«KAZAKH NATIONAL AGRARIAN UNIVERSITY»
Non-Commercial Joint Stock Company

DEVELOPMENT PLAN
OF THE EDUCATIONAL PROGRAM «ECOLOGY»
(6B05201; 7M05204; 8D05204)

For 2024–2028

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

Almaty, 2024

CONTENTS

1.Development Plan Passport
For the Educational Program «Ecology» for 2024–2028

1	Reasons for Developing the Development Plan	The strategy and theme of the EP development plan are based on employer requests and aligned with the educational policy of the Republic of Kazakhstan and the strategic development plan of the Department of Ecology.
2	Key Developers of the EP Development Plan	Head of Department: PhD, Associate Professor Bakenova Zh.B. Academic Teaching Staff: Employers: LLP NTC-Energo, Director K. Kumgambayev LLP Agrofirma TZN and K, Director B. Saikenov
3	Implementation Period	2024-2028
4	Funding Sources and Volume	State budget and contractual basis.
5	Expected Final Outcomes of the Development Plan Implementation	Training competitive specialists with knowledge in environmental protection, capable of understanding the main 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. Enhancing and improving conditions for receiving comprehensive, high-quality professional education.

2 Analytical Rationale 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 KZ89LAA00031870, indefinite validity, issued on August 5, 2021.
- State Compulsory Educational Standard of Higher Education. Order of the Minister of Science and Higher Education of the Republic of Kazakhstan No. 2, dated July 20, 2022.

Implementation of the main activities of the Department of «Soil Science, Agrochemistry, and Ecology» covers the educational programs for bachelor's, master's, and doctoral levels: 6B05201 – Ecology, 7M05204 – Ecology, 8D05204 – Ecology.

Information about students.

The contingent of undergraduate students in the 2024-2025 academic year is 140 students, of which 120 students are in the Kazakh department, students study under a state grant 101 (1 student studies at the expense of the People of Kazakhstan Foundation), 19 students study on a fee-based basis, 20 students study in the Russian

department, of which 16 students study according to the state grant, 4 students study on a fee-based basis.

The contingent of undergraduates in the 2024-2025 academic year is 2 undergraduates studying under a state grant.

The contingent of doctoral students in the 2024-2025 academic year is 5 doctoral students studying under a state grant.

Table 1 – Student Contingent

Academic Year	EP 6B05201 - Ecology					EP 7M05204 - Ecology					EP 8D05204 - Ecology				
	total	including				total	including				total	including			
		kaz	rus	grant	contract		kaz	rus	multilingual group"	грант		kaz	rus	multilingual group"	grant
2024-2025	140	120	20	117	23	2			2	2	5			5	5

2.2 Internal Conditions for the Development of the Educational Program

To implement the above educational program, the faculty has the necessary material and technical resources.

For the preparation of bachelor's and master's degree students, the department has modern teaching and laboratory classrooms, technical teaching aids, visual and demonstration materials. There are 4 well-equipped teaching laboratories and 2 research laboratories, equipped with modern teaching tools, lecture halls. The department's educational laboratories are equipped with the following equipment and instruments: photoelectrocolorimeters, compact gas analyzers, pH meters (converter, power unit, thermosensor) – 1, sound level meters, laboratory centrifuges, electronic thermometers, analytical and laboratory scales, drying cabinets, distillers, and more. Three lecture halls are equipped with interactive whiteboards and multimedia equipment. All teachers have personal computers and unrestricted internet access.

Students, master's students, and doctoral students, under the guidance of the department's academic staff, can conduct research work at the Kazakh-Japanese Innovation Center, Agro-technological HUB, and the Scientific Research Institute of Kazakhstan.

The monitoring of laboratory activities is carried out by annual checks of measuring instruments during inventory control, carried out by a university commission and by ministries and departments, whose programs include scientific research.

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 competitions (subject and interdisciplinary Olympiads, contests, tournaments, 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

The implementation of the educational program *«Ecology»* is ensured by academic and teaching staff with relevant basic education aligned with the program's profile, who are systematically engaged in educational, methodological, and/or scientific activities.

Students at bachelor’s, master’s, and doctoral levels are taught by experienced professors, doctors of sciences, associate professors, candidates of sciences, PhDs, senior lecturers, and assistant lecturers. The qualifications of the teaching staff of the Department of «Ecology» their quantitative and qualitative composition, meet the training directions' requirements and the licensing criteria, demonstrating the university's ability to deliver quality educational services.

The procedure for conducting a competition to fill vacant positions is regulated by normative documents of the Ministry of Education and Science of the Republic of Kazakhstan and internal documents (such as instructions on internships, preliminary training, and knowledge testing in occupational safety and health). The existing mechanism provides a comprehensive assessment of a teacher’s professional competence and their suitability for the desired position. The competition commission conducts a qualitative analysis of the academic and research activities of the candidate, reviews the department's conclusion on the candidate, and considers the voting results of the department members.

Over the years, there has been a stable trend of preferring candidates with master's, candidate, or doctoral degrees who can contribute to enhancing the university's human resources potential. When hiring teaching staff, a mandatory requirement is that the applicant for a vacant position has a higher professional education degree, an academic degree of a master, candidate, or doctor of sciences, or PhD. Their education must correspond to the university's specialization.

Staff recruitment through the university's system is carried out as follows:

- Formation of the ATS staff schedule.
- Determination of the number of vacancies for training students in various educational programs.
- Announcement of a competition to fill vacant positions on the KazNAU website, specifying qualification requirements.

- Holding the competition and submitting recommendations for hiring the ATS to the university rector.

Information about the teaching staff for the educational program is available on the KazNAU website:

- A list of instructors.
- A brief overview of achievements, including biographical data, specialization, scientific projects, patents, methodological recommendations, publications in journals with impact factors (Web of Science, Scopus), advanced training records, and contact details.

The Department of «Soil Science, Agrochemistry, and Ecology» employs 20 instructors, including 2 doctors of sciences, 6 candidates of sciences, and 10 PhD. The degree attainment level of the department is 95%, with an average staff age of 45 years.

All instructors conduct lessons in both the state and interethnic communication languages, with three also teaching in English. Currently, instructors of the department implementing the bachelor's, master's, and doctoral programs in ecology use new informational technologies and multimedia teaching aids in their work. Classes incorporate video presentations and interactive teaching methods, enabling students to better grasp and retain educational material.

Characteristics of Achievements of the Educational Program

The outcomes of mastering the educational program «Ecology» are reflected in the competencies acquired by graduates and their ability to apply knowledge, skills, and abilities relevant to professional tasks. Together, learning outcomes and competencies formed during training represent the graduate model.

The graduate model for the educational program is based on the university's fundamental graduate model criteria, supplemented to meet national qualification frameworks and key employers' needs.

Professional Competencies

1. Knowledge and Understanding:
    - Grasp fundamental principles of natural sciences that contribute to the development of a well-educated individual with a broad perspective and critical thinking skills.
    - Apply information technologies for data analysis and collection.
    - Understand the principles of economic laws and apply occupational safety norms and ethical development standards.
    - Analyze essays and scientific articles, develop content for project documentation.
2. Skills:
    - Work with biogeographic maps and analyze the transformation of chemical compounds in the environment.
    - Refer to necessary regulatory acts.
    - Understand the influence of environmental factors on living organisms and their responses.
    - Perform basic economic analysis.
    - Evaluate events and actions from the perspective of legal regulation.
    - Communicate competently, both orally and in writing, in the language of instruction.

3. Practical Abilities:
    - Apply ecological knowledge in various professional contexts.
    - Investigate the environmental impact of industrial enterprises on biosphere components and conduct technological forecasts.
    - Analyze selected anthropoecosystem models and understand the role of microorganisms in nature and human activities.
    - Calculate bioclimatic indices and explore prospects for ecological tourism in different regions.

Goals of Master's and Doctoral Programs

1. **Master's Program Goals:**
    - Train competitive specialists capable of addressing environmental challenges in professional, research, and pedagogical activities.
    - Develop the ability to process results, analyze existing literature, and use modern information technologies.
2. **Doctoral Program Goals:**
    - Prepare highly qualified specialists for teaching and research activities.
    - Enable graduates to address contemporary environmental issues in line with Kazakhstan's legislation and international conventions.

Achievements of the Educational Program

The educational program's success is reflected in its partnerships with organizations for training, research, and internships, leading to employment opportunities for students. Agreements have been signed with numerous enterprises to ensure practical training and future employment for graduates.

3. Problem Description Addressed by the Development Plan

The development plan aims to address the following issues:

- Insufficient involvement of foreign professors in the educational process.
- Lack of instructors teaching EP disciplines in English.
- Low participation of students in research activities.
- Limited availability of educational and methodological literature in English.
- Insufficient level of information and technical resources.
- Need to improve ATS qualifications in innovative teaching methods at 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 purpose of the OP is to train competitive specialists with knowledge in the field of environmental protection, who are able to understand the basic principles of the state regulation system in the field of ecology: to assess the levels of dangerous

environmental factors; to ensure the stability of geographical patterns within the biosphere and preserve environmental safety.

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, high-quality 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

5 Expected Final Results of the Development Plan Implementation

The expected final results of the educational program focus on future-oriented outcomes, enabling students to build their education to meet the demands of personal and professional success while satisfying employer requirements.

The implementation of the development plan through 2028 aims to achieve the following:

- Improvement in the quality of qualified specialists' preparation: Graduates will possess competitive knowledge, skills, and professional abilities in current ecological areas.
- Increase in the share of accredited educational programs: Enhanced alignment with international and national quality standards.
- Better provision of educational and methodological literature for students.
- Higher involvement of international scientists in teaching and research activities.
- Increase in the number of published textbooks, study guides, and methodological recommendations for educational programs.
- Expansion of contracts with employers for internships and job placements for graduates.
- Boost in student participation in national and international events and projects (symposia, forums, rallies, Olympiads, etc.).
- Improvement in the employment rate of graduates in the labor market.
- Growth in ATS publications in high-impact journals: Encouraging impactful research outputs.

- Modernization of information and technical resources: Improved infrastructure to meet contemporary demands.
- Advancement in ATS qualifications through innovative teaching technologies.

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 full-fledged, high-quality professional education	Providing educational services for the development of professional skills
2	Low enrollment in the "Ecology" master's program	Prepare a list and mentor fourth-year bachelor's students for master's admission
4	Traditional teaching methods dominate	Develop and integrate innovative teaching technologies
5	Insufficient motivation for ATS to publish in high-impact journals	Create a publication plan for ATS in international journals with a non-zero impact factor
6	Low level of international scientific collaboration	Expand partnerships with leading 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 international universities and research centers, invite foreign experts for lectures and research	2024-2028
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 Reuters and Scopus	2024-2028
8	Continuously monitor graduate employment	2024-2028
9	Conclude agreements with relevant enterprises for student internships and employment opportunities	2024-2028

8 Mechanism for Implementing the Development Plan

To ensure effective implementation of the development plan, the following actions will be taken:

- Conduct targeted efforts to increase the number of state grants for the "Ecology" educational program through career guidance for school and college graduates.
- Develop elective course catalogs with employer participation to enhance the educational program's relevance.
- Implement innovative teaching technologies through academic mobility programs with partner universities and research institutions.
- Organize annual graduate job fairs, engaging employers from various sectors in Kazakhstan.
- Strategically refresh the ATS composition by attracting talented youth to teaching and research activities and training staff through PhD programs.

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

The socio-economic effectiveness of implementing the development plan for the "Ecology" educational program is assessed based on the following criteria: sufficient theoretical knowledge and competenciesm, high level of applied skills and abilities, strong professional aptitude, improved graduate employment indicators, positive feedback from employers regarding graduate readiness and competence.

Anticipated Socio-Economic Effects

1. Enhanced quality of professional education, resulting in increased competitiveness of specialists in the field of ecology.
2. Preparation of graduates who meet the needs of potential employers.
3. Increased employer involvement in professional training.
4. Higher demand for qualified personnel and optimized workforce age structure.
5. Expanded opportunities for professional self-realization among youth.
6. Reduced outflow of promising academic staff to other sectors.
7. Upgraded educational and material resources to meet modern standards and requirements.

10. SWOT – Analysis

S (strengths): • High-quality teaching staff composition. • Student participation in faculty research projects.	**W(weaknesses):** • High teaching workload for ATS. • Low level of scientific development activities. • Insufficient proficiency in foreign languages among ATS.
O (opportunities): • Opportunity for self-learning via international online courses. • Collaboration with foreign universities and research institutions in scientific research. • Adaptation of the educational program to professional standards considering employer interests. • Student involvement in	**T (threats/Risks):** • High competition in attracting talented students and young staff.

research projects.	

11 Graduate Model

The graduate model of the "Ecology" educational program (6B05201, M05204, 8D05204) for all three education levels is designed with consideration of ational qualification frameworks and key employer needs.

Graduate model

	6B05201-Экология	7M05204-Экология	8D05204 –Экология
Skills:	-Work with biogeographic maps and analyze chemical transformations in the environment. -Use regulatory acts as necessary. -Understand the influence of environmental factors on living organisms and their responses. -Analyze events and actions from a legal perspective. -Communicate effectively, both orally and in writing, in the language of instruction.	-Demonstrate awareness in the philosophy of science, psychology, and pedagogy. - Use modern teaching methodologies in occupational health and safety. - Handle complex psychological situations and make managerial decisions. - Conduct professional conversations in English in an international environment.	-Plan and implement scientific research processes. -Analyze, evaluate, and compare various theoretical concepts in research. -Formulate conclusions based on research results.

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