NON-PROFIT JOINT-STOCK COMPANY
ABAI KAZAKH NATIONAL PEDAGOGICAL UNIVERSITY
Faculty of Mathematics, Physics and Informatics
Department of «Methods of Teaching Mathematics, Physics and Informatics»

«APPROVED»
Dean of the faculty of mathematics,
physics and informatics
Kaamraev Sh.I.
04 2024

EDUCATIONAL PROGRAM DEVELOPMENT PLAN
7M01504 – «Physics»
for 2024–2029

Almaty, 2024

The Development Plan of the Educational Program was prepared on the basis of the following documents:

- Law of the Republic of Kazakhstan dated July 27, 2007 No. 319-III «On Education»
- Law of the Republic of Kazakhstan dated July 4, 2018 No. 171-VI «On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on the Expansion of Academic and Managerial Autonomy of Higher Education Institutions»
- Law of the Republic of Kazakhstan dated December 27, 2019 № 293-VI «On the Status of a Teacher» (https://adilet.zan.kz/)
- «Development Program of the Non-Profit Joint-Stock Company 'Abai Kazakh National Pedagogical University' for 2023–2029» (approved by the decision of the Board of Directors of NJSC Abai KazNPU on 20.12.2023, protocol № 9) (https://www.kaznpu.kz/docs/docs/260224/Prog_ru.pdf)

Approved
at the meeting of the Faculty Council of Mathematics, Physics and Informatics,
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Reviewed
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Protocol № 9 dated «29» 04 2024 y.

Head _____ A.E. Abylkassymova

FOREWORD

The Development Plan of the Educational Program «7M01504 – Physics» for 2024–2029 Education Field Code and Name: 7M01 – Pedagogical Sciences Training Direction Code and Name: 7M015 – Teacher Training in Natural Sciences Educational Program Group: M011 – Physics Teacher Training

This development program is aimed at shaping and implementing a well-defined competency model, as well as expanding the potential circle of employers.

Mission of the Educational Program: We train educators capable of anticipating the needs of modern education, based on advanced methodologies, national heritage, and global approaches. We aim to elevate the prestige of the teaching profession and become a driver of human capital development.

Objective of the Educational Program: To prepare master's degree holders in pedagogical sciences with deep mathematical knowledge, mathematical thinking, and culture in accordance with high academic standards in a competitive educational environment. Graduates will possess civic responsibility and the ability to solve current scientific and practical problems.

The development plan of the educational program has been designed taking into account employer requirements, in alignment with the national development priorities of the Republic of Kazakhstan through 2029, and the Development Program of NJSC «Abai Kazakh National Pedagogical University» for 2023–2029.

CURRENT SITUATION ANALYSIS

General Information about the Educational Program

Developers of the Educational Program Development Plan	**Department Representatives:** Abylkasymova A.E., Sydykova Zh.K., Yerzhenbek B. **Employers:** Tileubai S.O. – Principal of Gymnasium No. 140 named after M. Makatayev Zhumadillayev K.N. – Physics Teacher at Nazarbayev Intellectual School of Physics and Mathematics, Almaty
Degree:	Master of Pedagogical Sciences in the Educational Program 7M01504 – Physics
Year of Launch:	2010
Language of Instruction:	Kazakh, Russian
Form of Study:	Full-time
Duration of Study:	2
Credit Volume:	120
Uniqueness of the Educational Program	The educational program is designed to train competent and in-demand specialists in the field of physics education, possessing deep knowledge of modern physics and its teaching methodologies. The program focuses on developing students' skills in analytical thinking, scientific research, and the implementation of innovative approaches in educational practice. Special emphasis is placed on the integration of digital technologies into the teaching process, the development and application of adaptive educational methods, and preparing specialists for work in inclusive and multilingual learning environments. The program combines a solid foundation in physics with pedagogical competencies, ensuring graduates a high level of professional mobility and competitiveness in the labor market.

Graduate Model	– Capable of continuous professional growth and self-development. – Ability to lead others, be a leader, and make independent decisions. – Creativity, ability for innovation, and constructive social activity. – Capable of independently analyzing available information. – Able to analyze the activities of all participants in the educational process. – Capable of mentoring young teachers in educational organizations. – Willingness to develop and implement methodological models, techniques, technologies, and teaching methods in educational institutions.
Types of Professional Activities	1. Educational (Pedagogical) 2. Educational and Upbringing 3. Educational and Technological 4. Socio-Pedagogical 5. Experimental-Research 6. Organizational and Managerial 7. Information and Communication
Graduate Employment	100%
Availability of License Attachment for the Training Direction	№ KZ29LAA00018497, issued on July 28, 2020, appendix to the license for educational activities.
Expected Final Outcomes of the Educational Program Development Plan Implementation	– Development of physics teaching methodologies based on advanced scientific research and pedagogical approaches. – Formation of skills in scientific analysis and independent research in the field of physics education among master's students. – Strengthening international cooperation through publications in high-ranking journals and participation in international scientific events. – Increasing academic mobility of students and faculty through internships and participation in international educational projects. – Implementation of modern digital tools and platforms in the educational process to enhance its effectiveness. – Development of competencies in graduates that ensure their leadership positions in the scientific and educational environment. – Creating conditions for the integration of scientific developments into the practical activities of educational institutions. – Ensuring the training of specialists capable of contributing to the development of the national education system through innovative physics teaching methods.

Main Risks of the Educational Program:

Risk Name:	**Possible Consequences:**	**Management Mechanisms and Measures:**
Low Interest from Applicants	Insufficient Enrollment of Students, Decreased	Active Promotion of the Program, Expanding Partnerships with Leading Universities, Developing Motivational Activities to Attract

	Competitiveness of the Program	Applicants
Weak Integration of Science and Practice	Failure to Implement Developed Methodologies in the Educational Process, Reduced Practical Relevance of Research	Creation of Practice Bases, Collaboration with Educational Institutions, Development of Methodological Recommendations and Textbooks
Insufficient Funding for Research	Limited Opportunities for Conducting Experiments, Low Publication Activity	Attracting Grants, Searching for Sponsors, Participation in International Research Projects
Low Digital Maturity of Students	Difficulties in Mastering Modern Technologies, Lag in Professional Training	Implementation of Digital Literacy Courses, Equipping Laboratories with Modern Equipment, Integration of Digital Technologies into the Educational Process
Low Motivation of Students for Research Activities	Low Quality of Theses, Decreased Level of Scientific Achievements of the Program	Introduction of an Incentive System (Grants, Awards), Support for Publication Activity, Involvement in Scientific Projects

SWOT Analysis of Educational Program Implementation:

	Strengths:	**Weaknesses:**
Internal Factors (Strengths and Weaknesses)	**Strengths:** – Established Reputation: A solid reputation in the market since 1928, with a dominant position in the professional-pedagogical education services sector of the country. – Clear Development Goals**:** The program's objectives and development plan focus on creating and implementing a well-defined competency model, as well as expanding the range of potential employers. – National University Status: Being recognized as a national university gives the program credibility and a strong position in the education sector. – Strong Faculty: The program benefits from a highly qualified and experienced faculty, ensuring high-quality teaching and research output. – High Employment Rate: The program has a high rate of postgraduate employment, demonstrating its effectiveness in preparing students for the job market. – Leadership in National Rankings: The program ranks highly in national rankings and is actively working to position itself in international rankings. – Successful Alumni Careers: Graduates	– Lack of Joint Educational Programs with Foreign Universities**:** The absence of collaborative educational programs with international institutions limits global exposure for students and faculty, and could hinder the program's international competitiveness and academic partnerships.

	consistently find employment in their fields of study, reflecting the program's relevance and effectiveness. – Continuous Monitoring and Evaluation: Regular monitoring and periodic assessment of the program ensure its continuous improvement and adaptation to evolving educational needs.	
	Favorable Opportunities:	**Threats and Risks:**
External Factors (Opportunities and Threats)	– Availability of a Large Pool of Research Topics: A wide range of research themes is available for scientific work, within which dissertation projects can be carried out, providing students with ample opportunities for academic exploration. – Career and Internship Opportunities Information: Providing students with information about job vacancies, internships, and the current labor market situation helps them make informed decisions about their careers. – Focus on Self-Education: Encouraging students to develop the ability for self-education across various domains, including academic, methodological, scientific, and professional careers, helps foster lifelong learning skills. – Development of Distance Learning Technologies: The growing adoption and improvement of distance learning technologies create opportunities to expand access to education, enhance flexibility in study formats, and cater to a wider range of students.	– Pandemic – Economic Crisis – General Trend of Increasing Tuition Fees

1. MAIN DIRECTIONS FOR THE DEVELOPMENT OF THE EDUCATIONAL PROGRAM

Direction 1. Abai University – a Center of Academic Excellence

The teacher training educational programs are developed in accordance with the professional standard "Teacher", as well as the National and Sectoral Qualifications Frameworks in the field of education. The university is a leader in a project implemented jointly by the International Bank for Reconstruction and Development, the Government of Kazakhstan, and the Ministry of Science and Higher Education (MSHE) aimed at transforming the working environment for teachers in Kazakhstan and redefining core values and fundamental approaches to quality education.

Abai University’s academic excellence is supported by its internationalization strategy, which focuses on studying international experience, implementing best global practices, and fostering collaboration between local and international experts. The academic and professional attractiveness of educational programs to international students, along with the involvement of foreign scholars and professors in the university’s activities to enhance the educational environment, positively contributes to internationalization and strengthens the academic reputation of Abai University.

Our top priority is to meet the requirements for quality teacher training and the needs of students, employers, and other stakeholders. We view the concept of quality as the process of creating and maintaining conditions that enable students to achieve set educational goals and obtain a quality education. This concept includes multiple interacting aspects that influence the educational process. One such aspect is undergoing procedures of specialized accreditation of educational programs, ensuring their compliance with established quality standards and

confirmation of alignment with the requirements of accreditation bodies and the education system as a whole.

Goal 1. Implementation of an Innovative Model of Teacher Education

Task 1.1. Ensure the quality of educational services in higher education

This task will be achieved through:

- **Modernization of the educational program content**: updating curricula in line with current scientific achievements and international standards, introducing interdisciplinary modules and courses aimed at developing innovative competencies for mathematics teachers;
- **Improvement of teaching methodologies and digitalization of the educational process**: incorporating modern digital technologies and tools (online platforms, VR/AR, artificial intelligence) into the educational process, developing interactive learning methods, and applying project-based and problem-oriented learning;
- **Development of students' research activities**: involving master's students in research and international projects, enhancing the system for scientific publications in peer-reviewed journals, supporting participation in conferences, and organizing scientific seminars, discussion clubs, and collaborations with leading universities;
- **Enhancement of academic mobility and international cooperation**: signing partnership agreements with leading domestic and foreign universities, inviting international professors to deliver lectures and seminars;
- **Improvement of assessment and quality monitoring systems**: designing and implementing feedback systems from students and employers, regularly updating educational programs based on the results of internal and external reviews, introducing mechanisms for independent knowledge assessment (external testing, participation in international rankings and accreditations);
- **Fostering graduate competitiveness**: developing soft skills (leadership, communication, project management) in master's students, organizing job placement training, startup development, and career growth workshops, and supporting the Alumni Association.

Task 1.2. Develop the internationalization of educational activities and ensure advancement in international rankings

This task will be achieved through:

- Expanding international cooperation: signing agreements with foreign universities and research centers to implement joint educational and research projects, organizing academic exchange programs for master's students and faculty;
- Enhancing academic mobility: participation of faculty and students in international research internships and conferences, inviting foreign scholars and lecturers to deliver lectures and workshops;
- Developing publication activity: encouraging publications in high-ranking international journals (Scopus, Web of Science), organizing scientific seminars and schools to prepare high-quality research articles, introducing English-taught courses and modules into the educational process;
- Participating in international rankings and accreditations: cooperation with international accreditation agencies for certification of educational programs, monitoring the university's and program's position in international rankings, and developing strategies for improvement;
- Integrating into the international scientific community: organizing international conferences and forums at the university, engaging master's students in international research projects and grant programs.

Task 1.3. Expand access to MOOCs and global digital libraries

This task will be achieved through:

− Increasing the share of educational programs utilizing global digital libraries;
− Integrating Coursera online courses into the educational program curricula;

− Creating more comfortable conditions for users and improving information and library services to support education quality;

− Promoting global digital library platforms among students.

Goal 2. High Level of Stakeholder Satisfaction

Task 2.1. Create conditions for inclusive education

This task will be achieved through:

− Ensuring physical accessibility in academic buildings, student dormitories, and elevators for students with special educational needs;

− Actively involving NGOs, public foundations, and community organizations in the development of inclusive education during the program update process.

Task 2.2. Implement the concept of lifelong learning

This task will be achieved through:

– Developing a system for continuous professional development of teachers: organizing regular professional development courses, master classes, seminars, and webinars on modern methods of teaching mathematics, incorporating modules on innovative technologies and digital tools into the curriculum, and establishing a mentorship system for early-career teachers;

– Building sustainable motivation for lifelong learning among students and graduates: developing individual learning trajectories based on professional interests and career goals, introducing a microcredit and certification system for mastering new competencies, supporting student participation in research competitions, grant projects, and olympiads.

Task 2.3. Ensure career prospects for graduates

This task will be achieved through:

– Developing partnerships with employers: signing cooperation agreements with leading educational institutions, research centers, and IT companies, organizing meetings, round tables, and job fairs with potential employers;

– Improving the content of educational programs to meet labor market demands: regularly monitoring stakeholder (employers, alumni, students) needs, adapting curricula to current trends in mathematics education and pedagogy, introducing courses on soft skills development, project management, and digital technologies;

– Facilitating graduate employment: developing a university career center, organizing training on resume writing, interview preparation, and career planning, maintaining a graduate database and tracking career outcomes, supporting startups and student-led research in mathematics education.

Direction 2. Abai University – Pedagogical Research University

Abai University is transforming into a pedagogical research university that will shape the agenda for educational research. The university boasts strong scientific and academic personnel. In 2023, six professors from the university were included in the Top-50 of the National General Ranking of Faculty Members of Kazakhstani universities. In 2022, one professor received the title of “Best Researcher,” three professors were awarded State Scientific Scholarships, and four received scholarships for talented young scientists. Additionally, three faculty members were honored with the title “Best University Teacher” of the Republic of Kazakhstan in 2022.

To enhance the scientific talent pool, a competitive selection process is conducted annually to form a pool of research professors and postdoctoral researchers. In 2023, the university employed 10 research professors and 20 postdoctoral researchers.

At the Department of Methods of Teaching Mathematics, Physics and Computer Science (MTMPCS), fundamental research projects funded by a grant from the Ministry of Education and Science of the Republic of Kazakhstan were carried out in 2022 under the leadership of PhD, Associate Professor Zh.M. Nurmukhamedova and Doctor of Physical and Mathematical Sciences, Professor A.K. Shokanov.In 2023, the department is implementing five research projects funded by the republican budget (Ministry of Science and Higher Education of the RK),

led by Doctor of Pedagogical Sciences, Professor A.E. Abylkasymova; PhD A.A. Kyrykbaeva (2 projects); PhD E.A. Ospanbekova; and Candidate of Pedagogical Sciences, Associate Professor F.D. Nametkulova.

As part of the Small Seed Grants competition in 2022 and 2023, the university allocated 30 million KZT annually from its own funds to support 15 projects by young researchers and 10 projects by faculty members. In 2023, projects at the MTMPCS department were carried out under the leadership of Professor A.E. Abylkasymova and PhD A.K. Ardabaeva.

One of the key indicators in international rankings is the publication of faculty research in journals indexed in Scopus. Significant growth has been observed in this area: in 2022, 14 articles related to educational issues were published by MTMPCS faculty in peer-reviewed international journals, compared to 11 in 2021. In 2022, the faculty published 10 articles in Scopus-indexed journals and 1 in the Web of Science. In 2023, 11 articles were published in Scopus-indexed journals.

The number of publications in journals recommended by the Committee for Quality Assurance in the Field of Education and Science (KOKSNVO) also increased: 23 articles in 2023, up from 11 in 2022.

In total, the MTMPCS department's faculty published 113 scientific works in 2022, obtained 2 patents for industrial designs and technologies, and received 1 copyright certificate.

In 2023, the total number of scientific works by MTMPCS faculty reached 132, with 1 patent and 9 copyright certificates—exceeding the results of 2022.

In 2023, the International Forum of Young Teachers of Pedagogical Universities of CIS Countries titled *"Young Teacher in the System of Continuous Pedagogical Education: Stages of Professional Development"*, dedicated to the university's 95th anniversary, was held. The forum gathered young researchers, scholars, and educators from CIS countries to discuss professional development, enhancement of professional competencies, and modern teaching methods within the continuous pedagogical education system.

Plenary sessions were held where participants shared experiences and developments, discussed current trends and challenges in pedagogical education. Topics included the status of young teachers, the work of the Council of Young Researchers, innovative teaching methods promoting effective education of modern youth, and tools for preparing future educators using HyFlex technology, among others.

Goal 1. Transformation into a Pedagogical Research University

Objective 1.1. Increase publication activity and citation rates, including through international research networks

This objective will be achieved through:
− focusing on publications in high-ranking journals (Q1, Q2 of the Journal Citation Reports (JCR), Q1, Q2 Web of Science, and Scopus journals in the 50–99 percentile);
− broad implementation of events promoting academic integrity and research ethics at both the institutional and academic levels, based on the experience of international universities.

Objective 1.2. Increase the scientific potential of faculty

This objective will be achieved through:

− participation in competitions by the Ministry of Science and Higher Education of the Republic of Kazakhstan (MSHE RK) for grant funding of research projects and program-targeted funding (PTF);

− implementation of a system of financial and moral incentives for faculty and researchers for scientific achievements that impact the university's standing in international and national rankings;

− faculty participation in annual MSHE RK competitions for awards such as "Best Researcher," state prizes, and scholarships;

− organizing activities to support scientific and professional growth (internships at leading global research centers, academic and scientific exchange and mobility);

− organizing and hosting international and national conferences at the department level;

− co-organizing conferences with international educational and research institutions;

− integrating leading scholars from Abai KazNPU into external expert pools and the membership of the National Scientific Council (NSC);

− increasing the number of participants in the MSHE RK "Zhas Galym" competition;

− engaging young scientists in research projects funded by MSHE RK grants and PTF;

− involving researchers from national scientific institutes in Abai KazNPU projects as team members, as well as lecturers, supervisors for master's students, and consultants for doctoral candidates.

Objective 1.3. Increase income and commercialization of research results

This objective will be achieved through:

− annual growth in the number of scientific projects implemented at the university via grant and PTF funding from the MSHE RK, as well as competitive funding from the university's internal budget;

− signing agreements, contracts, and memorandums of cooperation with international partner universities in the field of science;

− participation of faculty and administrative staff in professional development seminars for R&D managers (RNNTD) in accordance with international standards;

− identifying partners and sponsors for R&D initiatives.

Direction 3. Abai University – A Socially Engaged University

Student social engagement is an important aspect of the educational environment at the university. It includes active participation in academic and extracurricular university life, involvement in student organizations, volunteer work, participation in cultural and sports events, and more. High social engagement contributes to the development of leadership, communication, organizational skills, and social awareness among students.

As a result of cooperation between student clubs and the State Youth Policy Development Fund of Almaty city, an initiative was implemented to support lonely elderly people in the Medeu district. The student club "Niyet" carried out the projects "Zhily uya" (Warm Nest), "Shyragymyz sonbesin" (Let Our Light Not Fade), and "Meirimdilik – zhurekten" (Kindness from the Heart), aimed at helping those in need and creating a supportive environment for them.

In addition, in honor of the International Day of Older Persons, the university traditionally organizes an event called "Qarttarym qazynam" (My Elders – My Treasure). As part of this campaign, grocery baskets were distributed to the elderly to support their daily needs and express care and respect for this age group. Overall, such joint projects and campaigns allow students to demonstrate care and social responsibility, support those in need, and contribute to the creation of a supportive social environment. This engagement fosters active citizenship among students and strengthens the connection between the university and local communities.

Sport also plays a significant role at the university, with a wide variety of athletic opportunities available to students. The university actively promotes and supports sports by providing opportunities for physical activity and participation in competitions at various levels. There are 20 sports clubs operating at the university, offering different types of sports activities.

These clubs allow students to engage in both team and individual sports. Some of the sports offered include football, basketball, volleyball, tennis, swimming, gymnastics, boxing, karate, badminton, athletics, chess, and other popular sports. Sports clubs offer students the chance to participate in regular training sessions under the guidance of experienced coaches, develop physical abilities, and improve their techniques and strategies in their chosen sports. They also organize participation in competitions and tournaments within the university and at regional, national, and international levels.

Abai KazNPU also hosts a psychological support service that provides a wide range of services and assistance to students. This service offers professional counseling and help with psychological issues related to studies, personal development, interpersonal relationships, and other aspects of student life. The psychological service conducts individual consultations where students can discuss difficulties, emotional problems, or stressful situations. Psychologists

provide support, help develop self-reflection skills, emotional regulation, and stress management techniques. To date, over 1,000 consultations have been successfully conducted.

Goal 1. Creating an Educational Environment that Fosters the Unfolding of Students' Talents

Objective 1.1. Create and maintain a supportive environment for students

This objective will be achieved through:

− providing services through the psychological support center;

− organizing events aimed at forming a community of active students with a high level of national consciousness and civic responsibility.

Objective 1.2. Engage students in social, professional, creative, and sports activities

This objective will be achieved through:

− promoting student participation in social, professional, creative, and sports activities.

Objective 1.3. Develop students' essential skills

This objective will be achieved through:

− organizing training sessions and seminars focused on developing communication skills, leadership, time management, creative thinking, and other essential skills;

− supporting and developing student clubs and groups in various creative fields, such as music, dance, theater, literature, and visual arts;

− supporting and enhancing cooperation with public organizations, government institutions, and other partners to create new opportunities for student participation in social activities;

− organizing contests and providing grants to fund and support student-led social projects.

Direction 4. Abai University – A Friendly Campus

The Abai University campus, located in a historic district of Almaty, serves as a cultural hub that attracts residents of the city. Its ecosystem includes academic buildings, scientific laboratories, sports and socio-cultural facilities, and dormitories, along with architectural monuments that contribute to the university's unique campus identity.

All facilities on campus will be modernized to ensure accessibility and barrier-free movement for individuals with special educational needs. The university will enhance its material and technical base by equipping classrooms, computer labs, and scientific laboratories with innovative equipment, multimedia tools, and software.

A phased transition to the digitalization of scientific, educational, and administrative activities is underway.

Key Performance Indicators

Direction	Indicator	The target indicator (by 2029)
Education	Number of graduates of the program	is an increase of 5-10% annually
	Student satisfaction level	At least 85%
	The number of educational programs in the framework of double-degree education with partner universities	1 program
Science and research	Participation of undergraduates in research projects (external financing of research)	Growth of 5% annually
International cooperation	Number of international partnerships	At least 5
	Joint scientific projects	1 project
Infrastructure and resources	Modernization of educational and laboratory facilities	80% of the audiences have been updated