### DEVELOPMENT PLAN OF THE EDUCATIONAL PROGRAM «AGROECOLOGY» (6B08107) FOR 2024–2028

Reviewed at the extended meeting of the Department of «Soil Science, Agrochemistry, and Ecology» Protocol No. 10, of May 13, 2024 Recommended by the Academic Committee of the Faculty of "Agrobiology" Protocol No. 10, of May 24, 2024

# CONTENTS

No	Name of the component	
1	1 Development Plan Passport of the Educational Program (EP)	
2	Analytical Justification of the Program	
3	Description of Issues Addressed by the Development Plan	
4	Main Goals and Objectives of the Development Plan for the EP	
5	Expected Final Results of the Development Plan Implementation	
6	Measures to Mitigate Risks Affecting the EP	
7	List of Activities for the EP Implementation Plan	
8	Mechanism for EP Development Plan Implementation	
9	Socio-Economic Impact Assessment of EP Development Plan	
10	Graduate Model of the Agroecology EP	

# 1. Passport of the Development Plan of the Educational Program "Agroecology" (2024–2028)

1	Reasons for Developing	The strategy and theme of the development plan are		
	the Development Plan	established based on employer demands, aligned with the		
		educational policy of Kazakhstan and the strategic plan		
		of the Department for the Agroecology specialty.		
2	Key Developers of the	Head of Department: PhD, Associate Professor		
	EP Development Plan	Bakenova Zh.B.		
		Academic Teaching Staff:		
		Employers:		
		LLP "NTC-Energo," Director K. Kumgambayev		
		Chairman of the Board of KazNIIZiKR named after Zh.		
		Zhiembaev: B. Duissenbayev		
3	<b>Implementation Period</b>	2024-2028		
4	Funding Sources and	State budget and contractual agreements.		
	Volume			
5	Expected Final	The program aims to produce specialists proficient in		
	Outcomes of the	creating resource-saving technologies for cultivating		
	Development Plan	crops and assessing the ecological condition of		
	Implementation	agrocenoses to ensure high-quality biological production.		

# 2 Analytical Rationale of the Program

# 2.1 Information about the Educational Program

The content aligns with the State Educational Standards of Higher Education (Order No. 2 of July 20, 2022, by the Ministry of Science and Higher Education). **Student Statistics (2024–2025):** 

## • Total students: 20 (all in the Kazakh language track).

• Funding: 17 students on state grants, 3 on a paid basis.

ear	6B08107 - Agroecology				Table 1 – Student Contingen
cademic Y	otal tudents	в том число kaz	e rus	Government Grant	Paid Enrollment
₹ 2024-2025		20		17	3

# 2.2 Internal Conditions for the Development of the Educational Program

To implement the aforementioned educational program, the faculty is equipped with the necessary material and technical resources.

For the preparation of bachelor's students, the department offers modern educational and laboratory facilities, technical teaching aids, visual and demonstration materials, as well as 4 fully equipped educational laboratories and 2 research laboratories with state-of-the-art technical teaching tools (TST). Additionally, lecture halls are available.

The department's laboratories are outfitted with the following equipment and instruments: photoelectric colorimeters, compact gas analyzers, a pH meter (converter, power supply, thermal sensor) -1, a noise analyzer spectrometer, a tabletop laboratory centrifuge, an electronic thermometer (Thermal Probe TMC-9210 M1), analytical and laboratory scales, centrifuges, drying ovens, distillers, and others.

Three lecture halls are equipped with interactive whiteboards and multimedia technology. All faculty members are provided with personal computers and have unrestricted access to the internet.

The sanitary condition of the laboratories and classrooms meets the required regulatory standards. Each classroom has a passport document indicating seating capacity, inventory, and occupied area.

The provision of educational programs with educational and methodological course complexes is at 100%. New educational and scientific literature is regularly procured in accordance with the specialization, including titles such as "Plant Nutrition," "Soil Fertility and Fertilizers," "Elements of the Nature and Properties of Soils," "World Soil Resources and Food Security," "Soil Conditions and Plant Growth," "Soil Terminology, Correlation and Classification," "Soils and Soil Fertility," "Soil Formation," "Soil Chemistry," and "Soil Erosion."

Laboratory activities are monitored through annual calibration of measuring instruments, inventory checks by university commissions, and inspections by ministry and agency committees overseeing research programs.

Practical Training in the Implementation of the Educational Program "Ecology"

Practical training in the implementation of the educational program "Ecology" is aimed at forming, consolidating, and developing practical skills and competencies related to the program profile by expanding components (parts) of the educational program, which involve simulating real conditions or simulated production processes directly related to future professional activities.

Educational activities in the form of practical training:

- Are carried out during practical and laboratory classes, in the performance of independent research work (SRW), research and project work (RPW), and independent project work (IPW).

- Lectures, practical and laboratory classes, and scientific seminars aim to provide students with the necessary academic information for future professional activities.

Practical training is implemented throughout the study, covering all professional modules, types of practices, and disciplines specified in the curriculum of the educational program "Ecology."

Leading scientists and teachers from foreign universities, heads of departments and organizations, and leading specialists from Kazakhstan actively participate in delivering lectures and conducting seminars and practical classes. In recent years, M.V. Filippova from Angel Kynchev University (Bulgaria, Ruse) has conducted classes at the department.

Engaging domestic and foreign scientists and teachers in the educational process integrates theory with practice and helps graduates adapt quickly to the professional environment.

### Dual Education

Dual education (DE) involves obtaining not only theoretical knowledge in the process of mastering educational programs at the educational institution but also practical knowledge, skills, and abilities at real production sites.

• Dual education with fourth-year students at the "Institute of Botany and Phytointroduction" KHLJMEGP RK (discipline "Fundamentals of System Ecology")

- Continuing education for the department's academic staff in the subjects they teach.
  - Conducting seminars and round tables on pressing environmental issues.

Coursera

Currently, online education is quite popular and offers opportunities for obtaining both primary and supplementary education anywhere in the world. Online education allows students to choose their learning time, create their own schedule, and perform assignments in a comfortable environment, ensuring individualization of education, independence of the learner, openness, and continuity of education. The "Coursera" platform offers various opportunities for improving the qualifications of education professionals, from preschool educators to university lecturers.

The platform provides a wide range of free courses on various topics. Upon completion of the course requirements, the student receives a certificate of completion (Statement of Accomplishment or Statement of Accomplishment with Distinction). There is also an option to obtain a verified certificate, confirming that the specific student has completed the course by meeting all requirements. In some cases, the number of hours studied is indicated.

### Social Environment Characteristics

A priority direction in the development of the educational program is training that reveals the individual abilities of students, forming them as active participants in the educational process.

The educational environment's social component for the programs 6B05201, 7M05204, and 8D05204 - "Ecology" is based on the traditions and image of KazNAU, mutual responsibility, a high moral-emotional climate, social support for students, and extracurricular activities (creative teams, sports sections, scientific communities, etc.). One key component is the intellectual development environment: modern technologies for developmental learning (interactive methods), the elective system (business games, excursions), a system of elective courses in various fields to gain knowledge in specific topics, and intellectual marathons, games, etc.), and the support system for gifted students. All components of the educational environment are open and provide opportunities for self-realization, which increases motivation for academic activity and develops communication skills.

In the field of education, the goal of the EP "Ecology" is to train competitive specialists with knowledge in environmental protection, who are capable of understanding the basic principles of state regulation in ecology: assessing levels of hazardous environmental factors; ensuring the sustainability of geographical patterns within the biosphere and maintaining ecological safety.

Information on the Academic and Teaching Staff (ATS) Implementing the Educational Program

A key priority in the development of the educational program is to provide education that uncovers the individual abilities of students and shapes them as active participants in the learning process.

The foundation of the educational environment, as a social component for the 6B08107-Agroecology program, is built on the traditions and reputation of KazNAIU, mutual responsibility, a high moral and emotional climate, social support for students, and extracurricular activities (creative groups, sports clubs, scientific communities, etc.).

Another crucial component is an intellectually stimulating environment, which includes modern developmental teaching technologies (interactive learning methods), an elective system (business games, excursions), and a variety of elective courses aimed at acquiring knowledge in specific areas. It also involves a framework for intellectual competitions at different levels (subject and interdisciplinary Olympiads, contests, tournaments, intellectual marathons, games, etc.), and a system to support gifted students.

All elements of the educational environment structure are accessible and foster selfrealization, which enhances motivation for learning activities and develops communication skills.

Information about the teaching staff implementing the educational program

The implementation of the educational program "Agroecology" is provided by scientific and pedagogical staff who typically have basic education corresponding to the profile of the specialty and are systematically engaged in educational-methodical and/or scientific activities.

Student education is conducted by experienced teachers: professors, doctors of sciences, associate professors, candidates of sciences, PhD holders, senior lecturers, and assistant professors. The qualifications of the department's teachers, as well as their quantitative and qualitative composition, correspond to the directions of training for students, meet licensing requirements, and testify to the staffing capacity of the university's educational activities.

The procedure for conducting a competition for vacant positions is regulated by the normative documents of the Ministry of Education and Science of the Republic of Kazakhstan and internal documents (Instruction on the procedure for internship, preliminary training, instruction, and knowledge verification on safety and labor protection issues). The existing mechanism allows for a comprehensive view of the professional competence of the teacher and determines their suitability for the position. The competition commission conducts a qualitative analysis of the teacher's educational-methodical and research activities, reviews their last place of work, the motivated conclusion of the department about the candidate, and the voting results of the receiving department members. Long-standing practice shows a consistent tendency to give preference to master's degree holders, candidates, and doctors of sciences who can contribute to enhancing the university's human resources potential.

When hiring teaching staff, it is mandatory for the candidate to have higher professional education, an academic degree of a master's degree, a scientific degree of candidate or doctor of sciences, or PhD, and education corresponding to the university's specialty profile, etc.

Staff selection based on a recruitment system is carried out as follows:

- A staffing schedule for the teaching staff is formed;
- The number of vacant positions for training students in various educational programs is determined;
- A competition is announced through the KazNAIU website for filling vacant positions, specifying qualification requirements;
- A competition for filling vacant positions is held, and recommendations for hiring • submitted university teaching staff the rector. are to (https://www.kaznaru.edu.kz/department/81) provides The **KazNAIU** website information about teachers for the educational program:
- List of teachers,

A brief list of achievements. This information includes personal data, teacher specialization. scientific projects, patents, methodological recommendations. publications in periodicals (KOKSON Ministry of Education and Science of the Republic of Kazakhstan), as well as in journals with impact factors, Web of Science, professional development, contact Scopus. etc., information. and The "Soil Science, Agrochemistry, and Ecology" department has 20 teachers, including 2 doctors of sciences, 6 candidates of sciences, and 10 PhD holders. The department's staffing rate is 95%, the average age of the teaching staff is 45 years, and 100% of the teachers conduct classes in the state language and the language of interethnic communication. Three teachers conduct classes in English, and two master's degree holders are authorized to teach.

# **3** Characteristics of the Problems Addressed by the Educational Program Development Plan

Currently, there are several problems that the development plan of the educational program aims to address:

- Lack of teachers conducting classes in the educational program in English;
- Low level of student participation in scientific research activities;
- Insufficient amount of educational and methodological literature in English;
  - Insufficiently high level of information and technical infrastructure;
- Need for improving the qualifications of teaching staff in the field of innovative teaching technologies at the national and international levels.

### 4 Main goals and objectives of the educational program development plan

When drawing up an OP development plan, the provision of all necessary resources for its implementation is taken into account.

The goals and objectives of the educational program are formulated taking into account the requirements and demands of the labor market, and based on the assessment of the relevance of the educational program, which are determined by the interests of potential employers, applicants, the potential of the university, the requirements of the state and society as a whole.

The goal of the educational program is to train competitive specialists—personnel with professional skills in the development of resource-saving technologies for growing agricultural crops and assessing the ecological condition of agrocenoses to produce high-quality biological products.

Educational programs are based on the principles of:

-the principle of continuity;

-the principle of continuity of bachelor's, master's and doctoral degree programs;

-the principle of result-centricity is related to the realization of the goal of education;

Objectives of the OP development Plan:

-improvement and improvement of conditions for obtaining a full-fledged, highquality professional education;

-updating the content of the OP

-development of measures for mastering the work with scientific information using domestic and foreign experience in professional activities.

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

\* Modernization of the educational process, introduction of innovative technologies

\* Development of integrated educational programs for the development of internal academic mobility

\* Development of joint educational and research programs with foreign partner universities

\* Development of a professional development system for teaching staff

\* Improvement of bachelor's degree programs, taking into account the opinion of employers

\* Development of the employment program

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# Expected Final Results of the Development Plan Implementation

The expected final results of the educational program imply a clear orientation towards the future, manifested in the ability of students to shape their education based on success in both personal and professional activities that meet the employers' requirements.

The "Agroecology" educational program will provide students with deep theoretical knowledge and practical skills in the field of professional education.

The implementation of the Department Development Plan for the period up to 2028 will improve the quality of training qualified specialists, equipping them with a competitive level of knowledge, skills, and professional expertise in current areas of agroecology.

• The proportion of accredited educational programs will increase.

- The availability of educational and methodological literature for students will increase.
- The proportion of invited foreign scientists will increase.
- The number of published textbooks, study guides, and methodological recommendations for educational programs will increase.
- The number of contracts with employers for providing bases for industrial practice with the possibility of subsequent employment will increase.
- The demand for graduates of educational programs in the labor market will increase.
- The professional development of teaching staff in the field of innovative teaching technologies will increase.

# 6 Measures to Mitigate Risks for the Educational Program

To ensure the successful implementation of the educational program, potential risks and mitigation measures are outlined as follows:

No	Risk	Mitigation Measures
1	Providing conditions for obtaining a	Providing educational services for the
	full-fledged, high-quality professional education	development of professional skills
2	Low enrollment in the "Ecology"	To improve and implement innovative
	master's program	teaching technologies in the educational
		process
3	The traditional method of conducting	Develop and integrate innovative teaching
	classes	technologies
4	Insufficient motivation for ATS to	Create a publication plan for ATS in
	publish in high-impact journals	international journals with a non-zero impact
		factor
5	Low level of international scientific	Expand partnerships with leading
	collaboration	international universities and research centers

### 7 List of Activities for the Implementation Plan

No	Activity	Implementation
		Period
1	Enhance the EP content considering employer feedback	2024-2028
2	Develop a publication plan for textbooks and study guides	2024-2028
3	Actively promote academic mobility for students and ATS	2024-2028
4	Expand scientific collaboration and partnerships with	2024-2028
	international universities and research centers, invite foreign	
	experts for lectures and research	
5	Increase the number of ATS proficient in foreign languages	2024-2028
6	Upgrade classroom equipment with modern tools	2024-2028
7	Publish scientific articles in journals indexed in Thomson	2024-2028
	Reuters and Scopus	
8	Continuously monitor graduate employment	2024-2028
9	Conclude agreements with relevant enterprises for student	2024-2028
	internships and employment opportunities	
10	Participation in the national ranking of educational programs	Annually
	among universities of the Republic of Kazakhstan.	

### 8 Mechanism for Implementing the Development Plan

Conduct targeted work to increase the number of state grants for the "Agroecology" educational program through career orientation activities among high school and college graduates. To implement a high-quality educational program, the department staff will develop catalogs of elective courses with direct involvement from employers. The introduction of new innovative teaching technologies will be achieved through academic mobility with partner foreign universities and research institutes. Ensuring a high percentage of employed graduates of the educational program will be achieved by organizing and conducting the annual "Graduates' Fair" with the

participation of employers from various sectors of the economy in the regions of the Republic of Kazakhstan. The quality renewal of the teaching staff will be carried out based on continuity by involving talented young people in teaching and research activities.

Development of international academic mobility for students and faculty through the construction of individual learning trajectories and the selection of educational programs from various universities around the world, including internships for students and faculty at leading foreign universities. Organization of professional internships at the leading agricultural enterprises. Ensuring a high percentage of employed graduates of the educational program by organizing and conducting the annual "Graduates' Fair" with the participation of employers from the agricultural sector of various business entities in Kazakhstan's regions.

Conducting targeted work for the implementation of educational programs, for which department staff will develop catalogs of elective courses with direct involvement from employers. Lectures and practical classes will be conducted by invited leading scholars from both neighboring and distant foreign countries. Establishment of department branches at the bases of specialized research institutes.

# **9** Assessment of Socio-Economic Effectiveness of the Development Plan Implementation

The socio-economic effectiveness of implementing the "Agroecology" educational program is determined by such criteria as: the sufficient volume of theoretical knowledge and competencies, a high level of applied skills and abilities, excellent professional suitability, an increase in graduate employment rates, feedback from employers on the professional suitability of graduates, etc.

As a result of the implementation of the development plan for the educational program, the following socio-economic effects are expected:

Improvement in the quality of professional education and, consequently, the competitiveness of specialists in the field of agroecology;

• Training graduates who meet the needs of potential employers;

•

- Increased involvement of employers in the preparation of professional personnel;
- Increased demand for qualified personnel, optimization of their age structure;
- Expansion of opportunities for professional self-realization for young people;
- Updating the educational and material base to meet modern requirements and standards.

W(weaknesses):
High teaching workload for ATS.
Low level of scientific development activities.
Insufficient proficiency in foreign languages
among ATS.
T (threats/Risks):
High competition in attracting talented students
and young staff.

#### 10. SWOT – Analysis

<ul> <li>Adaptation of the educational program to professional standards considering employer interests.</li> </ul>	ram ring
• Student involvement in research projects.	arch

#### 11 Graduate Model

The graduate model of the educational program 6B08107-Agriculture has been supplemented in accordance with national qualification frameworks and the needs of key employers. The graduate model was developed by the working group based on the state educational standard of the specialty and was discussed with employers and at the department meeting. meeting.

		Graduate model
		6B08107-AGROECOLOGY
Skills:		<ul> <li>-be able to work with biogeographic maps; study the transformation of chemical compounds in the environment;</li> <li>-accounting and control of agroecological safety of agricultural products when using herbicides, fungicides and insecticides;</li> <li>-the main methods of production of environmentally friendly agricultural products;</li> <li>-basic principles of the organization of agroecosystems and optimization of agricultural landscapes;</li> <li>- efficiently and effectively use land, water, forestry, labor, material and other resources;</li> <li>- to know the peculiarities of the influence of environmental factors on living organisms and their responses;</li> </ul>
	Know and understand	to understand the basic foundations in the field of natural sciences that contribute to the formation of a highly educated personality with a broad outlook and a culture of thinking, to apply information technology for data analysis and collection; -apply the acquired knowledge for the analysis and comprehensive assessment of specific agroecosystems
	To be competent in matters	<ul> <li>to distinguish and analyze the models of the selected anthropoecosystem, to know the role of microorganisms in nature and various spheres of human activity;</li> <li>to regulate agricultural machinery and equipment, to set the rate of sowing of seeds of agricultural crops, fertilizers, pesticides, irrigation standards, etc.;</li> <li>to draw up technological maps of cultivation of agricultural crops with the introduction of elements of innovative technologies;</li> <li>Development and implementation of agrochemical measures aimed at increasing soil fertility and increasing the yield of legumes and oilseeds.</li> </ul>

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