

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN

SOUTH- KAZAKHSTAN UNIVERSITY named after M. Auezov

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| "APPROVE" |
| Chairman of the Board - Rector  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| of History, Academician Kozhamzharova D.P. |
| \_\_\_\_\_\_\_\_\_\_\_\_ 20\_\_\_\_ |

**EDUCATIONAL PROGRAM**

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

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| --- | --- |
| Registration number | 7M01500255 |
| Code and classification of the field of education | 7M01Pedagogical sciences |
| Code and classification of areas of study | 7M015 Teacher training in natural sciences |
| Group of educational programs (EP) | M011 Teachers training in physics |
| OP type | current |
| ISCED level | 7 |
| NQF level | 7 |
| ORC level | 7 |
| Language of instruction | Kazakh RussianEnglish |
| Labor intensity of EP | 120 credits |
| Distinctive features of the OP | - |
| Partner university (SOP) | - |
| Partner university (DDOP) | - |

Shymkent , 2022y.

Drifters:

Saidakhmetov Pulat Ablatyevich Candidate of Physical and Mathematical Sciences, Head of the Department of Physics

Omasheva Gaukhar Shapaevna Candidate of Physical and Mathematical Sciences, Associate Professor of the Department "Physics"

Turmambekov Torebai Abdrakhmanovich Doctor of Physical and Mathematical Sciences, Professor of the Department of Physics

Abdraimov Rakhimzhan Turisbekovich master, senior lecturer

Khitarov Ramazan Adilovich MEP-20-11nk tobynyn undergraduates

Ualikhanov Bayan Saparbekovna Head of the department "Physics" of the South Kazakhstan State Pedagogical University. PhD.,

Sarsenbayeva Zh.P. Principal of school-gymnasium No. 50 named after A. Baitursynov

Myrzasalieva A.S. Director South Kazakhstan Humanitarian and Economic College

The EP was reviewed by the academic commission in the direction of preparation "\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_"

protocol No. \_\_\_\_ dated "\_\_\_\_\_" \_\_\_\_\_\_\_\_\_\_ 2022

Chairman of AC\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Considered and recommended for approval at a meeting of the Educational and Methodological Council of the Yu. M. Auezov

protocol No. \_\_\_ dated "\_\_\_" \_\_\_\_\_\_\_\_\_\_ 2022

Approved by the decision of the Academic Council of the University

Protocol No. \_\_\_\_ dated "\_\_\_\_" \_\_\_\_\_\_\_\_\_\_ 20\_\_\_\_\_

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1. **PROGRAM CONCEPT**

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| **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. |
| **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 honesty and academic freedom, protection from any kind of intolerance and discrimination:   * Rules academic honesty (protocolscientist Council No. 3 October 30, 2018 . ); * Anti-corruptionstandard (Order No. 373 н/к December 27, 2019). * Codeethics (protocolscientistCouncil No. 8 January 31, 2020). |
| **Legal framework for the development of EP** | 1. Law Republic Kazakhstan "Education"; 2. Typical regulations activities organizations education implementing education al programs higher and (or) after university education approved by order of the Ministry of Education and Science of the Republic of Kazakhstan, October 30, 2018 No. 595; 3. State obligatory standards higher and after university education approved by order of the Ministry of Education and Science of the Republic of Kazakhstan, October 31, 2018 No. 604; 4. Rules organizations educational processon credit technology training approved by order of the Ministry of Education and Science of the Republic of Kazakhstan, April 20, 2011 No. 152; 5. Qualifying directory posts managers, professionals and other employees, approved by order Minister labor and social protection population Republic Kazakhstan, December 30, 2020 No. 553. 6. Management on using ECTS. 7. Management on developing educational programs higher and after university education , appendix 1 to the or derat directors TsBPiAM No. 45 o /д, June 30, 2021 |
| **About the organization of educational process** | * Implementation principles Bologna process * With a student centered education * Availability * Inclusiveness |
| **Ensuring the quality of the EP** | * In the interior systemensur equality * Attraction of stakeholders to the development of the EP and its evaluation * Systematic monitoring * Content update (update) |
| **Requirements for applicants** | U are established in accordance with the Model Rules for Admission to Education in Educational Organizations Implementing Educational Programs of Higher and Postgraduate Education Order of the Ministry of Education and Science of the Republic of Kazakhstan, No. 600 October 31, 2018 |

**2.** **EP PASPORT**

|  |  |
| --- | --- |
| **Purpose of the OP** | Training of highly qualifiedcompetitive masters who meet modern principles of teaching in the field of STEM education, based on leadership and an integrative approach to teaching and research . |
| **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. |
| **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 of the Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" [No. 133 dated June 8 , 2017](http://atameken.kz/uploads/content/files/%D0%9F%D1%80%D0%B8%D0%BA%D0%B0%D0%B7%20%D0%9F%D0%A1%20%D0%9F%D0%B5%D0%B4%D0%B0%D0%B3%D0%BE%D0%B3%20%E2%84%96133%20%D0%BE%D1%82%2008_06_2017.PDF) . |
| **Scrollqualifications and positions** | A graduate in this EP is awarded the degree of Master of Pedagogical Sciences / Master of Education in the educational program 7M01522-Physics and Informatics with the basics of STEM education.  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. |
| **Educational Outcomes** | **EO1** Deeply understand modern trends in education, features of STEM - training for the development of functional literacy of students.  **EO2** Effectively use psychological and pedagogical technologies in professional activities necessary for the training, development and education of students, including those with special educational needs  **EO3** Conduct training sessions professionally, actively using STEM technology to develop students' life skills.  **EO4** Integrate and apply science and engineering practices into teaching, learning materials and assessment, demonstrating skills in analyzing, selecting and transforming information.  **EO5 Reasonable to plan** and manage projects at all stages of their life cycle, solving problems based on critical thinking, applying digital technologies and resources, using logical, systematic and sequential approaches  **EO6** In cooperation with colleagues, plan and conduct research in the field of natural and pedagogical sciences to improve the practice of education, introducing the results of research into practical pedagogical activities.  **EO7** Generate new ideas and solve professional problems, including interdisciplinary areas.  **EO8** Critically determine the strategy of scientific, socio-pedagogical and communicative activities, making decisions and taking responsibility for the results. |

**COMPETENCES OF THE GRADUATE OF EP**

|  |  |
| --- | --- |
| **SOFTSKILLS**(Behavioral skills and personality qualities) | |
| SS 1. Competence in managing one's own literacy | SS1.1. Strive for professional and personal growth throughout life.  SS 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.  SS 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. |
| SS 2. Language competence | SS2.1. 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.  SS 2.2. The ability of mastering the skills of mediation and intercultural understanding. |
| SS 3. Mathematical Competence and Competence in the field of Science | SS3.1. The ability to interpret the methods of mathematical analysis and modeling for solving applied problems in the field of study.  SS3.2. The ability to plan the setting of scientific experiments, integrate and implement the results of scientific research in the professional field.  SS 3.3. The ability to analyze and comprehend modern methods of pedagogical and psychological science and apply them in pedagogical activity. |
| SS 4. Digital competence, technological literacy | SS 4.1. The ability to confidently use modern information and digital technologies, artificial intelligence systems for work, leisure and communications.  SS 4.2. Proficiency in the use, recovery, evaluation, storage, production, presentation and exchange of information in a wide range of digital devices.  SS 4.3. Ability to confidently use global information resources and apply technological literacy in research and computational and analytical activities. |
| SS 5. Personal, social and academic competencies | SS 5.1. Possession of the norms of business ethics, social and ethical values and focus on them in professional activities.  SS 5.2. Formation of a personality capable of mobility in the modern world, critical thinking and physical self-improvement.  SS 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.  SS 5.4. Ability to adequately navigate in various social spheres of activity and in conditions of uncertainty.  SS 5.5. Ability to find compromises, correlate own opinion with the opinion of the team. |
| SS 6. Entrepreneurial competence | SS 6.1. The manifestation of leadership qualities and the ability to have a positive impact on others, to lead a team.  SS 6.2. The ability to create conditions for the development of creative and entrepreneurial skills of the team.  SS 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.  SS 6.4. Ability to work with consumer needs. |
| SS 7. Cultural awareness and ability to express yourself | SS7.1. The ability to show worldview, civil and moral positions.  SS7.2. The ability to be tolerant of the traditions and culture of 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. |

**3. COMPETENCES OF**

**3.1 Matrix for correlating the learning outcomes of the EP in general with the competencies being formed**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **EO1** | **EO2** | **EO3** | **EO4** | **EO5** | **EO6** | **EO7** | **EO8** |
| SS1 | + | + | + |  |  | + | + |  |
| SS2 | + | + | + |  |  | + | + |  |
| SS3 |  | + | + | + | + |  | + | + |
| SS4 | + | + |  | + | + |  |  |  |
| SS5 |  | + |  |  | + |  |  |  |
| SS6 |  |  | + | + | + |  |  | + |
| SS7 |  |  |  |  | + |  | + |  |
| PC1 | + | + | + |  | + |  | + | + |
| PC2 | + | + | + |  | + | + | + | + |
| PC3 |  | + |  | + |  | + |  |  |
| PC4 |  |  | + |  | + | + |  | + |
| PC5 |  |  | + |  |  |  | + |  |
| PC6 |  |  |  |  |  |  | + |  |
| PC7 |  |  | + |  | + | + |  | + |

**4.MATRIX A OF THE INFLUENCE OF DISCIPLINE ON THE FORMATION OF EDUCATIONAL OUTCOMES AND INFORMATION ON LABOR INTENSITY**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No.** | **Module name** | **Сycle** | **Сomponent** | **Name of the discipline** | **Brief description of the discipline** | **Amount of credits** | **Formed educational outcomes (codes)** | | | | | | | |
| **EO1** | **EO2** | **EO3** | **EO4** | **EO5** | **EO6** | **EO7** | **EO8** |
| 1  2  3 | Moduleof Scientific and pedagogical training | BD | UC | History and philosophy of science | Undergraduates study the historical development of scientific thought and methodology using a comprehensive approach through the interaction of science or the humanities with cultural, social and institutional factors. The course will allow undergraduates to form an interdisciplinary worldview based on a deep understanding of the history and philosophy of scientific thinking as part of a universal culture. | 4 |  |  |  |  |  | **ѵ** |  | **ѵ** |
| BD | UC | Foreign language (professional) | The course is aimed at improving the foreign language for self-education in various areas of life: social and political, educational and professional and research. At the end of the course, undergraduates will be able to make arguments, make presentations, conduct discussions in a foreign language, and communicate based on the principles of critical thinking. | 4 |  |  |  | **ѵ** |  |  | **ѵ** |  |
| BD | UC | Higher School pedagogy | Undergraduates develop the professional and pedagogical culture of a teacher of higher education through the development of the theories of modern pedagogical science. The elements of andragogy are considered, which reveal the specific patterns of mastering educational and professional competencies by adult students. The interactive format of classes (projects, conferences, public discussions, etc.) will allow developing practical skills in teaching various forms of training, including for people with OOP. | 4 |  | **ѵ** |  |  |  | **ѵ** |  | **ѵ** |
| 4  5  6  7  8 | Methodology | PD | EC | Methods of teaching the basic principles of physics | The discipline considers conceptual approaches to the methods of teaching physics, their classification, describes the means of teaching physics and their application in the educational process, taking into account the psychological and pedagogical characteristics of students; a scientific and methodological analysis of concepts, sections and topics of the course of physics is carried out. | 4 |  | **ѵ** |  |  |  | **ѵ** |  |  |
| PD | EC | Methods of Teaching educational robotics | The course examines the psychological and using educational constructors in teaching robotics. Undergraduates master the methodological principles of studying robotics, which form the skills of independent research activities; the ability to apply modern technologies is solving practical problems. A method of teaching robotics based on the Arduino, Raspberry Pi and myRIOplatformsisproposed |  | **ѵ** |  |  | **ѵ** |  | **ѵ** |  |
| PD | EC | Modern practices of STEM education in physics | The course is aimed at expanding the professional competencies necessary for a physics teacher using the STEM integrated approach to teaching. Based on an understanding of contemporary STEM practices and their relationship to changing technological and social challenges, undergraduates will demonstrate research and leadership skills to develop sustainable action plans to engage students in the STEM learning process. | 5 | **ѵ** |  | **ѵ** | **ѵ** |  |  |  |  |
| PD | EC | Modern practices of STEM education in computer science | The course is aimed at expanding the professional competencies required by a teacher of computer science using the STEM integrated approach to teaching. Based on an understanding of contemporary STEM practices and their relationship to changing technological and social challenges, undergraduates will demonstrate research and leadership skills to develop sustainable action plans to engage students in the STEM learning process. | **ѵ** |  | **ѵ** | **ѵ** |  |  |  |  |
| PD | UC | Methods and technologies of STEM education | The course is aimed at studying the content, teaching methods, technologies and didactic tools of STEM education. Undergraduates acquire the ability to analyze, systematize, generalize and describe the experience of implementing the STEM approach, acquire creative abilities for the original solution of interdisciplinary problems, master the basics of designing STEM classes to achieve educational goals. | 5 | **ѵ** |  | **ѵ** |  |  |  | **ѵ** |  |
| 9 | Technology | BD | EC | Introduction to STEM | The course is aimed at understanding the concepts and current issues in STEM education at the national and global levels. The course explores strategies for integrated STEM learning based on a critical review of the history, methods, and theories of integrated STEM learning within contemporary research. Undergraduates will be able to express judgments in the field of prospects and directions for the development of the STEM approach in education | 4 | **ѵ** |  |  |  |  |  | **ѵ** | **ѵ** |
| 10 | BD | EC | Concepts of modern natural science | The course is focused on the conceptual knowledge of the main stages in the development of the natural-science picture of the world, the fundamental concepts and principles on the basis of which these pictures of the world are described are considered. Ideas are formed about the processes of cognition and forms of studying the surrounding reality within the framework of the natural sciences. The skills of a complex vision of the problems and phenomena of the surrounding world are developed. |  |  |  |  |  | **ѵ** | **ѵ** |  |
| 11 | BD | EC | Online Educational Platforms | The course forms the necessary competencies in the field of new information, communication and interactive technologies, as well as in the field of self-creation of their own interactive programs for the visualization of educational material. ICTs are used as a means of teaching and managing the learning process. Interactive SMART technologies in education are considered. | 6 |  |  |  | **ѵ** | **ѵ** |  | **ѵ** |  |
| 12 | BD | EC | Digital technologies in education | The course is aimed at studying digital educational resources (DER). The issues of designing the content of digital educational resources are considered: principles for designing the content of the DER, principles for presenting educational material, didactic requirements for the DER, technologies for creating the basic components of the DER, means and stages of creating the DER. Upon completion of the course, undergraduates acquire the skills and abilities to develop DER. |  |  |  | **ѵ** | **ѵ** |  | **ѵ** |  |
| 13 | BD | EC | Design and development of digital educational resources | The course is aimed at studying digital educational resources (DER). The issues of designing the content of digital educational resources are considered: principles for designing the content of the DER, principles for presenting educational material, didactic requirements for the DER, technologies for creating the basic components of the DER, means and stages of creating the DER. Upon completion of the course, undergraduates acquire the skills and abilities to develop DER. |  |  |  |  | **ѵ** |  | **ѵ** |  |
| 14 | BD | UC | Teaching practice | Pedagogical practice allows undergraduates to acquire professional skills and orients them to the following types of professional activities: teaching, scientific and methodological, consulting, organizational and educational, socio-pedagogical and cultural and educational. | 4 |  | **ѵ** |  |  |  | **ѵ** |  |  |
| 15 | Leadership | BD | UC | ManagementPsychology | The course is aimed at knowledge and understanding of the conceptual approaches and principles of modern psychological science, the role of individual psychology, teams and social structures, which are central to the formation of employee behavior patterns in an organization. The master develops the skills of critical thinking, designing the behavior. | 4 |  | **ѵ** |  |  |  |  |  | **ѵ** |
| 16 | PD | UC | Leadership and teamwork | The course is aimed at knowledge and understanding of the conceptual approaches and principles of modern psychological science, the role of individual psychology, teams and social structures, which are central to the formation of employee behavior patterns in an organization. The master develops the skills of critical thinking, designing the behavior. | 6 |  |  |  |  | **ѵ** |  |  | **ѵ** |
| 17 | PD | EC | Project management | Undergraduates study the key principles, concepts and strategies of project management. Modern tools and methods for developing a project plan, controlling and monitoring resources are considered. Upon completion of the course, undergraduates will be able to independently apply project management tools and methods to a real project in order to ensure that the goal of the project is achieved in terms of scope, cost, time and quality. |  |  |  |  | **ѵ** |  |  | **ѵ** |
| 18 | Physics of high technologies | PD | EC | Technologies for converting solar and thermal energy into electrical energy | The course examines the principles and technologies of converting heat into electricity using various devices. Thermoelectric power conversion, thermoelectric materials and photovoltaic equipment are discussed. Solar thermal technologies, various solar heat collection systems, elementary principles of solar photovoltaics and solar thermoelectricity are described. It is proposed to carry out a project on methods of managing solar thermal systems | 6 |  |  |  |  |  | **ѵ** | **ѵ** |  |
| 19 | PD | EC | Thermal radiation | The course explores the principles of thermal radiation and their application to engineering problems of heat and photon transfer, examines the radiation properties of materials, radiation transfer in absorbing, emitting and scattering media, and coherent laser radiation. Applications include lasers, imaging, infrared measurement equipment, and global warming. |  |  |  |  |  | **ѵ** | **ѵ** |  |
| 20 | PD | EC | Physical foundations of high technologies | The discipline describes research in semiconductor microelectronics, nonlinear optics, superconducting technology, nanoelectronics, based on the laws of classical and quantum theory; studies using electronic and nuclear magnetic resonance are considered; theories and models underlying the development of high technologies are outlined; gives an idea of the current state of high-tech physics and the prospects. | 7 |  |  |  |  |  | **ѵ** | **ѵ** |  |
| 21 | PD | EC | Experimental physics | The course focuses on current scientific problems and research in various fields of physics and astrophysics: the use of accelerators and detectors in other areas of science and technology, energy, lasers and their applications, semiconductors and nanotechnologies, superconductors, astrophysics and cosmology; achievements, prospects, research methods are described; proposed approaches to problem solving |  |  |  |  |  | **ѵ** | **ѵ** |  |
| 22 | PD | UC | Intelligent robotic systems | Static and dynamic characteristics of software operations, methods of information processing for controlling a robot, principles of organizing sensory systems, adaptation in robotic systems, informational assessments of sensory systems, robotic recognition systems are studied. Undergraduates develop the skills and abilities of designing and creating robots based on electronics according to various characteristics. | 7 |  |  |  | **ѵ** | **ѵ** |  |  |  |
| 23 | PD | EC | Educational Robotics | The course is aimed at mastering the basics of robotics and the formation of knowledge, skills and competencies necessary for the use of robotic designers in the educational process. Undergraduates develop logical and creative thinking, develop the ability to design and program robots of varying degrees of complexity. Undergraduates master the methods and technologies for developing of technical creativityprojects. |  |  |  | **ѵ** | **ѵ** |  |  |  |
| 24 | PD | EC | Cloud technologies | The article discusses the issue of cloud computing architecture and training in the implementation of the principles of cloud computing, creating cloud storage, managing users and cloud computing environment. | 7 |  |  |  | **ѵ** | **ѵ** |  |  |  |
| 24 | PD | EC | augmented reality | The course covers the basic concepts and definitions of augmented reality objects and platforms for developing argumented reality applications, functions, tools, stages of work on the implement ting of the project for own augmented reality application |  |  |  | **ѵ** | **ѵ** |  |  |  |
| 25 | PD |  | Research practice | During the practice, undergraduates learn to formulate and find ways to solve modern scientific and practical problems, analyze and design a mathematical model of the objects under study, and use the mathematical apparatus and ICT to solve applied problems of physical, natural, chemical and biological phenomena. | 7 |  |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** |
| 26 | Module research work and final certification |  |  | Research work of a master student, including an internship and a master's thesis | The student draws up a dissertation plan, a list of used literature; performs a scientific review on the topic of the study, on the basis of which he prepares an article; collects, processes scientific, secondary information on the topic of the dissertation; develops modern research methods, research tools; solves research problems using modern methods of processing, verification and presentation of scientific data; prepares an article, dissertation and abstract. | 24 |  |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** |
| 27 |  |  |  | Registration and defense of a master's thesis | The undergraduate draws up a dissertation work in accordance with the requirements for such works; 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. | 12 |  |  |  |  |  |  |  | **ѵ** |

**5.SUMMARY TABLE SHOWING THE VOLUME OF DISPUTED LOANS BY OP MODULES**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course of Study | Semester | Number of modules being mastered | Number of disciplines studied | | | Number of KZ credits | | | | | Total hours | Total loans KZ | Quantity | |
| OC | UC | EC | Theoretical training | Ped. practice | Research practice | Scientific research work of a master student, | Final examination | copy | differential standings |
| 1 | 1 | 3 |  | 5 | 2 | 29 |  | - | 1 | - | 900 | 30 | 6 | 2 |
| 2 | 4 |  | 1 | 3 | 2 3 | 4 |  | 3 | - | 900 | 30 | 4 | 2 |
| 2 | 3 | 2 |  |  | 3 | 21 |  | 7 | 2 | - | 900 | 30 | 3 | 2 |
| 4 | 1 |  |  | 0 | 0 |  | - | 18 | 12 | 900 | 30 |  | 1 |
| total |  |  |  | 6 | 18 | 66 | 8 | 12 | 24 | 12 | 3600 | 120 | 1 3 | 7 |

1. **STRATEGIES AND METHODS OF TRAINING, MONITORING AND EVALUATION**

|  |  |
| --- | --- |
| **Strategies and learning** | **Student - centered learning**: **the** learner is the center of teaching/learning **and an active** participant in the process of learning and decision-making.  **Practice-oriented learning**: focus on the development of practical skills. |
| **Teaching methods** | Conducting lectures, seminars, various types of practices with:   * application of innovative technologies: * problem learning; * case study; * group work and creative groups; * discussions and dialogues, intellectual games, olympiads, quizzes; * methods of reflection, projects, benchmarking; * Bloom's taxonomy; * presentations; * rational and creative use of information sources : * multimedia educational programs ; * electronic textbooks ; * digital resources .   Organization of independent work of students, individual consultations. |
| **Monitoring and assessing 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 state certification.** |

**7. TRAINING AND RESOURCE SUPPORT OF THE 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 link<http://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-kіtаr", "Kitаr.кz", 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 education

Director of the IPVO \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Konarbayeva Z.K.

Director of DAN\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Nazarbek U . B

Director of the DPiK \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Bazhirov T.S.