«KAZAKH NATIONAL AGRARIAN RESEARCH UNIVERSITY»
Non-profit joint stock company

DEVELOPMENT PLAN
EDUCATIONAL PROGRAM 6B05201- ECOLOGY

for 2024-2028

Considered at an extended meeting of the department
«Soil science, agrochemistry and ecology»
Protocol № 10 of 05/13/2024
Recommended by the academic committee faculty «Agrobiology»
Protocol № 10 of 24/05/2024

Almaty, 2024

CONTENTS

1 Passport educational program development plan

«Ecology» for 2024-2028

1	Grounds for the developments plan development of OP	Strategy and subject matter plan development OP created based on the request of employers in accordance s educational politics Republics Kazakhstan, strategic plan development departments specialties «Ecology».
2	Main developers of the OP development plan	Head. departments PhD, art. teacher Sagidoldina Zh.E. professorial teaching composition *Employers*: LLP «STC-Energo» director K. Kumgambaev LLP «Alem Shar» director N. Valiev
3	Timing of the OP development plan	2024-2028
4	Scope and sources of funding	State budget and the economic basis.
5	Expected final results of the implementation of the OP development plan	Training competitive specialists with knowledge in the field of environmental protection are able to understand the basic principles of the system of state regulation in the field of ecology: assess the levels of hazardous environmental factors; ensure the preservation of the stability of geographical patterns within the biosphere and maintain environmental safety. Improvement and improvement of conditions for of receipt full-fledged, high qualityvocational education.
6	Number of the appendix to the license for the direction of personnel training	KZ89LAA00031870 August 05, 2021, with changes and updates KZ69LAM00001188 04 martha 2025 years
7	OP accreditation Name of the accreditation body Validity of accreditation	Certificate № AV3132 NAAR 24/12/2020-23/12/2025g.

2 Analytical rationale for the program

2.1 Information about the educational program

Content of the educational program set by the following documents:

«About education» Law of the Republic of Kazakhstan dated July 27, 2007 № 319-III;

State compulsory standard of higher education. Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 № 2;

Classifier of areas of training for personnel with higher and postgraduate education. Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 13, 2018 № 569;

Model rules for the activities of educational organizations implementing educational programs of higher and (or) postgraduate education. Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 30, 2018 № 595;

Rules of law organization of the educational process on credit technology of education. Order of the Minister of Education and Science of the Republic of Kazakhstan from 10/12/2018 № 563;

Algorithm for inclusion and exclusion of educational programs in the Register of educational programs of higher and postgraduate education. Order of the Minister of Education and Science of the Republic of Kazakhstan №665 dated December 4, 2018;

Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated October 12, 2022 № 106. Rules for maintaining a register of educational programs implemented by organizations of higher and (or) postgraduate education, as well as the grounds for inclusion in the register of educational programs and exclusion from it.

Sectoral framework of qualifications in the field of environmental protection

1 atameken.kz/https://atameken.kz/ru/services/16-professionalnyye-standarty-i-tsentry-sertifikatsii-nsk

2. Hydrometeorology and ecology. (№ 79. to the order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan «Atameken») dated September 1, 2023. № 136

3. https://www.enbek.kz/atlas/profession/212

Purpose of the educational program 6B05201- «Ecology» -training competitive specialists with knowledge in the field of environmental protection are able to understand the basic principles of the system of state regulation in the field of ecology: assess the levels of hazardous environmental factors; ensure the preservation of the stability of geographical patterns within the biosphere and maintain environmental safety.

2.2 Information about students

The contingent of undergraduate students in the 2024-2025 academic year is 140 students, of which 120 are students in the Kazakh department, 101 students are studying under a state grant (1 student is studying at the expense of the «People of Kazakhstan»

Foundation, 19 students are studying on a paid-contract basis, 20 students are studying in the Russian department, of which 16 students are studying under a state grant, 4 students are studying on a paid-contract basis.

The undergraduate student population in the 2025-2026 academic year is 223 student, of these, 198 are students in the Kazakh department, 169 are studying under a state grant (1 student) learning at the expense of the foundation «To the People of Kazakhstan»), 25 students study on a paid-contractual basis, 25 students study in the Russian department, of which 23 students study on a state grant, 2 students study on a paid-contractual basis.

Tableau 1 – Contingent students

Educational year	OP 6B05201-Ecology				
	total	in the tom number			
		kaz	rus	grant	agreement.
2024-2025	140	120	20	117	23
2025-2026	223	198	25	169	54

2.3 Internal conditions for the development of the educational program

The faculty has the appropriate material and technical support for the implementation of the above-mentioned educational program.

For bachelor's degree training, the department has modern educational and laboratory rooms, technical training facilities, visual and demonstration materials, 4 equipped educational and 2 scientific laboratories equipped with modern technical equipment, lecture halls. The department's educational laboratories are equipped with the following equipment and instruments: photoelectrocolorimeters, small-sized gas analyzers, PH meter (converter, power supply, thermal sensor)-1, spector analyzer noise meter, laboratory benchtop centrifuge, Thermal probe-electronic thermometer TMC - 9210 M1, analytical and laboratory scales, centrifuges, drying cabinets, distillers, etc., Humidity analyzer HMT, Meteorological station, penetrometer, gas analyzer. Three lecture halls are equipped with interactive whiteboards and multimedia equipment. All teachers have personal computers and free Internet access.

Laboratory activities are monitored through annual verification of measuring instruments, during inventory, by a commission of the relevant university structures, as well as by a commission of the ministry and departments whose programs carry out scientific research.

Practical training in the implementation of educational programs

«Ecology» is aimed at the formation, consolidation, and development of practical skills and competencies in the profile of the educational program by expanding the components (parts) of the educational program, providing modeling of real conditions or simulated production processes directly related to future professional activities.

Educational activities in the form of practical training:

− implemented during practical and laboratory classes, performing SRO;

− lectures, practical and laboratory classes, scientific seminars, which provide for the transfer of educational information to students necessary for the subsequent performance of work related to future professional activities.

Educational activities in the form of practical training are carried out in all courses of study, covering disciplines, professional modules, and all types of practice provided for in the curriculum of the Ecology educational program.

Leading scientists and teachers from foreign universities, heads of departments and organizations, and leading specialists from the Republic of Kazakhstan are actively involved in lecturing and conducting seminars and practical classes. In recent years, M.V. Filippova from Angel Kinchev University (Bulgaria, Russe) has taught a class at the department.

The involvement of domestic and foreign scientists and teachers in the educational process makes it possible to integrate theory with practice and helps graduates quickly adapt to their professional environment.

Dual training

Dual training (DO) involves obtaining not only theoretical knowledge in the process of mastering educational programs in an educational department, but also practical knowledge, skills and abilities in real production.

-dual training with 3rd year students of PCV «Institute of Botany and Phytointroduction» KLHZHM MEGPR RK (discipline) «Restoring disturbed ecosystems»)

-advanced training of teaching staff of the department in the disciplines taught;

-conducting seminars and round tables on current environmental issues.

Coursera

Currently, distance learning is quite popular and offers educational opportunities, both basic and additional, anywhere in the world. Distance learning makes it possible to independently choose time for learning, draw up your own class schedule and complete tasks in a comfortable environment, which ensures individualization of learning, student independence, openness and continuity of education. The platform «Coursera» offers a number of opportunities for advanced training of education workers, from preschool teachers to university teachers. Currently, the platform «Coursera» is an educational platform that brings together many universities around the world and offers a wide range of free courses on a variety of topics.

Having completed all the requirements of the course, the student receives a certificate of completion of the course (Statement of Accomplishment or Statement of Accomplishment with Distinction). It is possible to obtain a confirmed certificate (Verified Certificate). A confirmed certificate indicates that it was a specific student who completed the course after completing all the requirements. In certain cases, the number of hours listened to may be indicated.

AI-Sana

The project brings together universities, research centers, industry partners and government agencies, forming a unified ecosystem of knowledge, research and technological entrepreneurship. The platform features areas of study, acceleration stages, science tracks and participation opportunities for students, teachers and organizations. Basic AI skills for a wide audience, AI-powered in-depth learning and entrepreneurship. Business acceleration and scaling of projects.

The goal of the «AI-Sana» program is to provide students and young researchers working in the field of ecology with additional knowledge and skills in the field of artificial intelligence and AI entrepreneurship. This will allow them not only to study their profession in depth, but also to effectively use AI technologies to optimize environmental processes and solve pressing problems in the field of nature conservation and sustainable development.

2.4 Characteristics of the surrounding society

The priority direction in the development of the educational program is training revealing individual abilities student, formation of the student as an active participant in the educational process.

The basis of the educational environment as a social component, in relation to OP 6B05201– Ecology there are traditions and image of KazNARU, mutual responsibility, high moral and emotional climate; social support for students, outside educational activities (creative groups, sports sections, scientific communities, etc.). One of the key components is also the intellectual and developmental environment: modern technologies of developmental education (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 certain topic, a system of intellectual competitions at various levels (subject and intersubject Olympiads, competitions, tournaments, intellectual marathons, games, etc.), a support system for gifted students. All components of the structure of the educational environment are open and provide an opportunity for self-realization, which leads to increased motivation for educational activities and develops communication skills.

IN THE areas of the region of training the goal OP «Ecology» is training competitive specialists with knowledge in the field of environmental protection are able to understand the basic principles of the system of state regulation in the field of ecology: assess the levels of hazardous environmental factors; ensure the preservation of the stability of geographical patterns within the biosphere and maintain environmental safety.

2.5 Information about teaching staff implementing the educational program

Implementation of the educational programme «Ecology» is provided scientifically-pedagogical personnel, having, how the rule, basic education, appropriate profile specialties, and systematically engaged educational and methodological and (or) scientific activities.

Training of students, undergraduates, doctoral students is carried out by experienced teachers: professors, doctors of science, associate professors, candidates of science, PhD, senior teachers, teaching assistants. The qualifications of teachers of the department «Ecology», their quantitative and qualitative composition correspond to the areas of training of students, meet licensing requirements and indicate the staffing level of the university's educational activities.

The procedure for holding a competition to fill vacant positions is regulated by regulatory documents of the Ministry of Education and Science of the Republic of Kazakhstan and internal documents (Instructions on the procedure for completing an internship, preliminary training, instruction and testing of knowledge on labor safety

and health issues). The existing mechanism makes it possible to obtain a holistic understanding of the professional viability of a teacher and determine his suitability for the desired position. The competition commission conducts a qualitative analysis of the indicators of the teacher's educational, methodological and research activities, studies the characteristics from the last place of work, the department's reasoned conclusion on the applicant, and the voting results of members of the host department. Many years of practice indicate a stable tendency to give competitive preference to masters, candidates and doctors of science who can help improve the human resources potential of the university. When hiring a teaching staff, a prerequisite is that the applicant for a vacant position has a higher professional education, an academic master's degree, an academic degree of candidate or doctor of science, a doctorate, compliance of education with the profile of the university's specialties, etc. Recruitment based on the recruitment system is carried out in the following order:

-the PPS staffing table is being formed;

-the number of vacant positions for training students in various educational programs is determined;

-a competition is announced through the KazNAIU website to fill vacant positions, indicating qualification requirements;

-a competition is held to fill vacant positions and recommendations are made to the university rector for hiring teaching staff. On the KazNAIU website (https://www.kaznaru.edu.kz/department/81) information is available on teachers in the educational programme:

- list of teachers, - short list of achievements. This information contains personal data, teacher specialization, scientific projects, patents, methodological recommendations, publication of articles in periodic collections (KOKSON MES RK), as well as in journals with impact – factor, Web of Science and Scopus, etc., advanced training, contact details. At the department «Soil science, agrochemistry and ecology»24 teachers working, including 4 doctors of science, 6 –candidates of science, 11– doctors of PhD, 3– masters. Sedateness – 86.4%. Average age – 48.5.

Currently, teachers of the department who implement the OP bachelor's degree in ecology use new information technologies and multimedia teaching tools in the educational process. During the training sessions, video presentations and interactive teaching methods are demonstrated, which enable students to better master educational material and consolidate knowledge.

2.6 Characteristics of achievements educational program

Educational program 6B05201 – «Ecology» is being implemented taking into account modern requirements for training specialists in the field of environmental protection, rational use of natural resources and sustainable development. Over the years of implementation of the program, significant results have been achieved in all areas of activity: educational, scientific, international and social.

1. **Educational achievements.** The program is implemented in accordance with the State Compulsory Education Standard and professional environmental standards. Curricula have been updated to reflect digital technologies, sustainable development and the green economy. Continuity between theoretical and practical training is ensured. Every year, students show good results at republican Olympiads in

ecology and related disciplines. The employment rate of graduates is more than 85%, which indicates the high demand for specialists in this program.

2. **Research activities.** Students and teachers actively participate in scientific projects, competitions and grants aimed at studying the ecological state of regions, developing methods for soil reclamation, wastewater treatment and waste management. On the basis of the department there is a student scientific society «EcoLife», where research, seminars and environmental events are held. Scientific articles and abstracts are published annually at conferences at various levels.

3. **International cooperation.** Academic mobility programmes are being implemented with foreign universities (including universities in Poland, the Czech Republic and Turkey). Teachers undergo internships at leading foreign research centers and participate in international projects Erasmus+ and DAAD. Initiatives are being implemented with partners in the areas of climate change, biodiversity conservation and the introduction of eco-technologies.

4. **Practice-oriented training.** Stable connections have been created with environmental and agroecological enterprises, such as LLP «KazEcoAnalysis», RSE «Kazhydromet», natural reserves and laboratories. On the basis of these organizations, students undergo educational and industrial internships, which allows them to develop professional skills and competencies that meet the requirements of employers.

5. **Innovation and digitalization.** Digital educational resources, Moodle, Platonus platforms, as well as Earth remote sensing technologies (GIS, GPS, QGIS) have been introduced into the educational process. Courses on environmental monitoring using drones and sensor systems are being implemented. This makes it possible to train graduates capable of applying innovative methods of analysis and management of environmental processes.

6. **Social and educational work.** Students are actively involved in volunteer and environmental movements - promotions «Green Kazakhstan», «Clean Campus», tree planting, cleanup days and outreach events. These initiatives shape environmental worldview, citizenship and social responsibility.

7. **Recognition and awards.** In recent years, teachers and students of the program have become laureates of scientific competitions, grants from the Ministry of Education and Science of the Republic of Kazakhstan and environmental awards. The educational program has been repeatedly noted as successful in external assessment of the quality of education and internal monitoring of the university.

The 6B05201 – «Ecology» educational program is characterized by a high level of academic, scientific and social activity, stable connections with employers and international partners, the introduction of digital technologies and environmental innovations. The results achieved confirm the competitiveness and sustainable development of the program in accordance with the mission of the university and the objectives of sustainable development of the Republic of Kazakhstan.

2.7. **Research activities.**

The department conducts scientific research in current and applied areas of ecology, environmental protection and sustainable environmental management. Research topics correspond to priorities in the field of environmental safety, monitoring of natural resources, «green» technologies and adaptation to climate change.

Research activities (R&D) within the framework of the educational program 6B05201 – «Ecology» aimed at developing students' research competencies, developing innovative thinking and practical skills in solving current environmental problems using modern technologies.

The key feature of NID is the close integration of the educational process with scientific research of the department and scientific departments of the university, as well as the participation of students in projects carried out in cooperation with scientific organizations and environmental enterprises.

The main directions and innovative topics of research and development:

1. Digitalization and environmental monitoring.

- Development and implementation digital platforms for environmental monitoring using GIS technologies, drones and satellite data.
- Creation interactive maps of air pollution and water bodies.
- Use of artificial intelligence (AI) to analyse pollution dynamics and predict risks.

2. Innovative technologies in waste management.

- Research biotechnologies for processing organic waste (composting, biogas plants).
- Development intelligent waste sorting and accounting systems at enterprises.
- Model creation «zero waste» (Zero Waste) as part of campus and regional eco-projects.

3. Green energy and decarbonization.

- Exploring implementation opportunities renewable energy sources (solar, wind, biogas) in rural and industrial areas.
- Evaluation carbon footprint of enterprises and the development of measures to reduce it.
- Research in the field carbon balance of soils and biodiversity.

4. Ecosystem restoration and protection.

- Monitoring conditions of soils, aquatic and forest ecosystems under conditions of anthropogenic influence.
- Development innovative methods of bioremediation and phytoremediation contaminated areas.
- Creation digital databases of rare and endangered flora and fauna species.

5. Environmental safety and adaptation to climate change.

- Simulation climate change at the regional level and their impact on natural resources.
- Development strategies for adapting agricultural regions to climate change.
- Research on assessing the risks of environmental emergencies and the development of preventive measures.

Forms of student participation in NID are

- Carrying out coursework and diploma projects on current and applied topics.
- Participation in grant projects of the Ministry of Science and Higher Education of the Republic of Kazakhstan and local environmental initiatives.
- Publication of scientific articles and abstracts at international and national conferences.
- Performances at student competitions, forums and scientific exhibitions («Green Campus», «Ecologist of the 21st century», etc.).

• Cooperation with laboratories and enterprises in the framework of dual training.

Innovative results and achievements:

• Created electronic system for environmental monitoring of territories using drones and touch sensors.

• Developed biosorbent models for wastewater treatment and disposal of oil pollution.

• Implemented pilot projects for the use of biofertilizers based on organic waste.

• Completed student startups in the region «smart farming» and environmental laboratories of the future.

Research activities in the educational program «Ecology» combine fundamental and applied research with the introduction of innovative environmental technologies and digital solutions. This ensures the development of graduates' competencies that correspond to modern global trends in the field of sustainable development, environmental safety and «green» transformation of the economy of Kazakhstan.

2.8. **Improving the content of the educational program.**

Improving the content of the educational program 6B05201 – «Ecology» it is carried out on the basis of the principles of a competency-based approach, the requirements of the State Compulsory Education Standard, international educational trends and labor market needs in the field of environmental protection and sustainable development.

The purpose of updating the content of the programme is to training of competitive environmental specialists, proficient in modern methods of analysis, modeling and management of natural and man-made systems, capable of using digital and innovative technologies in professional activities.

Main directions for improving the content of the OP

1. Updating the structure and content of curricula. Curricula are reviewed annually with the participation of teachers, employers and graduates.

As part of improving the content of the OP «Ecology», the following new disciplines and modules have been introduced into the educational process and are planned for implementation: Environmental safety and waste management, Environmental Impact Assessment (EIA); Assessing the quality of the natural environment. This flexibility and adaptability of the educational program ensures its relevance, practical orientation and compliance with modern professional standards, increasing the competitiveness of graduates in the national and international labor market.

2. Introduction of digital and innovative technologies into the educational process.

- Electronic platforms are actively used (Platonus, Coursera, Aisana) and virtual laboratories.
- Integrated into training courses GIS programs (ArcGIS, QGIS), technology remote sensing of the Earth, use of drones and touch sensors for field research.
- Developed electronic tutorials and video lectures, providing interactive learning.

3. Development of a practice-oriented approach.

- The list of practice bases has been expanded to include environmental enterprises, state environmental structures and laboratories.
- Elements are implemented dual training - students perform real tasks at enterprises and research institutes.
- Curricula have increased the proportion of disciplines aimed at developing practical skills in environmental monitoring and data analysis.

4. Integration of education, science and innovation.

- The content of the disciplines is closely related to the areas of scientific research of the department and projects in the field of ecology and «green technologies».
- Students are involved in scientific projects, grants, startups and cases on environmental technologies.
- Introduced into the educational process modules on research methods and academic writing.

5. International and interdisciplinary focus.

- Introduced disciplines in English, as well as courses integrated with Erasmus+ programmes, the Coursera.
- International electronic resources (ScienceDirect, SpringerLink, Scopus) are used in the preparation and implementation of courses.

6. Employer and stakeholder participation.

- Employers are involved in the development and updating of curricula, elective disciplines and the assessment of practical competencies.
- Representatives of enterprises and scientific organizations give guest lectures and conduct master classes.
- The Commission for the revision of the OP includes representatives of relevant departments and graduates working in the environmental industry.

Expected improvement results

- Improving the OP's compliance with international labour market standards and needs.
- Expanding digital and innovative competencies of graduates.
- Increasing the share of practice-oriented disciplines and student research activity.
- Enhancing academic mobility and international cooperation.
- Strengthening interaction with employers and increasing the employment of graduates.

Improving the content of the educational program «Ecology» is aimed at ensuring high quality training of specialists capable of effectively solving the problems of sustainable development, environmental safety and the introduction of «green» technologies into the economy of Kazakhstan. The program combines research focus, practical orientation and digital transformation of the educational process.

2.9. **Interaction with employers.**

Employers are important strategic partners of the department and take an active part in the implementation of the educational program «Ecology». Their participation is aimed at increasing the practice-oriented training of specialists and ensuring that the content of the program meets modern labor market requirements.

Interaction with employers is carried out in the following areas:

1) participation in the formation and updating of the content of the educational program, working curricula and a catalogue of elective disciplines;

2) organization and conduct of industrial and pre-graduate internships based on specialized enterprises, environmental and analytical organizations;

3) inviting employers as members of the State Attestation Commission (SAC) to assess the final competencies of graduates;

4) conducting master classes, lectures and trainings representatives of environmental services, industrial enterprises, NGOs and government agencies;

5) joint management of diploma and research projects students;

6) participation in consultations and expert councils on issues of improving the educational process and employment of graduates.

To provide practice-oriented training for students, the department cooperates with a number of specialized organizations and enterprises, including:

- LLP «STC-Energo» director K. Kumgambaev
- LLP «Alem Shar» director N. Valiev
- LLP «Ecoservice» head M. Khakimov
- RSE on PCV «Institute of Botany and Phytointroduction» KN MES RK director Sitpayeva G.T.
- KSU State Regional Natural Park «Medeu» - director Omarov A.M.
- RSE on PCBs Institute of Plant Biology and Biotechnology- Head Zhambakin K.Zh.

Such interaction ensures continuity between theoretical and practical training, contributes to the formation of professional competencies among students that are in demand in the modern labor market, and improves the quality of the educational program.

2.10. Achievements of the teaching staff

The teaching staff of the department has a high level of qualifications and is actively involved in scientific, methodological and innovative activities. Teachers of the department regularly improve their qualifications, participate in professional internships, international conferences and scientific projects, which contributes to the constant improvement of the educational process.

The teaching staff of the department takes part in the implementation grant and contract research, aimed at solving current environmental and environmental problems. The results of scientific research are published in domestic and foreign peer-reviewed publicationsindexed in databases *Scopus*, *Web of Science*, as well as in scientific journals recommended by KOKSON Ministry of Higher Education of the Republic of Kazakhstan.

As part of methodological activities, teachers develop and publish textbooks, teaching aids, electronic courses and multimedia materials, meeting modern educational standards.

Particular attention is paid to implementation the latest pedagogical technologies - elements of dual, modular and blended learning, a design and research approach, as well as active use digital educational platforms and tools (LMS, Platonus, Coursera, Aisana, etc.).

Teachers of the department actively involve students in research work, manage diploma and scientific projects, and contribute to the development of analytical thinking, research skills and professional culture of an ecologist among students.

The professional activity and achievements of the department's teaching staff help improve the quality of the educational program, strengthen its scientific and practical orientation, as well as increase the prestige of the university in the field of environmental education and science.

2.11 Development of academic mobility and international cooperation.

Within the framework of the program, events are held aimed at the academic mobility of students and teachers, as well as scientific internships and exchange of experience with foreign partners are organized. Attracting foreign specialists to conduct lectures and master classes helps improve the academic level of the program and strengthen international relations.

The achievements of the educational program include the number of concluded agreements on cooperation in the field of training specialists, scientific and pedagogical personnel and conducting scientific research, as well as on students undergoing practical training.

3. Characteristics of the problems that the development plan is aimed at solving OP

To date, there are a number of problems that the OP development plan aims to address:

-insufficient level of involvement of foreign professors educational process;

-shortage of teachers teaching OP disciplines in English;

-low level of student participation in student research activities;

-insufficient English language teaching and learning literature;

-insufficiently high level of information technology base;

-need for advanced training of teaching staff in the field of innovative training technologies at the national and international levels.

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

When drawing up a development plan for an OP, 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 an assessment of the demand for 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 system of state regulation in the field of ecology: assess the levels of hazardous environmental factors; ensure the preservation of the stability of geographical patterns within the biosphere and maintain environmental safety.

Educational programmes are based on the principles of

-of the continuity principle;

-principle of continuity for undergraduate, postgraduate and doctoral studies;

-the principle of results-centeredness is related to the realization of the goal of education;

Objectives of the OP development plan:

-improving and improving conditions for obtaining a full, high-quality vocational education;

-carrying out an update of the content of the OP

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

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

* 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 universities and partners

* Development of a system for advanced training of teaching staff

* Improving undergraduate educational programs taking into account the opinions of employers

* Development of the employment programme

5. Expected final results of the implementation of the OP development plan

The expected final results of the educational program assume a clear orientation towards the future, which is manifested in the ability of the student to build his education taking into account success in personal and professional activities that meet the requirements of employers.

Educational programs «Ecology» will allow students to gain in-depth theoretical knowledge and practical skills in the field of vocational education.

When implementing the Department's Development Plan for the future until 2028 the quality of training of qualified specialists will improve; they will have a competitive level of knowledge, skills and professional skills in the field of current areas in the environment.

- will increase proportion of accredited educational programs
- will increase provision of educational and methodological literature for students
- will increase share of invited foreign scientists
- will increase number of published textbooks, teaching aids and methodological recommendations for educational programs
- will increase the number of concluded agreements with employers to provide industrial practice bases with the possibility of subsequent employment
- will increase **proportion of students participating in national and international** events and projects (symposia, forums, rallies, Olympiads, etc.)
- demand for graduates of educational programs in the labor market.
- activity of teaching staff in terms of publications in rating publications with a non-zero impact factor; -increasing the level of information technology base;
- upgrading of teaching staff skills in innovative training technologie

6. Measures to reduce the impact of risks for OPs

Various factors and risks can influence the successful implementation of an educational program. In this regard, it is necessary to carry out the following preventive measures to reduce them.

№	Risk identification	Risk level	Measures to reduce the impact of risk	Responsible performers	Implementation deadlines	Performance indicators
1	Non-compliance of the content of the OP with the requirements of the labour market	Average	Regular review and updating of OPs involving employers; inclusion of disciplines on digital and «green» technologies	Department, Academic Committee, DAV.	Annually	OP update, positive feedback from employers
2	Insufficient level of practical skills of students	Average	Expanding practice bases, introducing dual training, performing cases in real enterprises	Department, Faculty, DAV.	Constantly	Increasing the share of practice-oriented disciplines, increasing employment
3	Decrease in student research activity	Average	Participation in scientific projects, grants, competitions; creation of student scientific circles	Department, Council of Young Scientists	Annually	Number of publications and research and development of students
4	Insufficient updating of the laboratory base	Tall	Attracting grants and extra-budgetary funds, modernization of equipment	Department, University Management.	2025–2027	Increasing the share of updated equipment
5	Insufficient qualifications of teachers	Average	Advanced training courses, internships at research institutes and foreign universities, exchange of experience	Department, faculty, DAV.	Annually	Number of teaching staff who have completed advanced training
6	Decrease in enrollment and student population	Average	Carrying out career guidance activities, promoting the program through the media and social networks	Department, Admissions Committee.	Constantly	Increase in the number of applicants
7	Insufficient proficiency in English and digital skills	Average	Introduction of courses in English, use of platforms (Coursera, EdX, Moodle), ICT trainings	Department, DAV, IT department.	Annually	Increased academic performance in language disciplines, participation in international projects
8	Decreased academic integrity	Low	Implementation of anti-plagiarism systems, conducting training on academic ethics	Department, DAV.	Constantly	Reducing the share of plagiarism works
9	Insufficient involvement of	Average	Inclusion of employers in the Civil Code,	Department, DAV.	Annually	Number of partnerships, joint

	employers in the implementation of OPs		educational and methodological commissions, organization of master classes			activities
10	Limited international cooperation	Average	Expansion of academic mobility programmes, participation in Erasmus+, etc.	Department of International Relations.	2025–2028	Number of students and teaching staff participating in mobility programmes

7. List of OP implementation plan activities

№	Direction of work	Event	Deadline	Responsible	Expected result
1	Improving the content of the OP	Analysis of labor market requirements and updating of curricula	annually	head of Department, DAW Academic Committee.	Updated RUP and QED that meet professional standards
2		Introduction of new disciplines: Environ mental impact assessment	2025–2026	department, Academic Committee, DAV.	Expanding student competencies, increasing practice-oriented
3	Development of human resources potential	Advanced training of teaching staff in digital and environmental technologies (courses, internships, seminars)	annually	head of the department	Increasing the professional competence of teachers
4		Participation of teachers in international and national grants	2025–2030	department, Research Institute.	Growth of scientific activity and international cooperation
5	Research activities of students	Organization of a student science circle «EcoFuture»	2025	curator	Increasing student involvement in research and development
6		Student participation in conferences, competitions, startup projects on ecology	annually	PPS, council of young scientists.	Growth of research and analytical competencies of students
7	Dual and practice-oriented training	Concluding contracts with enterprises to conduct practices	annually	department, DAV.	Broadening the practice base, increasing employability
8		Implementation of elements of dual training (part-time employment of students in enterprises)	2026–2028	department, employers.	Improving practical training for students
9	Digitalization of the educational process	Implementation international educational platforms (Platonus, Coursera)	2025–2027	department, IT department, D.A.V.	Increasing digital literacy of students
10	International cooperation	Signing of memorandums of partnership with foreign universities and eco-centers	2025–2026	department, Department of International Relations.	Development of academic mobility
11		Inviting foreign lecturers and experts	annually	department	Enrichment of the educational process with international experience
12	Educational and volunteer work	Creation and support of the activities of the student Eco-Club «Greenup.kz»	2025	club curator, department	Formation of environmental culture of students
13		Promotions: «EcoDay», «Plant a Tree», «Clean Campus»	annually	department, student council.	Increasing social activity of students
14	Monitoring the quality	Conducting a survey of students and	annually	department, DOVE.	Improving the educational process

	of training	employers on OP satisfaction			
15	Accreditation and external evaluation	Preparation for international accreditation	2027–2030	department, DOVE.	Enhancing the status and recognition of the programme

8. Mechanism for implementing the OP development plan

The mechanism for implementing the educational program development plan is aimed at ensuring systematic, effective and continuous improvement of the content, quality and effectiveness of training specialists in the field of ecology and sustainable development. The implementation of the plan is carried out through management, organizational and academic activities with a clear distribution of responsibilities, resources and a system for monitoring implementation.

Implementation phase	Implementation mechanism	Expected results	Responsible departments
Organizational and managerial	Coordination of the activities of the department, faculty, academic development department and quality department. Approval of the schedule and annual monitoring of the implementation of activities.	Effective management and control of the implementation of the OP development plan.	Department, faculty
Academic	Updating the content of the OP, introducing innovative teaching methods, developing elective disciplines, applying digital platforms.	Improving the quality of the educational process and compliance with labor market requirements.	Department, DAA
Research	Integration of research work, performance of student and teaching research, participation in grants, conferences and projects.	Development of research competencies and formation of innovative potential of students.	Department, Department of Science.
Practice-oriented	Implementation of dual training, industrial practices, project assignments from employers.	Strengthening the connection between theory and practice, increasing the demand for graduates.	Department, DAA
Personnel and resource	Improving the qualifications of teachers, updating the laboratory base, attracting extra-budgetary funds.	Modern material, technical and personnel base of the OP.	Department, faculty.
Monitoring and evaluation of performance	Conducting annual monitoring of performance indicators, reviewing results and	Improving the effectiveness and sustainability of OP	Department, DAA.

	implementing corrective measures.	implementation.	
Information openness	Publication of reports, achievements and analytical data on the progress of implementation of the OP on the university website.	Increasing transparency and involvement of participants in the educational process.	Department, faculty, IT Department, DAA.

9. Assessing the socio-economic effectiveness of the implementation of the development plan OP

Socio-economic efficiency of the implementation of the plan OP «Ecology» of an educational program is determined by such criteria as: a sufficient amount of theoretical knowledge and competencies, a high level of proficiency in applied skills and abilities, excellent professional suitability, increased employment rates of graduates, feedback from employers about the professional suitability of graduates, etc.

As a result of the implementation of the OP development plan, it is expected to ensure socio-economic effects:

- improving the quality of vocational training and, consequently, the competitiveness of specialists in the field of ecology;
- training graduates who meet the needs of potential employers;
- increasing the role of employers in the training of professional personnel;
- increasing the demand for qualified personnel, optimizing their age structure;
- expanding opportunities for young people's professional self-realization;
- preventing the exodus of promising teaching staff to other sectors;
- updating of the educational and material resources in line with modern requirements and standards).

SWOT – analysis

Strengths	Weaknesses
1. Compliance of the educational program with the requirements of the State Educational Standard and modern trends in sustainable development.	1. Limited number of educational materials and cases in Kazakh.
2. Qualified teaching staff with scientific publications and experience in participating in international projects.	2. Lack of student involvement in grant and startup projects.
3. Availability of partnerships with environmental organizations: RSE «Kazhydromet», environmental departments, LLP «EcoStandard», etc.	3. Limited financial resources for updating laboratory equipment.
4. A practice-oriented approach to training, including work practices and project-based training.	4. Insufficient international academic mobility of students and teachers.
5. Emphasis on the formation of digital competencies (use of QGIS, ArcGIS, Platonus, Moodle).	5. Insufficient level of English language proficiency among some students and teachers.

Opportunities	Threats

1. Growing state attention to issues «of the green economy» and eco-transformation.	1. Tightening of licensing and accreditation requirements for OPs.
2. Opportunity to participate in international programs Erasmus+, Green Academy, Climate Change Adaptation.	2. Competition with universities implementing similar programs.
3. Development of the labor market in the field of ecology, sustainable environmental management, ESG and climate management.	3. Possible reduction in funding for applied research in the environmental field.
4. The introduction of digital technologies in environmental monitoring and management of natural resources.	4. Changing environmental standards and priorities at the state level.
5. Possibility of integrating dual and distance learning to expand student coverage.	5. The outflow of qualified personnel and the decline in the interest of young people in the natural sciences.

10. Graduate model

Model of an educational program graduate
6B05201 – «Ecology»

Model of a graduate of the educational program 6B05201 – «Ecology»

The graduate model of the educational program 6B05201 – «Ecology» reflects a set of professional competencies, personal qualities and key skills necessary for successful professional activities in the field of environmental protection, environmental management and sustainable development.

The graduate is able to apply scientific, analytical and digital approaches to solve environmental problems of various levels of complexity, and participate in the implementation of government and corporate programs to improve the environmental situation.

1. Target image of a graduate

A graduate of the «Ecology» program — this is a specialist who has systemic environmental thinking, skills in monitoring and assessing the state of the environment, is able to apply modern methods of analyzing and modeling natural processes, as well as develop measures to reduce anthropogenic impact. It is oriented towards professional development, adheres to the principles of ethics, sustainable development and environmental responsibility.

2. Professional roles of the graduate

№	Professional role	Brief description
1	Ecologist-analyst	Collects, processes and analyzes environmental monitoring data, prepares analytical reports and forecasts.
2	Environmental Protection Specialist	Organizes and controls the implementation of environmental protection measures at enterprises and organizations.
3	Environmental engineer	Develops technological solutions for emissions treatment, wastewater treatment, and waste management.
4	Expert environmental risk assessor	Conducts environmental impact assessment and assessment (EIA), analyzes environmental risks.
5	Consultant on sustainable development	Participates in the development of corporate and regional sustainability strategies and ESG policies.
6	Researcher/research fellow	Conducts applied research, develops innovative environmental technologies, participates in projects and grants.

3. Graduate competency model

The graduate model includes a system of competencies formed in the process of mastering the educational program.

Competence group	Content of competencies
General cultural (OK)	Capable of critical thinking, effective communication, teamwork, use of ICT and foreign language in professional activities.

Socio-ethical (SEC)	Recognizes social responsibility, observes the principles of environmental and professional ethics, and shows a civic position.
Professional (PC)	1. Capable of conducting environmental analysis and assessing the state of natural systems. 2. Able to develop and implement environmental quality monitoring and management programs. 3. Mastery of methods of geoinformation analysis, bioindication and ecotoxicological control. 4. Applies methods of mathematical modeling and statistical processing of environmental data. 5. Able to assess environmental risks and propose measures to reduce them.
Digital competencies (DCCs)	Able to use digital platforms (QGIS, ArcGIS, Excel, R, Python) to process, model and visualize environmental data.
Research Competencies (IR)	Capable of developing and implementing scientific projects, formatting results in the form of publications, reports, reports.

4. Personal qualities of a graduate

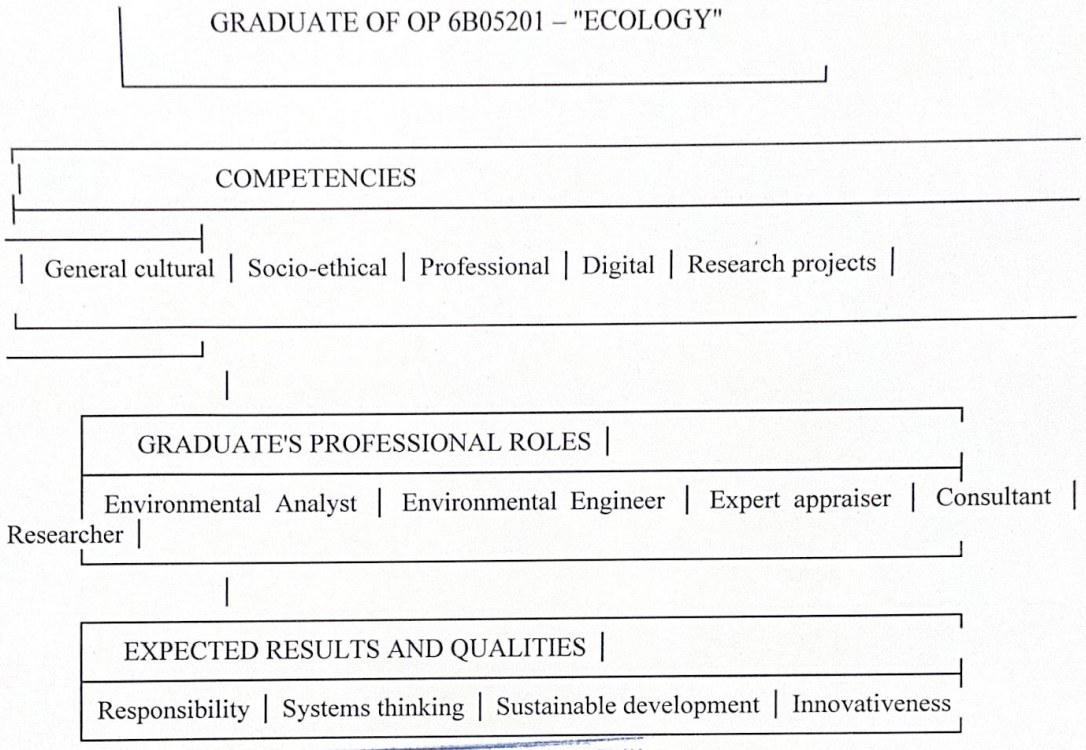
- Responsibility and environmental awareness;
- Analytical and systems thinking;
- The ability to self-learn and adapt to change;
- Communication skills and ability to work in a multidisciplinary environment;
- Readiness to innovate and apply digital technologies.

5. Expected learning outcomes

Upon completion of training, the graduate:

1. Demonstrates knowledge in basic environmental and biological sciences.
2. Able to assess the ecological state of natural and anthropogenic systems.
3. Applies environmental audit, monitoring and forecasting methods.
4. Justifies decisions to reduce pollution and rational use of natural resources.
5. Uses digital tools to model and visualize environmental processes.
6. Ready for professional and research activities in scientific, industrial and administrative structures.

6. Schematic graduate model



Dean of the Faculty of «Agrobiology» E. Abildaev

«ҚАЗАҚ ҰЛТТЫҚ АҒРАРЛЫҚ ЗЕРТТЕУ УНИВЕРСИТЕТІ» КЕАҚ «АГРОБИОЛОГИЯ» ФАКУЛЬТЕТІ

Head of the «Department of Soil Science, Agrochemistry and Ecology» Zh. Sagidoldina

BACHELOR'S DEGREE PROGRAM DEVELOPMENT PLAN
6B05201- Ecology

Task 1. Integration of scientific and scientific-technical activities and the educational process at all levels of higher and postgraduate education

№	Indicators	u	2024	2025	2026	2027	2028
1	The contingent of students enrolled in the OP	human	124	168	222	235	245
2	Percentage of employed graduates in the first year after graduation	%	84	78	85	87	88
3	The share of foreign students from the total number of students in the OP	%	-	7,7	8,8	8,9	9,0
4	The proportion of students participating in academic mobility programs out of the total number of students enrolled in the	%	-	-	1,3	1,4	1,5
5	Compliance of the teaching staff of the OP with the qualification requirements for settling down	%	40	45	48	50	50
6	The proportion of foreign experts involved in teaching	%	-	-	1	1	1
7	The number of Research Institute scientists on the staff of the university faculty on a part-time basis and/or hourly wage	human	3	3	4	4	5
8	The proportion of teaching staff teaching in English out of the total number of teaching staff	%	10	12,5	12,6	12,7	12,8
9	The number of educational and methodical publications developed by teaching staff on the specifics of the OP	quantity	8	9	10	11	12
10	Updating the OP to meet the requirements of the labor market	+/-	-	+	-	+	-
11	Analysis of the OP for compliance with the strategic development plan of the university	+/-	+	+	+	+	+
12	Implementation of dual education	+/-	+	+	+	+	+
13	The use of digital technologies in the disciplines of OP	+/-	+	+	+	+	+
14	Conducting round tables on the implementation of competencies in the educational process	+/-	+/-	+/-	+	+	+
15	Participation of representatives of potential stakeholders as OP experts	quantity	2	4	4	4	4
16	Participation of stakeholders in the development of the OP and assessment of the quality of specialist	+/-	+	+	+	+	+

	training (Students, employers, graduates)						
17	Implementation of the program within the framework of double-degree education/joint educational programs with partner universities	+/-	-	-	-	+	+
18	OP's position in national ratings (NAAR, NCAOKO, Atameken, etc.)	place	19(28)				
19	Availability of OP accreditation	+	+	+	+	+	+
20	The proportion of disciplines that use Coursera, edX, etc. online courses.	%	3	3	4	4	5
21	The number of students who have completed at least one certified Coursera course on the subject of OP	human	10	15	20	25	30
22	The number of teaching staff involved in the implementation of fundamental and applied research	unit	1	2	3	4	4
23	The number of research projects carried out within the framework of international cooperation	unit	-	-	-	1	1
24	The number of student publications in publications recommended by KKSON	unit	-	-	-	1	1
25	The number of students participating in scientific research and competitions	unit	-	-	-	1	1

Task 2. Creating an effective corporate governance model and strengthening the intellectual potential of the university

№	**Indicators**	**u**	**2024**	**2025**	**2026**	**2027**	**2028**
1.	The proportion of young scientists from the total number of scientists and researchers engaged in research and development	%	35,2	42,1	42,5	42,8	43,0
2.	Percentage of teaching staff who completed advanced training and internships abroad	%	-	-	1	2	2
3.	Participation of teaching staff in annual competitions for awarding prizes "The Best researcher", "The Best University teacher", state prizes and scholarships to outstanding scientists for their achievements in the field of science	quantity	-	-	-	1	1
4.	The participation of teaching staff in the programs of the "Silver University" for obtaining high-quality education for everyone and at any age. (specializations to choose from: digital education, inclusive education, digital technology-based learning)	+/-	-	-	+	+	+
5	The proportion of students involved in organized social activities, including through student government and debate, volunteer	%	8	10	12	14	15

	movement in order to increase the level of citizenship and patriotism						

Task 3. Activities aimed at commercializing the results of scientific and scientific-technical activities and the introduction of scientific developments and technologies into production.

№	Indicators	u	2024	2025	2026	2027	2028
1.	Students' participation in startup projects	human	-	-	1	1	1

Task 4. Development of scientific and educational infrastructure and digital architecture of the university

№	Indicators	u	2024	2025	2026	2027	2028
1.	The share of updated laboratory equipment	%	0,50	0,55	0,6	0,64	0,68
2.	Обеспечение обучающихся местами в общежитии Providing students with places in the dormitory	+/-	+	+	+	+	+