NAO KAZAKH NATIONAL AGRARIAN RESEARCH UNIVERSITY

EDUCATIONAL PROGRAM DEVELOPMENT PLAN

«6B07101 - Automation and Control»

FOR 2024 -2028 YEARS

Recommended by the Academic Committee of the Faculty of Engineering and Technology
Protocol No.11 of. 26.06/2024
Considered at the meeting of the Department of IT Technologies and Automation.
Protocol No. 10 of 15.05.2024

Almaty, 2024

1. PASSPORT OF THE DEVELOPMENT PLAN OF THE EDUCATIONAL PROGRAM (OP)

1	Reasons for developing a development plan for the EP	Strategy and topics of the development plan of the educational program in accordance with the educational policy of the Republic of Kazakhstan. Development Strategy of the Kazakh National Agrarian University until 2028 Strategic development plan for the department of " IT technology " until 2028
2	The main developers of the development plan of the EP	Head of the Department, Candidate of Physical and Mathematical Sciences, Associate Professor Makashev E.P., Master's degree, senior lecturer N.S. Toylybaev *Employers:* Deputy Director General of the Institute of Information and Computing Technologies of the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan; PhD , Assoc. Professor Mamyrbaev O., Director of the Branch of the State Enterprise on the Right of Economic Management “Information and Computing Center of the Bureau of National Statistics of the Agency for Strategic Planning and Reform of the Republic of Kazakhstan” E. Iemberdiev . *Students* Aizimbay B.-student AU-23-099K Ilesbek A.-year 2024 Kamzabek A.-Master's student of the 1st year M. Zhankish-vipusnik magistracy.
3	Deadlines for the implementation of the development plan of the EP	2024 - 2028 gg .
4	Volume and sources of funding	State budget and business contract basis.
5	Expected final results of the implementation of the development plan of the EP	Training of specialists in computer technology and software who are competitive in the labor market and who possess high personal characteristics and broad fundamental and applied knowledge in the field of information and communication technologies .

2 ANALYTICAL JUSTIFICATION OF THE PROGRAM

2.1 Information about the educational program

The content of the educational program is established by the following documents:

- License for educational activities No. KZ89LAA00031870, date of issue 08/05/2021 (bachelor's degree).

State compulsory standard of education at all levels of education. (Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated 20 July 20 22 , No. 2 ;) Registered with the Ministry of Justice of the Republic of Kazakhstan on July 27, 2022, No. 28916.

Professional standard. Appendix No. 72 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan " Atameken " dated 11.12.2018 No. 339.

Bachelor's degree training in the educational program "6B07101-"Automation and Control" at the NAO "Kazakh National Agrarian Research University" is carried out for a period of 4, 3 and 2 years. The training of undergraduates in the educational program "7M07101-Automation and Control" is carried out in the scientific and pedagogical direction for a period of 2 years.

2.2 Information about students

The contingent of students is presented in Table 1.

Table 1 – Contingent of students in the educational program

Training year	EP 6B06103 –«Computer systems and software engineering»					EP 7MB06103/8 - «Computer systems and software engineering»				
	total	including				total	including			
		kaz	rus	grant	contract.		Multilingual gr		grant	contract.
2022-2023	62	62	-	28	34	12	20		20	1
2023-2024	54	53	1	16	38				5	
2024-2025	40	37	3	23	17					

2.3 Internal conditions for the development of the OP

To prepare bachelors and masters, the department has modern teaching and laboratory rooms, technical teaching aids, visual and demonstration materials.

When implementing EP «6B07101 - Automation and Control»

uses the auditorium fund of the department and the university.

The Department of IT Technologies has modern computer classes and classrooms equipped with interactive boards with multimedia projectors. The department is equipped with various equipment for conducting interactive lectures, which are available to all students, including remote technology using a web portal.

The number of classrooms fully covers the entire contingent of the department and ensures continuity in accordance with the schedule of the educational process. All computers are of the new generation with Internet access.

Software tools Microsoft software Office , OS Windows 8-10 have licenses. The network is protected by the licensed program Dr.Web . Also , a proxy server is installed in the network.

The sanitary condition of the auditorium, laboratories and offices corresponds to the required regulatory documents. A passport has been drawn up for each auditorium indicating the number of seats, the amount of inventory, and the area occupied.

The provision of educational programs with educational and methodological complexes of disciplines is 100%. The acquisition of new educational and scientific literature in accordance with the specialty is carried out annually.

One of the tasks of the Department of IT Technologies is to develop a joint educational program with leading universities, the implementation of which is aimed at integrating into the international scientifically based space through academic exchange of teachers and students. The implementation of academic mobility is carried out with such universities as: Kazakh Agrotechnical University named after S. Seifullina (Astana), Putra University (Malaysia), St. Stephen's University (Hungary), University of Life Sciences (Czech Republic), Tashkent State Agrarian University (Uzbekistan).

Scientists from abroad were invited to give lectures: Doctor of Physical and Mathematical Sciences, Professor of Tashkent State Agrarian University Sapaev Bayramdurdy (Tashkent ,

Uzbekistan), Candidate of Technical Sciences, Associate Professor of Novosibirsk State Agrarian University Didenko Alexander Alexandrovich (Novosibirsk) . Novosibirsk , Russia).

Mobilize working practitioners to the educational process, allows integrating theory with practice and helps graduates quickly adapt to the professional environment. Leading experts are invited: Deputy General Director of the Institute of Information and Computational Technologies of the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan, PhD Mamyrbayev O.Zh.; Head of the Laboratory of "Methods of Computing and Software" of the Institute of Information and Computational Technologies of the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan, Professor Kudaykulov A.; Head of the Laboratory of "Automation and Information Technologies" at LLP "Scientific and Production Center of Agricultural Engineering", Professor, Doctor of Technical Sciences - A. Altybayev. In these laboratories, students undergo training in the discipline "Computer Networks" under dual training.

2.4 Characteristics of the surrounding society

The priority direction in the development of the educational program is training focused on the personality of the student, revealing his individual abilities, forming the student into an active and interested participant in the educational process.

The basis of the educational environment is its social component, in relation to the EP traditions and image of KazNAIU , mutual responsibility, moral and emotional climate; social support of students, extracurricular activities (creative teams, sports sections, scientific communities, etc.). One of the key components is also the intellectual and developmental environment: modern technologies of developmental learning (interactive teaching methods), a system of electives (business games, excursions), a system of elective courses in various areas of educational programs for acquiring knowledge on a particular topic, a system of intellectual competitions of various levels (subject and interdisciplinary Olympiads, competitions, tournaments, intellectual marathons, games, etc.), a system of support for gifted students.

All components of the educational environment structure are open, there is an opportunity to realize oneself, which leads to increased motivation for educational activities, and develops communication skills.

2.5 Information about the teaching staff implementing the OP

18 people working in the department teachers , 6 of them are part-time : head of the department , associate professor, PhD Makashev E.P. , including 1 doctor of sciences - professor, 5 Associate Professors, 7 Masters, 4 PhD , 1st position teacher . The department's degree-holding rate is 54.5 %, which shows a tendency to increase annually.

During this academic year, the department's employees received promotions . qualifications in the leading research centers of the Republic of Kazakhstan in the taught disciplines: AESA - training Training Center and Advance LLP . The department's teachers undergo advanced training on the international Coursera platform in the following courses: Excel Skills for Business: Essentials , Excel Skills for Business: Intermediate I , Graphic Design Fundamentals , Being a Researcher , BigData and others.

Department teachers Tengaeva A.A. and Medetbaeva S.A. are undergoing advanced training under the Bolashak program in Constructor University in Germany (Bremen).

Over the past year, teachers at the department have published textbooks “ Business Sheshimderdi Modeldeu ” Akhmetov K.A.; textbooks “Engineer esepterdegi matematikalyk adister men modeler” Serikbaev A.U., Tengaeva A.A., “Modeling of business decisions” author Kirgizbaeva B.Zh., Akhmetov K.A., Kozhamkulova Zh.Zh.; “Interactive graphics” Chingenzhinova Zh.S., Kirgizbaeva B.Zh. , “Computer graphics” by B.M. Dilmagambetova, etc.

The faculty publishes scientific articles not only in industry journals of the Republic of Kazakhstan, but also in journals with an impact factor included in the database on the Web of Science and Scopus . (Since 2021, the faculty has published 15 articles).

The following teachers have undergone promotion in the direction of “Artificial Intelligence”: Seydalieva G.O., Chingenzhinova Zh.S., Dilmagambetova B.M., Moldabekov B.K., Toylybaev N.S. have received promotion and certificates.

2.6 Characteristics of the achievements of the OP

The achievements of the educational program include the training of target specialists, scientific and pedagogical personnel and conducting scientific research based on contracts concluded with specialized research institutes and research and production institutes. These are organizations such as: LLP " Scientific and Production Center of Agroengineering " , RSE "Information and Computing Center of the Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan" , Almaty; Institute of Information and Computing Technologies of the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan , etc.

Funded scientific research conducted by scientists of the department over the past 4 years (2020-2024):

1. "Efficient system of macroeconomic instruments of state regulation of innovative development" (2023-2026). (Chief Researcher Akhmetov K.A., Leading Researcher Seydalieva G.O.). - amount of funding - 63 million tenge:
2. "Public-private partnership in the grain product subcomplex as a basis for intensive development of the agro-industrial complex. (Executor Toylybaev N.S. 2023-2024)
3. "Organizational and economic mechanism for sustainable development of enterprises of the feed industry of the agro-industrial complex using innovative and digital technologies" (2022-2024). (Executor Ordabaeva G.K.) - amount of financing - over 47 million tenge.
4. Construction of a decision support system for natural and economic development of the territory of the North Kazakhstan region in the context of sustainable development. Start 09/01/2024 - completion 12/31/2026 (Head - Makashev E.P.) Amount of financing - over 16 million tenge.

3 CHARACTERISTICS OF THE PROBLEMS THAT THE OP DEVELOPMENT PLAN IS AIMED AT SOLVEING

- Low availability of educational and methodological literature in a foreign language;
- Lack of an established system for creating electronic textbooks and training programs.
- Poor equipment of scientific laboratories with new generation equipment and devices.
- Low motivation of the department's teaching staff to publish scientific articles in journals with impact factor.

4 MAIN GOALS AND OBJECTIVES OF THE OP DEVELOPMENT PLAN

To achieve the goal, it is necessary to solve the following tasks:

The development plan for the educational program «Computer systems and software engineering»

was developed based on the requests of employers and students. The main goal of the development plan for the educational program is to create an educational environment that promotes the formation of a self-developing and self-actualizing personality based on the introduction of a competency-based approach in the educational and upbringing process.

To achieve the goal, it is necessary to solve the following tasks:

- Creation of an innovative educational environment;
- Expansion of the educational space;
- Publication of scientific articles in journals with impact factor;
- To orient the educational program towards the scientific research activities of students;
- To ensure a level of education that meets modern requirements and practical needs;

• Development of human resources;

• Strengthening language training of teaching staff through mandatory attendance of foreign language courses created both at the university and outside it ;

• Expansion of international cooperation of the university with universities in the near and far abroad within the framework of scientific projects and academic mobility of students and teaching staff.

Measures to reduce the impact of risks for the OP

The successful implementation of an educational program can be influenced by various types of risks and, as a result, preventive measures have been developed to reduce them.

• attracting a contingent of students on a fee-paying contractual basis;

• to intensify the work of the teaching staff on the development of electronic educational publications in the state language and their introduction into the educational process

• Visit of the faculty of the department to the webinar « Research metrics course » on writing a scientific paper: Module 1 - Introduction to scientometric systems, Module 2 - "Writing a scientific paper for the base Web of the science and Scopus »

• intensify work to improve the qualifications of teaching staff in research institutes and universities abroad to implement academic mobility;

• take an active part in competitions announced by the Ministries of the Republic of Kazakhstan and international organizations to receive grants for funded research projects;

• timely planned purchase of modern equipment and constant replenishment of the fleet of instruments and tools.

5 LIST OF ACTIVITIES OF THE IMPLEMENTATION PLAN OF THE OP

No.	Events	Deadlines implementations
1	Improving the educational program of bachelor's and master's degrees taking into account the opinions of potential employers	20 24 -20 28
2	Drawing up a plan for publishing textbooks, teaching aids and methodological recommendations for educational programs	20 24 -20 28
3	Active implementation of academic mobility students and PP S	20 24 -20 28
4	Expanding scientific cooperation and partnerships with leading foreign universities and research centers, attracting leading foreign scientists to give lectures to students	20 24 -20 28
5	Equipping classrooms with modern equipment	20 24 -20 28
6	Publication of scientific articles in journals included in Web databases of Science and Scopus , in scientific journals with impact factor	20 24 -20 28
7	Passing independent national specialized accreditation for the educational programs “6B07101 - «Automation and Control», «7M07101 - Automation and Control»	2026 2024
8	Participation in the national ranking of educational institutions among universities of the Republic of Kazakhstan	annually
9	Preparation and participation of students in the Republican Olympiads in the educational program “6B07101 - «Automation and Control»”	20 24 -20 28
10	Conclusion of agreements with specialized enterprises for the completion of industrial and research internships by students	20 24 -20 28

MECHANISM FOR IMPLEMENTING THE OP DEVELOPMENT PLAN

To implement a high-quality educational program, the faculty of the department develops catalogs of elective disciplines with the direct participation of employers and students. The introduction of innovative technologies of education and science by the faculty of the department will be actively implemented through the implementation of academic mobility with domestic and foreign partner universities and research institutes. Ensuring a high proportion of employed graduates of the educational program by organizing and holding an annual "Career Week", "Job Fair", industrial practice and internship with the involvement of employers.

The teaching staff and students must participate in international educational programs, participate in the competition for the allocation of grants for travel to participate in scientific conferences (seminars, congresses, conventions) and scientific internships.

7 ASSESSMENT OF SOCIAL AND ECONOMIC EFFICIENCY OF THE IMPLEMENTATION OF THE OP DEVELOPMENT PLAN

As a result of the implementation of the development plan for the EP, it is expected that the following socio-economic effects will be achieved:

- improving the quality of professional education and, as a consequence, the competitiveness of specialists in the field of soil science and agrochemistry;
- training graduates who meet the needs of potential employers;
- increasing the role of employers in training professional personnel;
- increasing demand for qualified personnel, optimizing their age structure;
- expanding opportunities for professional self-realization of young people;
- preventing the outflow of promising teaching staff to other sectors;
- updating the educational and material base (educational, laboratory, computer and technological base that meets modern requirements and standards).

8. Graduate model

	“6B07101 - «Automation and Control»	**«7M07101 - Automation and Control»**
Be able to:	-to use the apparatus of mathematics, physics, electronics, the basics of electrical engineering to solve engineering problems in the field of automation and control; -apply modern programming languages, computer graphics systems, computer hardware, telecommunications, modeling and database design methods; - to practice knowledge of linear and nonlinear automatic control systems, their mathematical description and modeling; - select standards, methodological and regulatory materials for the development and design of process automation systems; -assess the condition of automation facilities, technological processes and technical systems; -to critically analyze and verify the preliminary feasibility study of design solutions; -to conduct an experiment, analysis and interpretation of data; -develop projects in the field of automation, robotics and provide technical support for systems.	-use modeling methods for research and design of computer information processing and control systems and their subsystems; -apply standards, methodological and regulatory materials that define the development and design of process automation systems; - to develop intelligent control systems based on neurons and intelligent control of technological processes; -perform complex engineering and technical developments in the field of automation, fundamentals of management and decision-making, methods used in the development of modern computer process control systems.
Know and understand:	-principles of construction and functioning of technical and computer systems; - principles of the organization of expert systems and programming of microcontrollers, the basics of analyzing the results of solving management tasks; - design work on the creation and commissioning of automatic systems using computer technology; -mathematical methods for the analysis and synthesis of linear and nonlinear automatic control systems; -relay protection systems, application programming and circuit design of electronic devices; -effective systems for automatic and automated control of technological processes, controllers and actuators operating under the control of SCADA systems; -the content and procedure of project work in the field of automation and control of technological processes and productions; -design and calculation work at the stages of technical and operational design of automation and control systems, methods of synthesis of automatic control systems	-use modeling methods for research and design of computer information processing and control systems and their subsystems; -apply standards, methodological and regulatory materials that define the development and design of process automation systems; - to develop intelligent control systems based on neurons and intelligent control of technological processes; -perform complex engineering and technical developments in the field of automation, fundamentals of management and decision-making, methods used in the development of modern computer process control systems.

Dean of the Faculty _____ Nabiollina M.S.

Head of Department _____Makashev E.P.