MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KOSTANAY ENGINEERING AND ECONOMICS UNIVERSITY NAMED AFTER M.DULATOV

КИнЭУ

AGREED
Chairman of the Board –
Rector of «Kazakh National
Agrarian Research University»
Non-commercial joint-stock
company
_____ A.Kurishbaev
«___» _____2024

AGREED
Chairman of the Management Board
of «Zarechnoe» Agricultural
Experimental Station LLP
_____ R.Muldataev
«___» _____2024

APPROVED
Chairman of the Academic
Council -Rector
_____ A. Ismailov
Protocol № ____
«___» _____2024

EDUCATIONAL PROGRAM

6B08147 Agroecology

Field of education: 6B08 Agriculture and Bioresources

Direction of training: 6B081 Agronomy

Type of program: bachelor's Degree 6 level NQF/SQF/ISCED

Awarded degree: Bachelor of Agriculture in the educational program «6B08147 Agroecology»

Total amount of credits: 243 Academic credits

Typical period of study: 4 years

Kostanay 2024

It was considered at the meeting of the department «Standardization and Food Technology»
Protocol № 7 22.02 2024.
Head of the department Mukhamjetova Beren
full name signature

Reviewed by the Educational and Methodological Council of the University and recommended to the Academic Council
Protocol № 412 26.02 2024.

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1 PASSPORT OF EDUCATIONAL PROGRAMME

6B08147 Agroecology

Date of registration in the Register	14.05.2024
Date of passport renewal	22.08.2024
Registration number	6B08100014
Area of Education:	6B08 Agriculture and bio-resources
Field of study	6B081 Agronomy
Group of educational programmes	B077 Crop production
Type of EP	New EP
NQS level	6
SQS level	6
Purpose of the EP	Preparation of Bachelors in the field of agriculture and bioresources, capable of conducting agroecological assessments of lands and solving problems of agricultural production, taking into account technogenic loads of ecological aspects
Distinctive features of the EP HEI partner	Joint educational programme with Kazakh National Agrarian Research University, Almaty
Language of instruction	Russian, Kazakh
Volume of loans	243
Academic degree awarded	Bachelor of Agriculture in the educational programme "6B08147 Agroecology"
Licence number for the training area	No. 12020748 dated 05.11.2012.
Number of the annex to the licence for the direction of training	No. 23 dated 03.07.2019.
Availability of accreditation of the EP	-
Name of accreditation agency	-
Accreditation validity period	-

2 Distinctive features of the educational programme

The content of the educational programme is developed on the basis of the results of the project "AGROKAZ" and recommendations of employers on the formation of professional competencies and modular system, allowing students to obtain knowledge, skills and abilities for professional activity in the field of agroecology. Obtaining environmental knowledge, skills and abilities along with professional competencies is the uniqueness of this educational programme, providing the graduate with the opportunity to apply them in their professional activity in the conditions of modern environmental challenges and has a number of features:

- acquisition of professional knowledge and experience in the field of agroecology;
- acquiring practical skills in sustainable agriculture for small and medium-sized businesses in the region;
- providing an opportunity to study and implement elements of sustainable development and environmental technologies in future professional activities;
- acquisition of skills of application of modern ecological methods and technologies in professional activity;
- training using the dual system on the basis of ««Zarechnoe» Agricultural Experimental Station» LLP, the Kostanay branch of the Kazakh Research Institute of Plant Protection and Quarantine named after Zh. Zhiembaev LLC, etc.;
- joint educational programme with Kazakh National Agrarian Research University, Almaty.

The uniqueness of the educational program is determined by the learning outcomes formed in accordance with the National Qualifications System (industry qualification framework, professional standards, Atlas of new professions and competencies in the Republic of Kazakhstan, etc.) as well as Dublin descriptors. The educational programme is focused on training a generalist in the field of agroecology of both the region and the country as a whole, through the formation of competencies related to the sectoral focus of the region.

3 Formative learning outcomes

ON1 Capable of communicating in a global and diverse professional community, expressing their opinion in a reasoned manner orally and in writing in the state, Russian and foreign languages in accordance with the regulatory framework, using digital technologies;

ON2 Capable of reasonably making optimal decisions in the field of agroecology, an-alyzing alternatives, showing personal initiative and responsibility, priorities of a healthy lifestyle and life safety;

ON3 Capable of managing agro-environmental projects in a variety of team roles, using project management methodologies and science, financial literacy and entrepreneurial skills, complying with regulatory requirements and combating corruption;

ON4 Capable of conducting agroecological data analysis using mapping, mathematical modeling and systems analysis methods, interpreting and visualizing them;

ON5 Capable of conducting complex ecological expertise of agricultural lands, understanding the peculiarities of plant structures, their role in the biosphere, weather and climatic factors, determining their interrelations in agro-ecosystems, using resource-saving cultivation technologies with the use of agricultural machines and equipment;

ON6 Capable of rationally using agricultural land, increasing soil fertility, replenishing the shortage of chemical components for the growth and development of crop yields, analyzing biogeochemical processes, properties and transformations of chemical elements, compounds and managing their permitted norms;

ON7 Capable of justifying the selection of varieties, sowing technologies, methods of crop protection using innovative technologies in various agricultural landscapes and environmental conditions;

ON8 Capable of monitoring and evaluating lands used in agroindustrial complex, determining physical, chemical and biological characteristics of soils with the impact of toxic substances and the role of microorganisms in the soil-forming process;

ON9 Capable of determining the negative impact of technogenic systems on the environment, managing environmental risks and safe technologies, for effective technical regulation in the agroecology system;

ON10 Makes decisions on effective project management in agribusiness, taking into account the regulatory framework, industry economic efficiency and logistics of agricultural production movement.

4 Graduate model and qualification characterisation

Area of professional activity
The graduate is engaged in environmental monitoring, assessment of the environmental impact of agricultural activities, development of sustainable agro-technologies and natural resource management to conserve ecosystems and ensuring environmental safety of the agro-industrial complex.
Objects of professional activity
Departments of agriculture of the republic, regions and districts, joint-stock companies, production co-operatives, limited liability partnerships, farms, collective farms, agricultural firms and other agricultural formations.
Subjects of professional activity
The subjects of agroecologist's professional activity are ecological processes and management methods aimed at sustainable use of natural resources in agriculture. They include technologies for ecological monitoring of soil, water, air and biota, as well as methods for assessing the impact of the agro-industrial complex on the environment. Agroecologists study agro-technologies that can minimise damage to ecosystems and develop organic and sustainable farming systems. An important part of their work is the restoration of degraded land and the reclamation of areas affected by agro-technogenic activities. They also carry out environmental impact assessments and audits of agricultural enterprises for compliance with environmental standards, developing measures to reduce environmental risks and ensure compliance with environmental legislation.
Types of professional activities
Carry out soil survey work on territories. Determine the boundaries of soil contours, the main characteristics and properties of soils. Maintaining soil and soil fertility for organizing the production of agricultural crops in open and protected ground and increasing the quantitative and qualitative composition of the harvest. Monitoring the entophytopathological state of seed and planting material and field research. Carrying out organizational work of the agrochemical service in the production of agricultural crops. Organization of environmental control (monitoring) of the state of agroecosystem components and the safety of plant products. Ability to work with scientific and technical information, use domestic and foreign experience in professional activities, systematize and generalize the information received. Specialists with a clear focus on the future, which is manifested in the ability to build their professional career and education, taking into account success in personal and professional activities that meet the requirements of employers.

5 Results of the study of labour sphere

Profession	Labour function	Professional task	Skill	Learning Outcome
Professional standard "Cultivation of legumes and oilseeds"/ Occupational card "Agrochemist"	**Job Function 1:** Monitoring the entophyto-pathological status of seed and planting material and field surveys.	**Task 1:** Conduct research in the field of agrochemistry	**Skills:** 1. Development and implementation of agrochemical measures aimed at improving soil fertility and increasing yields of legumes and oilseed crops. 2. Participate and conduct research in agrochemistry of soil conditions and change in the growth of legumes and oilseed crops. 3. Systematic study of biological features of cultivated legumes and oilseeds, soil and climatic conditions of the farm, efficiency of use of organic and mineral fertilisers, chemical protection means, methods of their application and determination on which areas, at what time and to what extent fertilisers and other chemical means should be applied. 4. Participate in the preparation of crop rotations, plans for the need and use of fertilisers and chemicals. 5. Participation in agrochemical and ecological-toxicological survey of land for legume and oilseed crops production. 6. Organisation and compilation of agrochemical cartograms, annually by periods of work, carrying out their adjustment on the basis of analysis of soil samples for certain types of land depending on the type of legume or oilseed crops cultivated. Participate in soil and vegetation sampling works for structural sampling analyses and soil tillage for legume and oilseed crops.	**ON6** Able to rationally use agricultural land, increase fertility of soil by making up chemical deficiencies components for growth and development of crop yields; **ON4** Able to conduct agroecological data analysis, using mapping, mathematical modelling and systematic methods, analyses, interpreting and visualising them; **ON8** Able to monitor and assess land used in agro-industrial complex activities, determine physicochemical and

			8. Implementation of soil sample preparation throughout the production of legumes and oilseed crops, mineral, organic fertilisers and other materials.	biological characteristics of soils on toxic substances and the role of microorganisms in soil-formation process.
		Task 2: Control of entophyto- pathological condition of seed and planting material	**Skills:** 1. Control over the preparation and storage, as well as the correct application of fertilisers into the soil depending on the cultivated crop of legumes and oilseeds. 2. Participate in and make recommendations on the application of chemicalisation tools on a scientific basis. 3. Participate in the processing of analyses and systematisation of agrochemical survey materials. 4. Formalisation of the results of analyses and tests and their recording. 5. Participate in trials of new instruments and equipment to determine changes in the growth process of legume and oilseed crops and the finished crop. 6. Compilation reports(section reports) on completed works(analyses & tests, field studies, mapping works). **Knowledge:** 1. Standards, norms and regulations of agrochemical, ecological and toxicological works. 2. Agrochemical and environmental toxicological characteristics of pesticides and poisons. 3. Technical and environmental requirements for agricultural products and agrochemical facilities. 4. Technology of the main types of agrochemical works.	**ON6** Able to rationally use agricultural land, increasing soil fertility, filling the deficiency of chemical components for the growth and development of crop yields, analysing biogeochemical processes, properties and transformations of chemical elements, compounds and managing their permissible norms.

	Labour function 2: Implementation of organisational work of agrochemical service in grain legumes and oilseeds production	**Task 1:** Implementation of organisational work of agrochemical service in legume and oilseed crops production	**Skill**: 1. Monitoring compliance with the legislation on environmental protection, labour protection and fire safety rules and regulations. 2. Controlling and ensuring safe working conditions, prevention of poisoning, industrial injuries, occupational diseases and emergencies that pose a threat to the health and lives of the company's employees. 3. Taking measures to limit the development of the emergency and to eliminate it. 4. Provide first aid to a victim, take measures to call an ambulance, emergency services, fire safety. **Knowledge**: 1. Principle of operation, device and rules of safe operation of instruments and agricultural equipment. 2. Achievements of science and best practices of agrochemical works in agriculture. 3. Fundamentals of economics, labour organisation and management. 4. Fundamentals of Environmental Protection Legislation of the Republic of Kazakhstan. 5. Rules and regulations on labour safety, industrial sanitation and fire protection, labour and environmental protection, observes norms, methods and techniques of safe work performance.	**ON9** Able to determine the negative impact of man-made systems on the environment, managing environmental risks and safe technology for effective maintenance of technical regulation in the agro-ecological system.
		Task 2: Organisation of agrochemical control in grain legumes and oilseeds production	**Skills:** 1. Organisation and carrying out of physical and chemical studies and express analyses by the agrochemical laboratory staff. 2. Approbation of new methods of chemical analysis, preparation of laboratory installations, instruments and equipment for work on determination of soil changes in the process of legume and oilseed crops cultivation. 3. Performing calculations and mathematical- statistical	**ON4** Able to conduct agroecological data analysis, using mapping, mathematical modelling and systematic methods, analyses, interpreting and visualising them.

			processing of soil analysis data and tracking the degree of impact on growing legumes and oilseed crops. 4. Conduct trial work with fertilisers and chemical protection products for legumes and oilseed crops, being responsible for excessive inclusions of harmful substances in the crop. 5. Participation in the introduction of mechanisation of the fertiliser application process and best practices in the organisation of these works. **Knowledge:** 1. Theory and practical methods and ways of solving problems of optimisation of parameters of fertility indicators and basic chemical and physical-chemical properties of soil. 2. Methodology of creating an optimal cultural agro-landscape through complex agrochemical impact on its links. 3. Methods of reducing soil degradation processes. 4. Methods of regulation of soil microbocenoses. 5. Ways to improve the chemical composition and nutritional value of crop production.	**ON6** Able to rationally use agricultural land, increasing soil fertility, filling the deficiency of chemical components for the growth and development of crop yields, analysing biogeochemical processes, properties and transformations of chemical elements, compounds and managing their permissible norms.
Professional standard "Growing vegetables and potatoes" Profession card "Agronomist-soil scientist"	**Labour Function 1:** Performing soil survey work on the areas. Determination of soil contour boundaries, basic soil characteristics and properties	**Task 1:** Study of soil genesis, dynamics of processes in natural and agricultural soils	**Skills**: 1. Physical and mechanical requirements to soils for potatoes and vegetable crops grown in open ground. 2. Soil fertility requirements and its conservation for potato and vegetable crops in the open field, and fertiliser requirements. 3. Physical and mechanical requirements for soil for vegetable crops grown in protected ground. . Requirements for soil fertility and its maintenance for vegetable crops in protected areas, as well as the need for fertilisers according to the periods of growth. **Knowledge:** Solve practical problems involving a variety of solutions and their selection	**ON5** Able to conduct a comprehensive ecological assessment of agricultural lands, understanding the peculiarities of plant structure, their role in the biosphere, weather and climatic conditions, determining their interrelationships in agro-ecosystems, using resource-saving methods of cultivation technology with the use of agricultural machinery and equipment;

				ON6 Able to rationally use agricultural land, increasing soil fertility, filling the deficiency of chemical components for the growth and development of crop yields, analysing biogeochemical processes, properties and transformations of chemical elements, compounds and managing their permissible norms.
		Task 2: Improving fertility	**Skills**: 1. Control of soil fertility to obtain high and quality yields of potatoes, vegetable crops in open and protected soil and maintain the fertility of the rooting environment (soil in open soil and soil in protected soil). 2. Calculate the need for soil physical and mechanical conditions and fertilisers, pesticides, irrigation water. 3. Evaluate the quality of the work performed.	
	Labour function 2: Maintaining soil and soil fertility to organise vegetable and potatoes production and maximise quality of yields.	**Task 1:** Assessment of the suitability of agrolandscapes for vegetable crops and their rational utilisation.	**Knowledge:** 1. Principles of maintaining soil fertility and physical and mechanical properties. 2. Fertility assessments for high and quality yields of vegetables and potatoes. 3. The order and regimes of fertiliser application. 4. Agrotechnical requirements for technological operations in open and protected areas.	**ON6** Able to rationally use agricultural land, increasing soil fertility, filling the deficiency of chemical components for the growth and development of crop yields,

			5. Technologies and timing of application of loosening materials and fertilisers. **Skills:** Solve different types of practical problems requiring independent analysis of the work situation and its predictable changes.	analysing biogeochemical processes, properties and transformations of chemical elements, compounds and managing their permissible norms.
	Labour function 3: Introduction of advanced methods and techniques for maintaining soil and soil fertility in open and protected areas	**Task 1:** Assessing the quality of crop products and identifying ways to utilise them	**Knowledge:** 1. Possess a wide range of knowledge of workflow, procedure control, quality. 2. Record keeping. **Skills:** 1. Predict and plan for harvesting. 2. Organise innovative techniques for the use of loosening materials, other soil components and fertilisers to produce yields of potato and vegetable crops in open and protected areas. 3. Work on modern means of computing, office equipment, communications and liaison.	**ON1** Able to communicate in a global and diverse professional community, reasonably expressing his/her own opinion orally and in writing in the state, Russian and foreign languages, in accordance with the legal and regulatory framework, using digital technologies.
		Task 2: Organisation of work to improve the condition of soil and its components	**Knowledge:** 1. Principles for obtaining high and quality yields 2. Soil quality assessments of farms, peasant farms 3. Mastering and introducing new techniques and methods of potato and vegetable cultivation to obtain high and stable yields. **Skills:** 1. Organise work to preserve and maintain soil fertility in open and protected areas 2. Organise innovative techniques for the use of ripping materials, other soil components and fertilisers for potato and vegetable yields	**ON5** Able to conduct a comprehensive ecological assessment of agricultural lands, understanding the peculiarities of plant structure, their role in the biosphere, weather and climatic conditions, determining their interrelationships in agro-ecosystems, using resource-saving methods of cultivation technology with the use of agricultural machinery and equipment.

Professional standard "Hydrometeorology and ecology" Occupational card "Environmental engineer" Occupation card	**Labour function 1:** Production of environmental monitoring	**Task 1:** Implementation of systematic observations of environmental conditions	**Skills:** 1) Organisation and implementation of systematic observations of atmospheric air, precipitation, surface water, soil and bottom sediments, radiation background, hydrobiological observations according to the observation plan. 2) Ensuring completeness and correctness of tests, objectivity and reliability of their results. Ensuring continuous functioning of the quality management system of the testing laboratory. **Knowledge:** 1) State systems of technical regulation of the Republic of Kazakhstan. 2) Knowledge of the rules of operation of instruments, equipment. 3) Design, principle of operation, rules of installation, operation, verification of devices, equipment and installations. 4) International requirements GOST ISO/IEC 17025 "General requirements for the competence of testing and calibration laboratories".	**ON1** Able to communicate in a global and diverse professional community, reasonably expressing his/her own opinion orally and in writing in the state, Russian and foreign languages, in accordance with the legal and regulatory framework, using digital technologies; **ON9** Able to determine the negative impact of man-made systems on the environment, managing environmental risks and safe technology for effective maintenance of technical regulation in the agro-ecological system; **ON10** Makes decisions on effective project management in the agro-industrial complex, taking into account the regulatory framework, industry economic efficiency and logistics of agricultural goods.

		Task 2: Planning, organization and coordination of the work of the state observation network	**Skills:** 1) Formation of the RK Environmental Observation Plan for environmental objects. 2) Coordination of the work of the integrated laboratory of territorial subdivisions in the performance of monitoring and analyses of environmental samples. **Knowledge:** 1) Knowledge of the rules of operation of enterprises, rights and obligations of employees of the enterprise, their mode of work, basics of economics, methodology of system analysis, decision-making of professional situations, ways of communication and coordination of points of view, making managerial decisions, about collective and team education, labour organisation and management.	**ON4** Able to carry out agro-ecological data analysis using mapping techniques, mathematical modelling and systemic analysis, interpreting and visualising them; **ON3** Able to manage agro-ecology projects in a variety of team roles, drawing on project management methodologies and science, financial literacy and entrepreneurial skills, complying with regulatory and countering corruption; **ON2** Able to reasonably make optimal judgements in agroecology, analyzing alternatives, taking personal initiative and responsibility, priorities of healthy lifestyle and life safety.

6 Information about disciplines of the educational programme

No.	Formative learning outcomes of EP	Name of discipline	Brief description of the discipline	Amount of credits
Cycle of general education disciplines Compulsory component				
1	**ON1**	History of Kazakhstan	Objective: to provide objective knowledge of the main stages of development of the history of Kazakhstan from ancient times to the present. The discipline allows to demonstrate knowledge and understanding of the main stages of development of the history of Kazakhstan, to correlate phenomena and events of the historical past with the general paradigm of the world-historical development of human society, to possess the skills of analytical and axiological analysis in the study of historical processes and phenomena of modern Kazakhstan, to give a critical assessment of historical phenomena and processes of history of Kazakhstan.	5
2	**ON1**	Psychology. Cultural studies	The discipline is aimed at formation of psychological bases of awareness of psychological identity on the basis of social-personal and instrumental competences in the field of psychological theory and practice of interpersonal communication of personality, as well as understanding of specificity of development of national and world culture, necessity of preservation of cultural code of Kazakh people, ability in independent professional activity to carry out strategy of preservation of cultural heritage of Kazakh people in dynamically changing multi-cultural world. The discipline studies the general laws of the psyche, the psychological essence of human activity, and also psychological regularities of the formation of a person as an individual.	4
3	**ON1**	Foreign language	Discipline forms intercultural-communicative competence of students in the process of foreign language education at a sufficient level.	10

4	**ON1**	Kazakh (Russian) language	The discipline provides a qualitative mastering of the Kazakh language as a means social, intercultural, professional communication through the formation of communicative competences.	10
5	**ON1**	Physical Education	The discipline teaches to purposefully use the means and methods of physical culture, providing the preservation and promotion of health to prepare for professional activity; to endure physical exertion, neuropsychic stress and unfavourable factors in the future labour activity.	8
6	**ON1**	Information and communication technologies	The discipline forms the ability to critically evaluate and analyse processes, methods of searching, storing, processing and transmitting information through digital communication technologies.	5
7	**ON1**	Political science. Sociology	The content of the module "Political Science. Sociology" is aimed at the formation of students systematised set of basic knowledge of political and social processes and concepts, designed to prepare students for their use in the course of their professional activities in the conditions of civil society and the rule of law. The study of disciplines of the module "Political Science. Sociology" contributes to the formation of students' knowledge of public development based on an understanding of their fundamental laws.	4
8	**ON1**	Philosophy	The discipline forms a holistic view of philosophy as a special form of cognition of the world, its main sections, problems and methods of their study in the context of future professional activity. In the framework of the discipline students will study the basics of philosophical, worldview and methodological culture in the context of understanding the role of philosophy in modernising social consciousness and solving global problems of our time.	5
Cycle of general education disciplines Elective component				
1	**ON2**	Ecology and Fundamentals of Life Safety	The study of the theoretical foundations and acquiring practical skills in the field of safe human interaction with the environment (industrial, domestic, urban); basic patterns of interaction of all living organisms with the environment; regularities of the circulation of substances in nature and the flow of energy through living systems, as well as the functioning of ecological systems and the biosphere as a whole; safe human interactions with the environment; socio-ecological consequences of anthropogenic activity on the technosphere; basic principles of nature protection and	5

			rational use of natural resources.	
2	**ON3**	Fundamentals of Scientific research	Goal: developing a culture of scientific thinking and research skills using various genres of academic writing. and carrying out research work. As a result of mastery, students will learn the basics of the methodology for conducting scientific research necessary to solve current practical problems in the field of professional activity.	
3	**ON3**	Fundamentals of Law and Anti-corruption Culture	The purpose of studying the discipline is to increase public and individual legal awareness and legal culture of students, as well as the formation of an anti-corruption model of behavior and a public atmosphere of rejection of corruption, the formation of an active civic position in the fight against corruption.	
4	**ON3**	Fundamentals of Financial Literacy	The purpose of the discipline is to form students rational financial behavior in everyday life, as well as abilities related to the protection of rights and interests as consumers of financial services through the use of digital technologies. The discipline is a course aimed at teaching the basics of personal finance management, understanding financial instruments and concepts necessary for making informed financial decisions. As part of the course, students will gain practical skills and knowledge in the field of money circulation, taxes, banking and financial services, individual entrepreneurship; they will study the bankruptcy procedure of individuals and modern digital, financial technologies.	
5	**ON3**	Fundamentals of Economics and Entrepreneurship	The discipline is aimed at developing students basic level of economic literacy, a culture of economic thinking and the ability to make economic decisions in business. The discipline contains the study of the system of economic knowledge in the context of the professional sphere, the principles and objectives of state regulation of entrepreneurship, rational behavior of consumers and producers, the formation of market demand and supply, the AD-AS model, principles and approaches to the organization of entrepreneurial activity, theory and practice of team building. In practical classes, students, using the methodology of design thinking, will make economic calculations, identify business opportunities, identify promising markets, diagnose target customer segments and develop entrepreneurial projects.	

Cycle of basic disciplines University component				
1	**ON5**	Biology and taxonomy of agricultural crops	The purpose of this discipline is to form students the structure of plants, their role in the biosphere and in human life. During the course, students will study the processes of reproduction, growth and development of flowering plants, the main genera and species. The diversity of plant life forms and the morphology of their vegetative and generative organs will also be considered. Practical classes will provide students with the opportunity to master the methodology of determining plants using a determinant, conduct independent morphological descriptions to determine the genus and species of plants, as well as observe their growth, development, flowering, pollination and reproduction in natural conditions, which contributes to a deeper understanding of the plant world.	4
2	**ON6**	Organic, inorganic and analytical chemistry	The purpose of this discipline is to form an understanding of the properties of compounds of elements, which are the basis for the subsequent development of chemical and specialized courses in their future professional activities. The course includes the study of basic chemical concepts, fundamental laws of chemistry and patterns that explain the properties and transformations of chemical elements and their compounds. The scientifically based choice of methods for chemical analysis of agricultural objects is also emphasized. Practical classes will allow students to predict chemical reactions, establish relationships between the structure of a substance and its chemical properties, use modern chemical terminology and perform calculations based on basic concepts and laws of chemistry.	5
3	**ON5**	Plant ecology	The discipline studies the interaction of plants with the environment at various levels of plant life organization, starting from the cellular level and ending with ecosystems. Within the framework of this discipline, students deepen their knowledge about the influence of environmental factors, study plant adaptations to various environmental conditions, mechanisms of aquatic and mineral nutrition, photosynthesis, as well as interaction with other organisms such as bacteria, fungi and animals. An important part of the program is the analysis of the impact of human activities on the flora, as well as the development of methods and strategies for the sustainable use of natural resources.	3

4	**ON4**	Higher mathematics	Within the framework of the discipline, such sections as linear and vector algebra, analytical geometry, mathematical analysis, differential equations, probability theory and mathematical statistics are studied. As a result of studying the discipline, students gain mathematical knowledge, develop abstract thinking and logical analysis skills, which is the foundation for further study of basic and core disciplines, as well as the application of mathematical methods in various fields of science and technology.	4
5	**ON6**	Soil science	The discipline is an extensive study of the structure, composition and functions of the soil environment in the context of its interaction with the plant world and the environment. Within the framework of this discipline, students learn to analyze and evaluate a variety of soil properties such as structure, texture, moisture, acidity, nutrient content and microorganisms. The processes affecting the dynamics of nutrients in the soil and their relationship with plants, the impact of human activity on soil resources, including anthropogenic pollution, soil degradation and sustainable agriculture, are studied.	5
6	**ON1**	**Minor 1** English for everyday use	The discipline provides for students to master common vocabulary in English at all levels and areas of study and use it in everyday communication situations. According to the form of classes, it is assumed that full language immersion and improvement of communication skills and bringing certain language cliches used in certain situations to automatism. Special emphasis should be placed on practicing the skills of untrained speech in a foreign language.	5
7	**ON4**	**Minor 2** Data visualization	The concept of data visualization. Relevance, role, functions. Data sources. Basics of data visualization. Data types. Types of data visualization. The main errors in data visualization. Making charts. Using accents to create effective graphs. Tools and technologies for creating infographics and data visualization. Cartography. Fundamentals of cartography, types of maps. Interactive maps.	
8	**ON6**	Agriculture	The purpose of the discipline is to develop skills in the rational use of land and reproduction of soil fertility in order to achieve high and stable yields of agricultural crops. During the training, the scientific foundations of agriculture, methods of regulating various aspects of crop growth, as well as ways to control weeds and methods of tillage are studied. Practical work includes the determination of agrochemical, agrobiological and	5

			agrochemical indicators of soil fertility, as well as the acquisition of practical skills in the field of weed control, crop rotations, tillage systems. Students will also learn how to make maps of field contamination and develop scientifically sound crop rotations and farming systems, taking into account the soil and climatic conditions of the region.	
9	**ON1**	**Minor 1** English in communicative situations	This discipline is designed for students of all levels and areas of study to improve communication skills and use common vocabulary in English in various situations of everyday communication. During the study of this discipline, students will have the competencies necessary for the practical use of the English language in the future, including for studying the language of the specialty within the discipline "professionally oriented English".	5
10	**ON4**	**Minor 2** Payment operations automation	Basics of working in Excel. Data entry and editing. Creating tables. Fundamentals of computing. The use of mathematical, statistical, logical functions, error checking and text processing functions. Formatting of data, cells and tables. Principles of developing spreadsheet applications. Filtering the list to find the necessary information. Summary tables. Array formulas. Interactive elements. Analysis tools	
11	**ON4**	Environmental cartography and GIS	The discipline is focused on the development of modern methods and technologies in the field of creating maps and using geographic information systems (GIS) with a focus on application in the agroecological field. During the course, students learn the basics of cartography, the principles of mapping, as well as the use of GIS in the analysis and visualization of environmental data. The main topics include familiarization with methods of collecting and processing geospatial information, creating digital maps, analyzing ecosystems, assessing changes in the natural environment, as well as forecasting environmental processes using modern GIS technologies. Practical exercises include working with software for creating and analyzing maps, as well as using spatial data to solve environmental problems. Students also learn how to integrate various types of data into GIS, which allows them to analyze the environmental situation more effectively and comprehensively.	5
12	**ON1**	Minor 1 English in situations of professional communication	This discipline will be studied by students of separate areas of study after or in parallel with the discipline "Professionally oriented English" and is intended to improve the communication skills of thesaurus students necessary for communication in the future professional field. Situations of	5

			professional communication should be built taking into account the training profile.	
13	**ON4**	**Minor 2** Data analysis and business planning	The purpose of the discipline is to systematize existing information on the processes of data analysis and maintenance in IT systems. Within the framework of the discipline, students develop strategic plans for the successful creation, development and management of a business, as well as cloud technologies; practical issues of creating and using electronic signatures of institutions; a significant place is given to practical actions in social networks; the functionality of GOOGLE and YANDEX related to the protection and registration of document forms, as well as the preparation of high-quality booklets, postcards, greeting letters, e-mailings, etc. are being studied.	
14	**ON9**	Processing and disposal of waste in the agro-industrial complex	This discipline focuses on the study of various methods and technologies for the processing, processing and use of agricultural waste in order to create biofertilizers. During the course, students will get acquainted with the basics of sustainable use of natural resources, legal and economic aspects of waste management in agriculture, as well as master the terminology and classification of agricultural waste. In practical classes, students will learn how to develop methods of waste treatment and disposal, apply an integrated approach to environmental protection in the context of processing agricultural waste.	4
15	**ON8**	Agroecology of microorganisms	This discipline studies the effects of microorganisms on agroecosystems and agriculture. Students study the role of microorganisms in soil, plants and other components of agricultural systems, analyzing the interactions of microorganisms with plants, the processes of biological nitrogen fixation, decomposition of organic matter and other aspects important for sustainable agriculture. Methods of control and regulation of microbial activity in the soil, as well as the effective use of microorganisms in agriculture, are being studied.	5
16	**ON6**	Agricultural chemistry	The discipline is aimed at developing skills in regulating and managing plant nutrition using scientifically based methods of applying fertilizers. Special attention is paid to the consideration of soil properties, zonal features of agriculture and biological characteristics of cultivated plants, the chemical composition of plants, the process of their mineral nutrition, as	5

			well as methods of its regulation are studied. The biological, chemical and physico-chemical properties of soils, the use of fertilizers, as well as technologies for their storage, preparation and application will be considered. The program also provides for the study of ways to determine the optimal doses of fertilizers and methods of chemical soil reclamation. In practical and laboratory classes, students will work with agrochemical devices to determine the chemical composition of soils, plants and fertilizers. They will also carry out analytical work to determine agrochemical indicators using methods of visual and chemical diagnostics of plant mineral nutrition. In addition, students will learn how to adjust the methods and timing of applying mineral fertilizers, as well as to monitor the quality of work on their application.	
17	**ON8**	Biogeochemistry and ecotoxicology	This discipline is devoted to the study of biogeochemistry and ecotoxicology, focusing on the patterns of distribution and movement of chemical elements and toxicants in the biosphere. The course includes the study of the basic patterns of transition and circulation of chemical elements and toxicants through the biosphere, their effect on organisms and the environment, quantitative and qualitative characteristics of biogeochemical features of elements, as well as the importance and role of chemical elements and toxicants in the circulation of substances in nature. Quantitative methods for assessing biogeochemical processes and ecotoxicological effects on various ecosystems are being studied. Special attention is paid to the importance of elements in natural processes, such as biological nitrogen fixation, participation in the formation of soil structures, and their impact on biodiversity. Methods for analyzing and monitoring toxicant levels in the environment are also considered. Practical classes will provide experience in applying the acquired knowledge to assess and analyze biogeochemical processes and ecotoxicological phenomena in real conditions.	5
18	**ON5**	Operation of machines and equipment in crop production	The discipline examines the general structure of tractors and agricultural machines, the aggregation of tractors with agricultural machines, the theoretical foundations of the production operation of a machine and tractor park (MTP). Topics related to the operation and maintenance of machinery used in plant cultivation are considered, providing students with knowledge about the operation and maintenance of equipment necessary for	5

			agricultural activities. The use of artificial intelligence systems in the management of autonomous tractors, drones and other agricultural machinery to perform tasks such as sowing, field processing and harvesting.	
19	**ON6**	Environmental chemistry	The discipline is an extensive study of chemical processes and interactions in the natural environment in order to understand and assess the effects of chemicals on ecosystems and humans. The main objective of the course is the formation of in-depth knowledge about chemical processes in the environment, their impact on biota and the atmosphere, as well as the development of methods for monitoring and managing chemical pollution. Within the framework of the discipline, various aspects of environmental chemistry are studied, including sources of chemical pollutants, mechanisms of their movement in natural systems, bioaccumulation and biomagnification in food chains. Attention is also paid to the analysis of the effects of various chemicals on water resources, soil and the atmosphere. The course includes the study of methods for assessing environmental quality, analyzing samples of substances, as well as developing strategies to solve pollution problems.	5
20	**ON6**	Biogeocenology	The discipline is the study of the interaction between biota, geosphere and atmosphere in various ecosystems. The purpose of this discipline is to study the biogeochemical processes that shape the structure and functioning of ecosystems, as well as to understand the influence of biological and geochemical factors on wildlife and inanimate environments. As part of the course, students are introduced to the principles and methods of studying biogeocenoses — sustainable communities of organisms and their environment. Various aspects of the interaction of vegetation, animals and microorganisms, as well as their influence on the cycles of substances in nature, are studied. The course includes an analysis of the biogeochemical cycles of elements such as carbon, nitrogen, phosphorus and others, as well as consideration of the mechanisms of their movement in the biosphere.	5
21	**ON5**	Environmentally friendly technologies and rational use of natural resources	The discipline is aimed at minimizing the negative impact on the environment and effective management of natural resources. The purpose of the discipline is to form an understanding of the importance of sustainable development, responsible use of resources and the development	5

			of innovative technologies taking into account environmental aspects. They study the principles of creating and applying environmentally friendly technologies in various industries. They master the methods of research and assessment of the environmental impact of technological processes, as well as develop strategies for the rational use of natural resources. They analyze modern challenges related to the rational use of natural resources. They study ways to apply innovative and optimal solutions to reduce the negative impact of human activities on the environment and life safety.	
22	**ON5** **ON7**	Crop production	The discipline is focused on the assimilation of scientifically based methods and technologies of crop cultivation in order to achieve maximum yield per unit area. During the study of the discipline, the morphological structure and biological features of field crops are considered in detail, as well as they will get acquainted with the latest achievements of modern cultivation technologies. Practical work includes the development of technological maps for various types of crops, such as cereals, legumes, technical, oilseeds, essential oils, melons, root tubers, spinning, narcotic, taking into account the specific soil and climatic conditions of the region. They also calculate biological yields using various methods, identify the features of growth and development of field crops; determine the morphological and biological characteristics of crops using sheaves, drawings, layouts and atlases.	5
Cycle of basic disciplines **Elective component**				
1	**ON8**	**Soil diagnostics**	The discipline is a key element in the study of soil science and covers methods, techniques and principles for assessing the physico-chemical and biological characteristics of the soil environment. Methods of collecting soil samples and conducting laboratory analyses to determine parameters such as nutrient content, pH, texture, humidity and other key indicators are being studied. An important part of the program is to master the techniques of interpreting the results of soil analyses and assessing their impact on plant growth and health. The course includes laboratory work, including the determination of the content of macro- and microelements, humus, the study of soil texture, determination of moisture levels, analysis of pH and other indicators. Students master modern equipment for conducting	5

			analyses and interpreting the results obtained.	
2	**ON5**	**Agrometeorology**	The purpose of the discipline is to develop students deep understanding of the relationship between atmospheric processes and agriculture. This course is aimed at studying the basics of agrometeorology, the effects of temperature, precipitation, wind and other atmospheric phenomena on the growth and development of crops. The main focus will be on assessing weather fluctuations and their impact on yields, as well as on developing methods for adapting agriculture to changing climatic conditions. During the study of the discipline, students will acquire practical skills in using modern meteorological technologies and tools to predict the weather and its impact on agriculture. In addition, the methodology for developing risk management strategies related to agro-climatic conditions will be mastered.	
Cycle of specialised disciplines University component				
1	**ON1**	**Minor 1** English for a specific purpose	In the course of studying this discipline, students are expected to master such a level of language competence in a foreign language that will allow them to independently study literature in their specialty and communicate in the future with colleagues from foreign countries and get acquainted with their work experience. It is recommended to conduct classes in separate groups divided according to the specialization of students training.	5
2	**ON10**	**Minor 2** E-Business	Fundamentals of the functioning of the global Internet network as an environment for economic activity and the basis of electronic business. E-commerce and its place in the modern economy. The main ways of doing network business. Internet marketing. Payment systems on the Internet. E-business models. Organization of a website for conducting your own electronic business. Electronic market complex.	
3	**ON4**	Project management	The purpose of the discipline is to prepare students for teamwork and project implementation. Students will master project management methodologies, explore project roles, methods and approaches to project development, its stages, planning, resource and inventory management within a variety of projects. Students will create descriptions and plans for the implementation of projects, assign roles, draw up a Gantt chart, identify project risks and warn them, calculate the cost of alternative project options. Students will develop projects by performing the functions of a	5

			project manager, including projects for the development and implementation of products and services using digital technologies and software.	
4	**ON1**	Regulatory support and document flow in the agro-industrial complex	This discipline focuses on the study of regulatory and legal aspects and the organization of document management in the field of agro-industrial complex. During the training, they will get acquainted with the basic rules and regulations governing activities in agriculture, including laws, regulations and other regulations. They will study the principles and processes of document management in the agro-industrial sector, including the preparation, processing and storage of necessary documentation.	5
5	**ON8**	Agroecological monitoring	This discipline is aimed at studying the agroecological assessment of lands, focused on comparing the requirements of agricultural plants to the growing conditions in specific territories – agricultural land. During the course, students will get acquainted with the methods of land assessment carried out in accordance with the biological needs of specific agricultural plants, taking into account their varietal characteristics. The course includes the study of the basic principles of agroecology, analysis of crop requirements for soil composition, climatic conditions and other environmental factors. Students will also master the methods of collecting and processing data necessary for agroecological assessment of lands, as well as learn how to analyze soil and climatic parameters in the context of the requirements of specific varieties of agricultural plants.	5
6	**ON4**	Mathematical modeling in agroecology	The discipline is designed to study mathematical methods and models used in agroecological research. Students deepen their knowledge in using mathematics to analyze and optimize agricultural processes, taking into account environmental aspects. The course includes an analysis of the impact of various agricultural practices, such as crops, fertilizers and plant protection, on plant growth and development, as well as interaction with the ecosystem. Nutrient cycle modeling is being studied, assessing the metabolism and movement of nutrients in soil, plants and the atmosphere, and strategies are being developed for the effective use of fertilizers. Modeling of the spread of diseases and pests is also considered, including analysis of the dynamics of pest populations and determination of optimal control and quarantine methods. The training also includes the study of	3

			economic and environmental modeling, which analyzes the impact of agroecological factors on the economic performance of agriculture, in order to develop sustainable business strategies.	
7	**ON9**	Technogenic systems and environmental risks	The discipline is aimed at studying the basics of environmental safety management in agriculture. The trainees will gain knowledge about the impact of agricultural processes on the environment and learn how to apply modern risk management methods in agronomy, safety methods in agronomic processes, including fire and explosion safety, waste air purification from harmful impurities, wastewater treatment and waste disposal within agricultural systems. Special attention will be paid to the methodology for assessing man-made and environmental risk, as well as the basics of the legislative framework in the field of environmental safety of agriculture. Practical training will be aimed at developing skills in the field of safety in agronomic systems.	4
8	**ON7**	Selection and seed production of agricultural crops	The discipline is aimed at developing skills in applying methods, techniques and creating technological schemes in the field of breeding and seed production processes. During the training, students will master the classification of varieties, study various types of crossing, methods of castration and pollination. They will learn how to identify and select varieties taking into account their economic and biological properties, understand the concept of heterosis and methods to achieve it. During the practical training, an informed choice of crop varieties will be made, taking into account the conditions of a particular region and the level of intensity of agriculture. They will carry out a description of the physiological state of plants, assess the resistance of varieties to extreme factors, diseases and pests. Practical field trips are provided, where students will independently determine the varieties of crops based on the morphological characteristics of plants, fruits and seeds. They will master the technique of crossing, methods of castration and pollination, as well as master the simplest operations to obtain clean lines.	5
9	**ON10**	Logistics of production processes in agriculture	The discipline focuses on mastering the key principles and skills of logistics used in agriculture. The course examines the main aspects of planning, management and optimization of production processes in the rural sector, the principles of supply, inventory management, transportation	3

			and warehousing in the context of agricultural production. Apply modern tools, study resource management methods, and develop strategies to optimize logistics processes in the context of agricultural enterprises.	
10	**ON8**	Agroecological land assessment	The discipline covers methods and tools for analyzing the impact of agricultural practices on the ecosystem and soil resources. The course aims to explore the interaction between agriculture and the environment, as well as to develop sustainable land use strategies. Students master soil quality assessment, including analysis of physico-chemical and biological characteristics, to determine the condition and potential for agriculture. The influence of agrochemical fertilizers is being studied in order to minimize negative effects on soil and biota. The main focus is on assessing the use of water resources, the impact of mechanization and tillage on their sustainability. The course also covers land resource assessment, aimed at analyzing sustainability under the influence of agricultural activities and developing recommendations for their effective use.	5
11	**ON7**	Plant protection and quarantine	The discipline is aimed at a deep understanding of the methods and principles of prevention, control and management of diseases, pests and other biotic factors that can have a negative impact on plants in agriculture. Various aspects related to ensuring phytosanitary safety are being studied, including methods for the diagnosis and identification of diseases, parasites and pests of plants. The discipline also covers the principles of the application of chemical, biological and cultural methods for disease prevention and control, as well as the development of strategies for sustainable pest management. Students learn the principles of creating and implementing quarantine systems to prevent the spread of dangerous diseases and harmful organisms. The course also includes an analysis of environmentally sound approaches to plant protection, including the use of biological agents and integrated pest management systems. As a result of studying the discipline, students acquire not only theoretical knowledge in the field of plant protection, but also practical skills necessary for effective management of the phytosanitary situation.	5
Cycle of specialised disciplines Elective component				

1	**ON8**	Fertilizer application systems	This discipline is aimed at developing skills for independent analysis of the soil cover of territories, understanding the ecological state of soils through the study of their basic properties, as well as mastering the principles of soil protection measures and applying the knowledge gained in professional activities. During the course of the course, the morphology of soils, key processes of soil formation, the structure of soil horizons, the classification of soils by type and the basics of rational land use are studied. Practical classes form the skills of determining the agrophysical and agrochemical properties of the soil using generally accepted soil science techniques, as well as determining the type, type and genetic affiliation of the soil based on the morphological structure of the soil profile and granulometric composition.	5
2	**ON6**	Soil Fertility Management	The discipline is aimed at studying methods and strategies for soil fertility management in agriculture. Students will get acquainted with the basic principles and technologies aimed at maintaining and increasing the fertility of the soil layer. Consideration of issues in this area includes the study of legislative acts regulating the use of land resources in agriculture, as well as the analysis of scientific research in the field of soil science, the main aspects of the impact of agrotechnical methods on the structure and fertility of soils. Special attention is paid to understanding the chemical processes affecting the composition of the soil and methods of their correction to optimize the conditions for plant growth.	
3	**ON9**	Technical regulation in agroecology	The discipline is aimed at studying and understanding the system of regulatory and technical aspects used in agriculture to ensure environmental safety and sustainability of agricultural production. During the course, students will be introduced to the basics of technical regulation in the agricultural sector, as well as methods and controls aimed at minimizing the negative impact on the environment, will acquire not only theoretical knowledge in the field of technical regulation in agroecology, but also practical skills in the application of modern standards and methods.	5
4	**ON10**	Economics and organization of agricultural production	The discipline is aimed at acquiring theoretical knowledge and practical skills in the field of organizing the economics of agricultural production. Students study the basics of economic theory, principles, methods and	

			forms of coordination of workers' actions in order to rationalize the use of production resources and effective production management.	

7 Content of the educational programme

Module name	Module Learning Outcome	Amount in academic credits	Module components					
			Discipline cycle and component	Discipline Code	Name of discipline	Amount of credits	Semester	Form of control
Socio-political knowledge module	The learning outcome of the module of socio-political knowledge is aimed at forming in students a comprehensive socio-humanitarian worldview, the ability to analyze and evaluate social, political and cultural phenomena, as well as to use the acquired knowledge in solving applied problems and in communication in various spheres	13	GES MC	PM 1102	Psychology. Cultural studies	4	1	Examinatio n
				SA 1107	Political Science. Sociology	4	2	Examinati on
				F 2108	Philosophy	5	3	Examinati on
Linguistic	The module's language learning outcome aims to develop students' competences in language, including understanding, using and analysing language structures, and the ability to communicate effectively and to apply linguistic knowledge in different contexts.	20		FL 1103 (1)	Foreign language	5	1	Examinati on
				KRL 1104(1)	Kazakh (Russian) language	5	1	Examinati on
				FL 1103 (2)	Foreign language	5	2	Examinati on
				KRL 1104(2)	Kazakh (Russian) language	5	2	Examinati
Social communication and physical education	Learning outcomes of the module of general disciplines are aimed at the formation of a set of knowledge and skills for personal development, social responsibility and professional competence in students.	28		HK 1101	History of Kazakhstan	5	1	State examinatio n
				ICT 1106	Information communication technologies	5	2	Examinati on
				PC 1105(1)	Physical Education	2	1	Examinati on
				PC 1105(2)		2	2	
				PC 1105(3)		2	3	
				PC 1105 (4)		2	4	
			GES SC	ELS 1109	Ecology and safety fundamentals vital activities			
				FACC 1109	Fundamentals of law and anti-corruption culture	5	1	Examinati on

				FEE 1109	Fundamentals of economics and businesses			
				FSR 1109	Fundamentals of scientific research			
				FFL 1109	Basics of financial literacy			
			PS UC	PM 4311	Project management	5	7	Examination
Natural and mathematical sciences	Module learning outcomes include an in-depth understanding of the biological systematics of crops, mastering the basics of organic, inorganic and analytical chemistry, and acquiring knowledge of plant ecology. Learners also develop their skills in higher mathematics, enabling them to apply an analytical approach to biogeochemical and ecotoxicological problems.	32	BS UC	BSAP 1201	Biology and systematics crops	4	1	Examination
				OIACh 1202	Organic, inorganic and analytical chemistry	5	2	Examination
				PE 1203	Plant ecology	3	2	Examination
				HM 2207	Higher mathematics	4	3	Examination
				BE 3220	Biogeochemistry and ecotoxicology	5	6	Examination
				B 3213	Biogeocoenology	5	5	Examination
				EC 3215	Environmental chemistry	5	5	Examination
				EP 1218	Educational practice	1	2	Clearance
Farming and soil fertility management	The learning outcomes of the module “Farming and Soil Fertility Management” include a thorough understanding of the basics of soil science, agronomy and soil diagnostics. Students acquire knowledge of agrometeorology and fertilizer application systems, enabling them to effectively manage soil fertility and develop optimal farming strategies	28	BS UC	SS 2204	Soil science	5	3	Examination
				A 3212	Agrochemistry	5	5	Examination
				A 2209	Farming	5	4	Examination
			BS UC	SD 2211	Soil diagnostics	5	4	Examination
				A 2211	Agrometeorology			
			PS UC	PT 3314	Practical training	3	6	Clearance
			PS SC	FAS 3303	Fertiliser application systems	5	6	Examination
				SFM 3303	Soil fertility management			
Innovation and eco-efficiency in agriculture	Module learning outcomes include mastering innovative technologies in agriculture, as well as processing and utilization of waste in the agro-industrial complex. Students study modern technologies and means of mechanization of agricultural production, with emphasis on their environmental safety and efficiency of use in agriculture	14	BS UC	PDWAIC 2205	Recycling and utilisation of waste in the agro-industrial complex	4	3	Examination
				OMECP 2206	Operation of machines and crop production equipment	5	3	Examination
				EFTRUNR 3221	Environmentally safe technologies and rational use of natural resources resources	5	6	Examination

Crop production	The module learning outcomes include mastering the fundamentals of crop production, as well as learning about plant protection and quarantine techniques. Learners also acquire knowledge of crop breeding and seed production, which enables them to effectively manage the process of growing and improving plants.	15	**BS UC**	PG 3217	Crop production	5	5	Examination
			PS UC	PPQ 3302	Plant protection and quarantine	5	6	Examination
				SSPAC 4306	Crop breeding and seed production	5	7	Examination
Agro-ecological assessment and monitoring	Module learning outcomes include mastery of agroecological monitoring techniques and the application of mathematical modeling in agroecology. Learners also learn the processes of agroecological land assessment, which enables them to analyze and manage the environmental aspects of agricultural activities.	52	PS UC	AM 3304	Agroecological monitoring	5	6	Examination
				MMA 4305	Mathematical modeling in agroecology	3	7	Examination
				ALA 4310	Agroecological assessment of lands	5	7	Examination
				TSER 4309	Technogenic systems and environmental risks	4	7	Examination
				PT 4313	Industrial practice (without ex.)	22	8	Clearance
				PGP 4314	Pre-diploma practice			
			BS UC	PT 2219	Industrial practice	3	4	Clearance
				AM 3214	Agroecology of microorganisms	5	5	Examination
				ECGIS 2210	Environmental mapping and GIS	5	4	Examination
Agro-industrial complex management and legal framework	Learning outcomes of the module include mastering the skills of logistics of production processes in agriculture, technical regulation in agroecology, basics of economics and organization of agricultural production, as well as project management in agro-industrial complex.	13	PS UC	LPPA 4308	Logistics of production processes in agriculture	3	7	Examination
				RSDFA-IC 2301	Regulatory and legal support and document flow in the agro-industrial complex	5	4	Examination
			PS SC	TRA 4312	Technical regulation in agroecology	5	7	Examination
				EOAP 4312	Economics and organization of agricultural production	5	3	Examination

Minor 1 Communication in foreign language	The module learning outcomes cover increasing language proficiency for everyday communication, improving communicative skills in a variety of situations, developing professional language communication and specialized use of English for specific purposes.	20	BS UC	EFEU 2216	English for everyday use	5	3	Examination
				EICS 2216	English in communicative situations	5	4	Examination
				EISOPC 3216	English in situations of professional communication	5	5	Examination
			PS UC	EFSP 3307	English for a specific purpose	5	6	Examination
Minor 2 Information technologies in the professional sphere	The learning outcomes of the module are that students acquire the knowledge and skills to effectively use IT tools i n their professional activity.		BS UC	DV 2216	Data visualisation	5	3	Examination
				AOSO 2216	Automation of settlement operations	5	4	Examination
				DAABP 3216	Data analysis and business planning	5	5	Examination
			PS UC	EB 3307	E-business	5	6	Examination
Final certification		8	FA	WDT/SES 4401	Writing and defence of a thesis (project) / Preparation and passing a comprehensive examination	8	8	DR/Complex defence examination
Total						**243**		

8 Map of correspondence between prerequisites and post-requisites of disciplines

List of disciplines			Discipline numbers of	
No. of semester*	**No. of discipline***	**Discipline name**	**pre-requisites*** **	**post requisites*** **
1	2	3	4	5
0	**1**	**School course**	**-**	**-**
1 semester				
1	1	History of Kazakhstan	0-1	9
1	2	Biology and systematics of agricultural crops	0-1	2-5,2-6
1	3	Psychology. Cultural studies	0-1	2-8
1	4	Foreign language	0-1	2-2
1	5	Kazakh (Russian) language	0-1	2-3
1	6	Physical Education	0-1	2-4
1	7	Ecology and life safety	0-1	2-5
1	8	Fundamentals of law and anti-corruption culture	0-1	9
1	9	Fundamentals of scientific research	0-1	9
1	10	Fundamentals of economics and entrepreneurship	0-1	7-3
1	11	Basics of financial literacy	0-1	3-3
2 semester				
2	1	Organic, inorganic and analytical chemistry	0-1	3-6,5-4
2	2	Foreign language	1-4	9
2	3	Kazakh (Russian) language	1-5	9
2	4	Physical Education	1-6	3-1
2	5	Plant ecology	0-1	3-6,4-4
2	6	Training practice	1-2	4-8
2	7	Information and communication technologies	0-1	3-7
2	8	Political Science. Sociology	1-3	3-4
3 semester				
3	1	Physical Education	2-4	4-1
3	2	Minor	0	4-2
3	3	Higher mathematics	1-11	4-3, 7-1
3	4	Philosophy	2-8	9
3	5	Soil science	2-1	4-6,4-7
3	6	Recycling and disposal of waste in agro-industrial complex	2-5	4-5,7-6
3	7	Operation of machinery and equipment in crop production	2-7	5-3
4th semester				
4	1	Physical Education	3-1	9
4	2	Minor	3-2	5-1
4	3	Soil diagnostics	3-5	5-2, 5-6
4	4	Agrometeorology	2-5	5-3
4	5	Regulatory and legal support and document management in the agro-industrial complex	3-6	4-3,7-2

4	6	Farming	3-5	5-5
4	7	Environmental cartography and GIS	3-5	5-6
4	8	Industrial practice	2-6	6-8
5th semester				
5	1	Minor	4-2	6-1
5	2	Agroecology of microorganisms	4-3	6-6
5	3	Biogeocoenology	4-4	6-5, 6-7
5	4	Agrochemistry	2-1	6-4
5	5	Crop production	4-6	6-2
5	6	Environmental chemistry	4-3	6-3
6th semester				
6	1	Minor	5-1	9
6	2	Plant protection and quarantine	5-5	7-5
6	3	Fertiliser application systems	5-6	7-5
6	4	Soil fertility management	5-4	7-7
6	5	Biogeochemistry and ecotoxicology	5-3	7-4
6	6	Agro-ecological monitoring	5-2	7-8
6	7	Environmentally sound technologies in agriculture	5-3	7-4
6	8	Industrial (technological) practice	4-8	8-1
Semester 7				
7	1	Mathematical modelling in agroecology	3-3	9
7	2	Technical regulation in agroecology	4-5	9
7	3	Economics and organisation of agricultural production	1-10	9
7	4	Technogenic systems and environmental risks	6-5,6-7	9
7	5	Crop breeding and seed production	6-2,6-3	9
7	6	Logistics of production processes in agriculture	3-6	9
7	7	Project management	6-4	9
7	8	Agro-ecological assessment of land	6-6	9
8 semester				
Professional practice				
8	1	Production (without ex.)	6-8	8-3
8	2	Pre-diploma	6-8	8-3
Final certification				
8	3	Writing and defence of a thesis (project) / Preparing and passing the comprehensive examination	8-1,8-2	9
9		Professional activities		

0 - school course
9 - professional activity

9 Summary table reflecting the volume of mastered credits by module for the main educational programme

Year of study	Semester	Number of disciplines studied			Number of academic credits					Total hours	Quantity	
		CC	UC	EC	Theoretical training	Physical Education	Professional practice	Final certification	Total		examinations	differential credit
1	1	5	1	1	28	2	-	-	30	900	7	-
	2	5	2	-	27	2	1	-	30	900	7	1
2	3	2	5	-	28	2	-	-	30	900	7	-
	4	1	4	1	25	2	3	-	30	900	6	1
3	5	-	6	-	30	-	-	-	30	900	6	-
	6	-	5	1	30	-	3	-	33	990	6	1
4	7	-	6	1	30	-	-	-	30	900	7	-
	8	-	-	-	-	-	22	8	30	900	-	1
Total		**13**	**29**	**4**	**198**	**8**	**29**	**8**	**243**	**7290**	**46**	**4**

10 Regulatory and legal support

1. Law No. 319-III of the Republic of Kazakhstan dated 27 July 2007 "On Education".

2. "On approval of qualification requirements imposed on educational activities of organizations providing higher and (or) postgraduate education, and a list of documents confirming compliance with them" Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated January 5, 2024 No. 4.

3. "On approval of the Classifier of training programs for personnel with higher and post-graduate education" Order of the Minister of Education and Science of the Republic of Kazakhstan of October 13, 2018 No. 569.

4. "On Approval of State Compulsory Standards of Higher and Postgraduate Education". Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated 20 July 2022 No. 2.

5. "On Approval of the Model Rules for the Activities of Organisations of Higher and Postgraduate Education" Order of the Minister of Education and Science of the Republic of Kazakhstan of October 30, 2018 No. 595.

6. "On Approval of the Rules for the organisation of the educational process on credit technology of education in organisations of higher and (or) postgraduate education". Order of the Minister of Education and Science of the Republic of Kazakhstan dated 20 April 2011 No. 152.

7. "On Approval of the Standard Rules of Admission to Training in Educational Organisations Implementing Educational Programmes of Higher and Postgraduate Education". Order of the Minister of Education and Science of the Republic of Kazakhstan dated 31 October 2018 No. 600.

8. Guidelines for the development of educational programmes of higher and postgraduate education. Annex 1 to the order of the Director of the National Centre for Higher Education Development of MSHE RK dated 04.05.2023 No. 601 o/d.

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

10. Professional standards and sectoral qualifications frameworks available on the website of the National Chamber of Entrepreneurs "Atameken":

- Professional standard: "Growing vegetables and potatoes" (Annex No. 18 to the order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan). "Atameken" dated 26.10.2022 No. 190), (link https://atameken.kz/ru/services/16).

- Professional standard: "Growing legumes and oilseeds" (Annex No. 4 to the order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated 26.10.2022. No. 190), (link https://atameken.kz/ru/services/16).

- Professional Standard "Hydrometeorology and Ecology" (Annex No. 79 to the order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan) "Atameken" dated 01.09.2023 No. 136), (link https://atameken.kz/ru/services/16).

11. Atlas of new professions and competences in the Republic of Kazakhstan. "Ecotechnologist" (link: https://www.enbek.kz/atlas/profession/209).

12. Atlas of new professions and competences in the Republic of Kazakhstan. "Ecosystem Management Technologist". (link https://www.enbek.kz/atlas/profession/212).