HARD SKILLS	
Theoretical knowledge, practical skills and abilities specific to this direction	**PC1** ability to independently set specific tasks of scientific research in the field of methods of teaching physics and solve them with the help of information technology and the use of the latest domestic and foreign experience. **PC2** the ability to apply knowledge of physics and methods of teaching physics to solve scientific and innovative problems, and apply the results of scientific research in innovative scientific and pedagogical activities. **PC3** ability to participate in the development of new methods and methodological approaches in scientific and innovative research and teaching activities **PC4** the ability to plan, organize and conduct research, scientific seminars and conferences in the field of education and physics. **PC5** ability to prepare and execute scientific and pedagogical documentation, scientific reports, reviews, reports and articles. **PC6** ability to lead research activities of students in the field of physics and methods of teaching physics. **PC7** the ability to methodically competently build lesson plans for the sections of academic disciplines in physics and publicly present the theoretical and practical sections of these disciplines in accordance with the approved teaching AIDS. **PC8** ability to demonstrate professional values: professionalism; innovation; creativity; meritocracy; integrity

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
GC1	+	+	+			+	+	
GC 2	+	+	+			+	+	
GC 3		+	+	+	+		+	+
GC 4	+	+		+	+			
GC 5		+			+			
GC 6			+	+	+			+
GC 7					+		+	
PC1	+	+	+		+		+	+
PC2	+	+	+		+	+	+	+
PC3		+		+		+		
PC4			+		+	+		+
PC5			+				+	
PC6							+	
PC7			+		+	+		+
PC8			+				+	+

4.Matrix of the influence of modules and disciplines on the formation of learning outcomes and information on labor intensity

No.	Module	Cycle	Component	Name of the discipline	Brief description of the discipline	Amount of credits	Formed learning outcomes (codes)							
							LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8
1	Module of Scientific and pedagogical training	BD	UC	History and Philosophy of Science	Purpose: Study of the problems of the phenomenon of science as a subject of special philosophical analysis, patterns and trends in the development of special activities for the production of scientific knowledge taken in a socio-cultural context. Contents. Identification of the specifics and relationship of the main problems of history and philosophy of science. Study of the laws of the development of science and the structure of scientific knowledge, methods of scientific research. Knowledge of the main concepts and directions of the non-classical and post-classical stage of the development of science. Analysis of the realities of modern theory and practice based on understanding the methodology of natural science, socio-humanitarian and technical knowledge. Critical thinking as a prerequisite for the development and functioning of modern society. Technologies for the development of critical thinking: consideration and study of the logic of arguments. Formation of	4	v							

					critical reflexive thinking and metacognitive abilities.									
2		BD	UC	Foreign Language (professional)	The aim is systemic deepening of communicative competence within the framework of foreign language education's international standards based on the further skills and abilities' active language proficiency development in the professional activities of the future master's student Contents. Levels B2, C1 are presented in the form of a pragma-professional orientation for professional and academic aims at an advanced level: scientific information base, interpretation of scientific information, argumentation, persuasion, scientific controversy, academic writing. Use of innovative methods and technologies, and attraction of modern means (Internet resources). Demonstration of language material's knowledge in any related discipline	4								**v**
3		BD	UC	Pedagogy and Psychology of Higher Education	The purpose of the course is to develop undergraduates' skills and abilities to effectively organize professional and pedagogical activities at a university based on modern psychological and pedagogical knowledge. Course content: Modern paradigms of higher education. History, trends and strategies of higher education development in Kazakhstan. The subject, tasks, and categories of higher school pedagogy and	5	**v**							**v**

					psychology. Methodological foundations of higher school pedagogy and psychology. Professional competence of a university teacher. The communicative competencies of a university teacher. Higher school didactics. Psychological features of student age.The university learning process and its patterns. The content of education at the university. Forms of organization of the educational process at the university. Technologies of organization and implementation of the educational process at the university. Features of the credit training system. Methods and methods of teaching. The relevance and objectives of inclusive education. Psychological and pedagogical aspects of teaching students with special educational needs. Creating a psychologically supportive educational environment for inclusive education at universities.										
4	Methodology	PD	EC	Methods of Teaching the Basic Principles of Physics	Purpose: to familiarize with the basic principles of physics, the methodology of their training and the possibilities of their application in solving problems of professional activity. Contents: Scientific and methodological analysis of the basic principles of physics and methods of their teaching. Physical methods of studying nature, objects of	4		**v**	**v**					

					studying physics: phenomena, body, matter and physical field. Examples of solving physics problems using general methodological principles of physics are given: the principles of symmetry, relativity, causality, superposition, complementarity, etc. The main demonstrations and experiments of physics are presented.									
5 6		PD	EC	Methods of Teaching Educational Robotics	Purpose:To develop theoretical, methodological, and practical competencies among master's students in the design and organization of educational robotics instruction within the framework of STEM education. Contents:The course covers the theoretical, methodological, psychological, and pedagogical foundations of teaching educational robotics, as well as didactic principles, methods, and forms of organizing the educational process. Approaches to designing learning content and outcomes are explored, taking into account learners' age-related and individual characteristics, as well as the potential of robotics platforms and educational construction kits. Students develop skills in organizing project-based, research-oriented, and practice-based activities, designing teaching and learning materials and tasks, and developing criteria and assessment tools for evaluating learning outcomes.				**v**			**v**		

7		BD	EC	Methodology and Methods of Pedagogical Research	Purpose: To develop methodological and research culture in master's students, to develop research competence in developing, conducting and analyzing scientific research in education. Contents: theoretical and methodological foundations of pedagogical research. Modern approaches to research. Classification of scientific research methods in education. Technologies for carrying out of pedagogical experiment. Sociometric techniques in pedagogical research. Methods of processing and analyzing empirical data. Methods of mathematical statistics in pedagogical research. Research structure and ethics and interpretation of results. Application of knowledge in master's theses and educational practice.	5					v		v	
8		BD	EC	Organization, Planning and Forecasting of Scientific Research	Purpose: to develop in master's students the skills and abilities of effective organization of independent scientific research activities, mastering the methods of forecasting research results taking into account modern global trends. Contents: theoretical foundations of scientific research organization. Structure and main stages of the scientific research process. Protection of intellectual property. Planning scientific research: principles and methods. Forecasting in scientific research.						v		v	

					Organization of research groups work. Ethics of scientific research and scientific projects quality management. Innovative technologies in research planning and forecasting. Specifics of presenting research results.									
		PD	UC	Methods and Technologies of STEM Education	Purpose: Development of creative abilities of master students for the original solution of interdisciplinary problems, as well as mastering the basics of designing STEM classes to achieve educational goals. Contents: The content, teaching methods, technologies and didactic tools of STEM education are considered. Methods and technologies of STEM education are being explored, such as project-based learning, problem-based learning, research method, design thinking method, virtual reality technologies. The specifics of the implementation of STEM methods and technologies in modern lessons of various types in teaching physics are shown. Examples of the use of virtual reality technologies, 3D printing, blended learning and artificial intelligence in education are given.	5	**v**		**v**			**v**		

9	Technology	BD	EC	Introduction to STEM	Purpose: to provide insight into the concepts and current issues in STEM education at the national and global levels. Contents. Definition and principles of STEM education. Features and conditions for the implementation of STEM education. STEM policies and initiatives at the national and global levels. Strategies for Integrated STEM Learning based on a critical review of the history, methods, and theory of Integrated STEM Learning within the framework of contemporary research. STEAM in the field of inclusive and special education.	4	v					v		
10		BD	EC	Concepts of Modern Natural Science	Purpose: formation of the scientific worldview of master students based on the assimilation of the most important natural science concepts and theories that underlie modern natural science and determine the prospects for its development. Contents: the main stages of the development of the natural science picture of the world are considered. The fundamental concepts and principles on the basis of which these pictures of the world are described. Key scientific achievements in the field of natural science. Methods of scientific cognition of various levels of organization of matter, space and time. Principles and categories of modern interdisciplinary concepts of natural science.		v					v		

11		PD	EC	Online Educational Platforms	Purpose: to acquire the knowledge and skills necessary for the successful development, implementation and management of online platforms in an educational environment. Contents: Definition and features of online educational platforms. Fundamentals of designing educational online platforms: structure, principles of development, functionality, interface and usability for users. Technical aspects of online educational platforms. Development, placement, management and updating of content on an online platform. Organization of interaction and communication on online platforms: services and tools. Analysis of data and statistics on the use of the platform. Managing the development and updating of online platforms.	5			v	v				
12		PD	EC	Modern Approaches and Technologies for Assessing Educational Outcomes in Physics	Objective: To develop students' knowledge and skills in applying modern approaches to the assessment of educational outcomes in Physics, ensuring objective evaluation of learners' subject-specific and cross-curricular achievements. Content: The course covers the theoretical foundations of educational assessment, criterion-referenced, formative, and summative assessment, methods for designing diagnostic and assessment materials, developing assessment criteria and descriptors, analyzing learning			v		v				

					outcomes, and applying digital tools and educational measurement technologies in Physics teaching.									
13		BD	UC	Teaching Practice	Purpose: formation of practical skills of teaching and learning methods. Contents: The student studies and analyzes the organization of the educational process in higher education, the teaching experience of leading university teachers during their classes. Attends scientific and methodological consultations. Plans, develops the content of training sessions and conducts them independently. Works individually with students; conducts reflection on his own pedagogical activity. Prepares a report on the results of the internship and defends it.	4		**v**				**v**		
14	Leadership	BD	UC	Management Psychology	Purpose: to ensure the competence of a psychologist by mastering his knowledge in the field of psychological management, developing skills in managing the organization's human resources. Content: methodological foundations of management psychology. Development of psychological theories of management. General theoretical questions of management psychology. Psychology of managerial communication. Psychological characteristics of the staff. Psychology of employee motivation. Technologies of	3								**v**

					human resource management of the organization. Psychological support of the personnel policy of the organization. Psychology of conflict in the organization. Technologies for preventing professional deformation of personality. Practical implementation in the form of creating diagnostic tools, developing digital methods for training leaders, and management consulting.									
15		BD	EC	Leadership and Teamwork	Purpose: formation of master students' knowledge about the psychological aspects of the individual, the structure and functioning of the team; mastering the skills of team management as an organization system. Contents: the essential characteristics of leadership are considered. The concept of leadership. Differences between management and leadership. Leadership and governance. Theories of leadership. A modern approach to leadership. The laws of leadership. Behavioral theories of leadership. A professional team. Signs of a professional team. Stages of development of a professional team. Ethical aspects of leadership.	6						**v**		**v**
16		PD	EC	Projects Management	Purpose: to form master students' ideas about modern project management technology and to acquaint students with the principles of project management in the tasks of their future professional activities.							**v**		**v**

					Contents: an introduction to the problems of project management is considered. Project management methodologies are being studied. Modern tools and methods of project management are outlined at all stages of the project life cycle: project initialization, planning of its work, organization and management of the project team, project resources, change and problem management in the project, project quality and control.									
17	Physics of high technologies	PD	EC	Technologies for Converting Solar and Thermal Energy into Electrical Energy	Purpose: to develop the professional competencies of future physics teachers in the field of the physical foundations and technologies for converting solar and thermal energy, as well as the skills to apply them in organizing students' experimental, project-based, and research activities. Contents: physical foundations of solar and thermal energy conversion; thermoelectric, thermionic, and photovoltaic energy conversion; thermoelectric materials; solar thermal technologies and solar energy collection systems; solar thermophotovoltaics and thermoelectrics; methods of spectral control. Methods of applying energy technologies in physics education, development of laboratory and demonstration experiments, STEM-based tasks, and educational projects on the conversion and utilization of solar and	6					**v**	**v**		

					thermal energy.									
18		PD	EC	Thermal Radiation	Purpose: To develop master's students' systematic understanding of current issues related to the use of thermal energy and its transfer through various media, as well as to develop their ability to apply the acquired knowledge to explain thermal phenomena and design educational materials for teaching physics. Contents: The principles of thermal radiation and their applications to engineering problems involving heat and photon transfer are studied. The radiative properties of materials are considered. Radiation transfer in absorbing, emitting, and scattering media is examined. Coherent laser radiation is discussed. Applications of lasers, imaging technologies, and infrared measurement equipment are presented. Problems related to the selection of thermal radiation detectors are considered. The main parameters of instruments that use thermal energy are evaluated. Practical-oriented problems are solved, and educational tasks and methodological materials on the topic of "Thermal Radiation" are developed using modern digital and experimental tools.						**v**	**v**		
19		PD	EC	Physical Fundamentals of	Purpose: To develop knowledge of the physical foundations of modern high	6					**v**	**v**		

				High Technologies	technologies and the ability to apply this knowledge in the professional activities of a physics teacher. Contents:The course examines the physical foundations of modern high technologies and their application in physics teaching. It covers the physical principles of semiconductor microelectronics, nanoelectronics, nonlinear optics, superconductivity, and electronic and nuclear magnetic resonance. The physical processes underlying electronic, optoelectronic, sensor, and other modern technological devices are analyzed, with an emphasis on their application in the educational process. Students develop skills in selecting and adapting materials on high technologies for physics lessons, designing educational tasks and experimental activities aimed at developing students' scientific, digital, and research literacy.									
20		PD	EC	Experimental Physics	Purpose: To develop master's students' competencies in conducting, processing, and interpreting physical experiments, as well as in applying experimental methods in the educational process. Contents: The course covers contemporary scientific research in the fields of physics and astrophysics, including the application of accelerators and detectors, energy, lasers and their applications, semiconductors and				**v**		**v**			

					nanotechnology, superconductors, and cosmology. The theoretical foundations of experimental methods used in physical research are examined. Research methods, as well as methods for processing and analyzing experimental and theoretical physical data, are described. Using contemporary areas of physics and astrophysics as examples, the course explores the possibilities of integrating the results of experimental research into the content of school physics education.									
21				Research Practice	Purpose: familiarization with the latest theoretical, methodological and technological achievements of domestic and foreign science, modern methods of scientific research, processing and interpretation of experimental data. Contents: the master student plans a research work, gets acquainted with the topics of research work and chooses a research topic. Master student studies special scientific domestic and foreign literature. Collects, processes, analyzes and systematizes scientific information on the topic. Selects the appropriate method of scientific research and studies the method of processing experimental data. He makes presentations at research seminars and conferences. Prepares a report on the research work and makes a presentation of	6						**v**		**v**

					the work performed.									
22		PD	EC	Intelligent Robotic Systems	Purpose: To develop master's students' knowledge and practical skills in applying intelligent robotic systems to physics teaching, conducting educational experiments, and organizing students' research and project activities based on the STEM approach. Contents: The course covers the fundamentals of intelligent robotic systems, principles of sensor systems operation, and methods for collecting, processing, and visualizing experimental data. The possibilities of applying robotic systems in the study of physical phenomena and in conducting educational experiments are considered. Students acquire methods for developing and implementing robotics projects in physics, organizing students' research and project activities, solving practice-oriented problems, and developing engineering, algorithmic, and critical thinking skills through STEM education.	6			v			v		
23		PD	EC	Modern Methods for Advanced Physics Learning	Purpose: To develop master's students' professional competencies in the methodology of advanced physics education based on modern pedagogical technologies. Contents: Students explore modern methodologies for advanced and specialized physics education aimed at			v	v					

					developing learners' subject-specific thinking, functional and scientific literacy, as well as critical and systems thinking. The course includes an in-depth study of fundamental areas of physics, the application of modern methods of physical and mathematical modeling, and experimental research methods. It also examines the principles of selecting and structuring learning materials, as well as methodological approaches to teaching the most complex and practically significant topics in physics.								
24		PD	EC	Methods for Solving Non-Standard Physics Problems and STEM Tasks	Purpose:To develop systematic knowledge and practical skills among master's students in solving non-standard physics problems and designing STEM tasks based on the interdisciplinary integration of physics, mathematics, computer science, and engineering approaches. Contents: Modern methods and strategies for solving non-standard physics problems, physical modeling, and the application of mathematical and digital tools are studied. Advanced problem-solving methods are considered, including graphical, analytical, geometric, dimensional analysis, estimation, experimental, and modeling methods. The principles of STEM task design, organization of project-based, research, and experimental activities,	5					v	v		

					interdisciplinary integration, and assessment of STEM activity outcomes are also examined.									
25		PD	EC	STEM-based Physics Lesson Design	Purpose:To develop master's students' competencies in designing, implementing, and evaluating a STEM-oriented physics lesson based on interdisciplinary integration, digital technologies, and an engineering-research approach. Contents: The course covers the theoretical foundations of STEM lesson design in physics; interdisciplinary integration of physics, mathematics, computer science, engineering, and technology; analysis of the STEM potential of physics topics within the curriculum; design of learning objectives, learning outcomes, and STEM-based tasks; development of experimental and project-based activities using digital technologies, virtual laboratories, and computer modeling; development of lesson plans and assessment tools; and evaluation of the effectiveness of STEM lesson design and learning outcomes.				v			v		
26		PD	EC	Organization of Computer Laboratory Work in Physics	Purpose: to improve students' knowledge of physics with the help of computer laboratory work. Contents: Sets out the methods of organizing and conducting computer laboratory work in accordance with the purpose of the lesson. Describes the	5			v		v			

					methodology for creating exercises (qualitative tasks; experimental tasks; research tasks) based on the experiment. Explains the methods of computer raster graphics and animation elements using a programming language, the construction of computer models in physics. The method of using computer laboratory work from PhET and a computer program from Vladimir Vaščák is given.									
27		PD	EC	Formation of ICT-competence of Future Teachers of Physics	Purpose: To develop an understanding of the use of information and communication technology (ICT) tools in the educational process. Contents: The course examines the concept and components of ICT competence. It explores the theoretical and methodological foundations for developing the digital (ICT) competence of future physics teachers, contemporary models of integrating digital technologies into the educational process, and the criteria and assessment tools for evaluating teachers' digital professional competencies. The course also addresses methodological approaches to the use of digital educational resources in organizing master students' independent learning, project-based, research, and inquiry-based learning activities.				**v**		**v**			
28		PD	EC	Artificial Intelligence and Machine	Purpose: to develop the ability to apply machine learning methods to control and predict the behavior of physical systems.	5			**v**		**v**	**v**		

				Learning	Contents: the use of a programming language in machine learning is considered. The simplest methods, neural networks of various structures, and the scope of their applicability are described. Optimization algorithms, methods of selecting the appropriate structure and parameters of the method, nuances related to the set and preprocessing of input data, regression and clustering are studied. "Ab-initio" modeling of the properties of cyber-physical systems using machine learning. Examples of the application of machine learning to solve actual problems of physics are given.									
29		PD	EC	Modeling of Cyber-physical Systems Based on Machine Learning	Purpose: formation of theoretical knowledge and practical skills in the field of design, modeling and debugging of cyberphysical systems. Contents: solved and unsolved problems in the field of artificial intelligence are considered. The basic concepts and methods of machine learning, the problems of formalization of reasoning, the Godel incompleteness theorem, the universal Turing machine are presented. The application of machine learning methods to tasks related to the professional field is discussed. The stages of designing and manufacturing cyberphysical systems and the software tools used are described; formalization, technology, engineering and modeling of cyberphysical systems are				v		v	v		

					considered.									
30	Module research work and final certification			Research work of a master student, including passing an internship and completing a master's thesis	Purpose: to demonstrate the consistent implementation of the dissertation work plan and its writing. Contents: the student completes the dissertation plan, performs a scientific review on the research topic, following which he prepares an article; makes a list of used literature; collects, processes scientific information on the topic of the dissertation; applies or develops modern research methods, research tools; solves research problems using modern methods of processing, verification and presentation of scientific data; prepares an article, abstract and dissertation.	24						v		v
31				Execution and Defence of Master's Thesis	Purpose: assessment of the achieved learning outcomes and mastered competencies upon completion of the study of the master's educational program. Contents: a master student draws up a dissertation work in accordance with the requirements for such works, as well as the requirements of the QMS of the university; delivers a scientific report on the main results of the prepared dissertation, made on the basis of the results of research work. When defending a dissertation, a master student must demonstrate his research and teaching competencies acquired during his studies at the master's program and their compliance with the requirements of the educational program.	8						v		

5. Summary table reflecting the volume of credits mastered by modules of the educational program

Course of Study	Semester	Number of modules being mastered	Number of disciplines studied			Number of KZ credits					Total hours	Total KZ credits	Quantity	
			OC	UC	EC	Theoretical training	Ped. practice	Research practice	Scientific research work of a master student,	Final examination			copy	differential standings
1	1	4		5	2	29		-	1	-	900	30	5	2
	2	4		-	4	22	4	-	4	-	900	30	4	1
2	3	2			2	11		6	3	-	600	20	2	1
	4	1			3	16		-	4	-	600	20	3	
	5								12	8	600	20		
total				5	11	78	4	6	24	8	3600	120	14	4

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 activities (*according to the syllabus*). Evaluation forms: • surveys; • testing topics of academic discipline; • test papers; • protection of independent creative works; • discussions; • trainings; • colloquia; • essay , etc. **R intermediate control** at least two times during one academic period within the same academic discipline. **Intermediate certification** is carried out in accordance with the working curriculum, academic calendar. Conduct forms: • examination in the form of testing; • oral exam; • a written exam; • combined exam; • protection of projects; • protection of reports on practices . **Final Certification.**

7. Educational and resource support for EP

Information Resource Center	The structure of the OIC includes 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The network infrastructure of the JIC is based on 180 computers with Internet access, 110 workstations , 6 interactive whiteboards, 2 video doubles, 1 video conferencing system, 3 A-4 format scanners, the JIC 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 24/7 via external linkhttp://articles.ukgu.kz/ru/pps . Catalogs are processed electronically. EC consists of 9 databases: "Books", "Articles", "Periodicals", "Proceedings of the teaching staff of SKSU", "Rare Books", "Electronic Fund", "SKSU in Print", "Readers" and "SKR". The JIC 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 JIC; through the information network of the university for faculties and departments; remotely on the website of the library 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-kitar", "Kitar.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	For the preparation of undergraduates in this direction, there is an appropriate material and technical base of the specialty, that is, classrooms, laboratories, a computer class that meets the requirements of the SES. The Department of Physics includes 6 classrooms: mechanics and molecular physics, electromagnetism, the TSE Laboratory and astronomy, optics, atomic and nuclear physics (an interactive whiteboard is installed here) and a computer class. There is a specialized scientific and technical experimental base in the laboratories of the center "SAPA" and "IRLIP", where EP 7M01522 - "Physics and Computer Science with the basics of STEM education" meets sanitary and technical standards and provides all types of practical, disciplinary training, research work of undergraduates provided for in the working curriculum of the specialty.

APPROVAL SHEET

according to the Educational program 7M01522- Physics and computer science with the basics of STEM learning

Director of AID _____ Naukenova A.S.

Director of DCS _____ Nazarbek U . B

Appendix 1. Review from the employer

Appendix 2. Expert opinion

Appendix 3. Professional standards