CATALOG OF ELECTIVE DISCIPLINES

7M08 - Agriculture and bioresources
(Code and classification of the field of education)

7M081 - Agronomy
(Code and classification of the direction of training)

0812
(Code in the International Standard Classification of Education)

M131 - Crop Production
(Code and classification of the educational program group)

7M08101 - Agronomy
(Code and name of the educational program)

Master
(Level of preparation)

set of 2023

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By the Academic Committee of the EP
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Chairman of the Academic Council Oralkanova I.A.

Actual problems of crop production

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying theoretical questions about the patterns of crop formation, identifying reserves for increasing the production of crop products, developing the theory and technology for obtaining the highest yields and the best quality at the lowest labor and cost. The issues of violation of environmental safety due to the improper use of chemicals that harm plant growth, the suspension of work on fertilizing the soil and irrigating fields are considered.

Purpose of studying of the discipline
To provide theoretical knowledge about increasing soil fertility by implementing various agro-reclamation measures to obtain a stable and high yield of agricultural crops, rational economic, environmental and technological use of land.

Learning Outcomes
ON7 To study the problems of crop production, to recommend modern technologies and methods of forage harvesting and promising crops for agriculture, to make managerial decisions in various branches of crop production.

Learning outcomes by discipline
- To study the problems of crop production;
- Recommend modern technologies and methods of forage harvesting and promising crops for agriculture;
- To make managerial decisions in various branches of crop production.

Prerequisites
Bachelor

Postrequisites
Promising cultures of Kazakstan

Innovations in crop production

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying the development and implementation of new technologies for the most important crops. It includes: the development and implementation of resource-saving techniques and innovative agricultural technologies in crop production, as well as new varieties and hybrids of agricultural crops approved for use in the production, management of various areas of the economy, allowing to increase the financial, environmental and social performance of production.

Purpose of studying of the discipline
to form students` knowledge, skills and abilities in accordance with the competencies being formed on the scientific and technological foundations of soil science, agrochemistry, agriculture and crop production, on which
crop production technologies are based.

Learning Outcomes
ON5 Recommend modern, digital technologies in forecasting, programming, production and processing of crop production and apply innovative technologies in crop production.

Learning outcomes by discipline
1. to use modern achievements of science and technology, innovative processes in the agro- industrial complex in the design and implementation of environmentally safe and cost-effective technologies for the production of crop production and reproduction of soil fertility of various agrobiocenoses.
2. use, generalize and analyze information, set a goal and willingness to find ways to achieve it in the conditions of formation and development of information technologies.
3. to know the best practices of cultivating field crops using innovative technology, as well as the achievements of science and practice in this field.

Prerequisites
Bachelor

Postrequisites
Promising cultures of Kazakstan

Patenting and intellectual property protection

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is aimed at studying the main provisions of copyright and patent law, the legal foundations of the legislation of the Republic of Kazakhstan in the field of protection of intellectual property. Includes: the concept of patenting and protection of intellectual property, the results of intellectual activity protected by copyright, innovations and the relevance of protecting intellectual property rights, types of intellectual property, protection of intellectual property, transfer and transfer of exclusive rights to intellectual property.

Purpose of studying of the discipline
The objectives of teaching this discipline are to study the problems of legal protection of inventions, utility models, the study of national regulatory legal acts and their comparison with international legal acts of various levels in the field of patent law, the study of objects of

patent law, identification of signs and conditions of patentability of inventions, utility models and industrial designs, practical development of skills of registration of patent rights, optimization the choice of protection of violated rights of authors and patent holders, identification of the most urgent problems of legal protection of intellectual property results in the field of patent law, study of the features of the current state
of the results of intellectual activity in the field of patenting.

Learning Outcomes

ON2 Possess the methodology and methodology of agronomic research, determine and organize the direction of research, process and analyze scientific results and patent research data.

Learning outcomes by discipline

1. use scientific and reference literature on the topics of the discipline;
2. analyze and adequately evaluate your own and others` work;
3. use the conditions of patentability of objects of patent law;

Prerequisites

Bachelor

Postrequisites

The research work of a student, including an internship and the implementation of a master s thesis I

Innovative technologies in seed production

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course is aimed at the formation of knowledge on innovative technologies (techniques and methods) in the seed production of agricultural crops and skills in the organization and technique of the seed production process using innovative technologies. The course examines the development of sustainable seed production in modern conditions, variety renewal and features of the development of productive innovations in seed production, elite seed production, environmental and agrotechnical conditions for growing high-quality elite seeds.

Purpose of studying of the discipline

The purpose of teaching the discipline is to teach undergraduates to independently summarize information about modern and promising technologies in seed production, analyze the data obtained using a database

Learning Outcomes

ON5 Recommend modern, digital technologies in forecasting, programming, production and processing of crop production and apply innovative technologies in crop production.

Learning outcomes by discipline

1. master the methodology of theoretical and experimental research in the field of agriculture, seed production.
2. to use modern achievements of science and technology, innovative processes in the agro- industrial complex in the design and implementation of environmentally safe and cost-effective technologies for the production of agricultural seeds.
3. to ensure the receipt of environmentally safe products of agricultural landscapes during the cultivation of agricultural crops and the economic efficiency of crop production.

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination

IT technologies in crop production

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course defines the essence of innovation and its classification, the structure and features of the innovation process in the agro-industrial complex, innovation activity and its features in crop production, the state and trend of production, as well as the economic efficiency of the industry. The course considers promising areas for the application of innovative technologies and their implementation in agricultural production, applied computer programs for optimizing the placement of crops in zonal crop rotation systems.

Purpose of studying of the discipline

Teach the master to independently summarize information about innovative technologies in agronomy, analyze the data obtained using the innovation database. Possess the skills of using modern information technologies for the collection, processing and dissemination of innovations in agronomy, use and create databases on innovative technologies in agronomy, master the methods of constructing schemes of innovative processes, operations and methods in new technologies of cultivation of crops; the method of dissemination of innovations in production.

Learning Outcomes

ON5 Recommend modern, digital technologies in forecasting, programming, production and processing of crop production and apply innovative technologies in crop production.

Learning outcomes by discipline

1. Solving the tasks of developing the sphere of professional activity and (or) organization based on the analysis of scientific and industrial achievements.
2. The use of modern methods of problem solving in the development of new technologies in professional activities.
3. conducting scientific research, analyzing the results and preparing accounting documents.

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination

Innovative methods in crop breeding

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course is aimed at studying breakthrough achievements in the field of genetics, genomics and biotechnology, the main priorities of modern plant breeding and ways to achieve them. Considers innovative methods of work in modern breeding and includes cellular, genomic, chromosome and genetic engineering at the level of populations, organisms, tissues, cells, plasmids, chromosomes, genes and their individual parts.

Purpose of studying of the discipline

familiarization of undergraduates with modern scientific developments and advanced breeding technologies and features of crop cultivation, familiarization with the state and prospects for the development of technical means, study of promising areas and acquisition of skills in the selection process, practical training in methods and agrotechnical techniques for growing high-quality seed crops in the region, acquisition of competencies for planning and conducting field scientific experiments.

Learning Outcomes

ON8 Apply new technologies in crop breeding, evaluate the adaptive potential of plants in various soil and climatic conditions.

Learning outcomes by discipline

1. demonstrates basic ideas about the basic laws and modern achievements of genetics, about genomics.
2. apply diagnostic methods of the source and breeding material for resistance to adverse environmental factors, taking into account the biological characteristics of agricultural crops.
3. apply innovative technologies in the selection and production of agricultural crops.

Prerequisites

Innovations in crop production

Postrequisites

Final examination

Innovative technologies for processing of crop products

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline is aimed at the rational use of grown products, taking into account their quality, expanding the range of products, the use of innovative non-waste technologies in the processing of crop products. The course covers innovative ways to preserve fresh and processed products without mass loss and with minimal losses, as well as new ways to store products without compromising their quality, modern methods of certification of agricultural products and products of their processing.

Purpose of studying of the discipline

formation of professional knowledge among future specialists on innovative technologies of storage and processing of crop products; to study the condition of grain entering storage; modern waste-free technologies in grain processing; obtaining new products in the processing of crop products.

Learning Outcomes

ON5 Recommend modern, digital technologies in forecasting, programming, production and processing of crop production and apply innovative technologies in crop production.

Learning outcomes by discipline

1. to know the main trends and directions of development of scientific and technological progress in the field of storage, processing and deep processing of crop production.
2. know industrial and intensive technologies of storage, processing and deep processing of agricultural crops.
3. apply modern methods of scientific research in the field of production and processing of agricultural products.

Prerequisites

Innovative technologies and methods of quality control in the storage of crop products

Postrequisites

Final examination

Physiology of resistance of agricultural plants

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course is focused on the study of modern data on the physiology of stress, considers the mechanisms of plant defense, their resistance to abiotic and biotic environmental conditions, the effect of plants on temperature rises and falls, water deficiency, high salt content in the soil, air pollution, ionizing radio emission, the influence of pathogenic microorganisms. Analyzes the main mechanisms of adaptation, adaptation of plants to certain environmental conditions, which is provided by physiological elements.

Purpose of studying of the discipline

The objectives of mastering the discipline physiology of the stability of agricultural plants are to consider and integrate knowledge about the peculiarities of the impact of various environmental factors of the external environment on numerous physiological processes of the plant organism.

Learning Outcomes

ON8 Apply new technologies in crop breeding, evaluate the adaptive potential of plants in various soil and climatic conditions.

Learning outcomes by discipline

1. to predict the consequences of adverse effects on plants in natural conditions and in agrophytocenoses; it is advisable to use the knowledge gained to realize the adaptive potential of plants in solving practical problems
of crop production and breeding.
2. possess modern methods of plant research, including methods of stress diagnostics, skills for purposeful changes in plant resistance using various physico-chemical factors, the ability to work with scientific and educational literature on the physiology of resistance of plant organisms to stress.
3. apply in practice the theoretical knowledge gained about the physiology of stress resistance of plant organisms for monitoring and protecting plant biota and increasing the productivity of cultivated plants in adverse environmental conditions.

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination

Innovative technologies for the use of fertilizers

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline is focused on the study of innovative technologies for the use of fertilizers, advanced solutions for optimizing the agrochemical properties of the soil and their importance for the correct use of fertilizers. The issues of improving the technology of using fertilizers, minimizing the negative impact of fertilizers on the environment, using modern equipment for applying fertilizers, the effect of fertilizers on the growth and development of plants in different periods of the growing season.
The discipline is focused on the study of innovative technologies for the use of fertilizers, advanced solutions for optimizing the agrochemical properties of the soil and their importance for the correct use of fertilizers. The issues of improving the technology of using fertilizers, minimizing the negative impact of fertilizers on the environment, using modern equipment for applying fertilizers, the effect of fertilizers on the growth and development of plants in different periods of the growing season.
The discipline is focused on the study of innovative technologies for the use of fertilizers, advanced solutions for optimizing the agrochemical properties of the soil and their importance for the correct use of fertilizers. The issues of improving the technology of using fertilizers, minimizing the negative impact of fertilizers on the environment, using modern equipment for applying fertilizers, the effect of fertilizers on the growth and development of plants in different periods of the growing season.

The discipline is focused on the study of innovative technologies for the use of fertilizers, advanced solutions for optimizing the agrochemical properties of the soil and their importance for the correct use of fertilizers. The issues of improving the technology of using fertilizers, minimizing the negative impact of fertilizers on the environment, using modern equipment for applying fertilizers, the effect of fertilizers on the growth and development of plants in different periods of the growing season.

Purpose of studying of the discipline

The purpose of mastering the discipline is to deepen knowledge of the basic technologies used by modern production to improve soil fertility, improve fertilizer systems of agricultural crops and the ecological state of agrocenoses.

Learning Outcomes

ON4 Determine and calculate methods, technology and doses of organic and mineral fertilizers, microbiological preparations for the planned harvest.

Learning outcomes by discipline

1. To use knowledge of problem solving methods in the development of new technologies in professional activities.
2. To be guided by modern technologies of reproduction of soil fertility.
3. Use modern methods and mechanisms of reproduction of soil fertility.

Prerequisites

Bachelor

Postrequisites

Soil fertility models

Reclamation of disturbed lands of the Republic of Kazakhstan

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline is aimed at studying the factors of natural and anthropogenic disturbances of arable territories, a complex of specialized and agrotechnical works aimed at restoring the productivity and economic value of disturbed territories. The issues of restoration and improvement of lands subject to erosion are considered. It is aimed at acquiring the ability to conduct research work on the state of disturbed lands; implementation of a forecast of the impact of disturbed lands on the surrounding environment.

Purpose of studying of the discipline
The purpose of mastering the discipline is to form knowledge about the directions and procedure of reclamation works of disturbed economic and other activities of lands.
Learning Outcomes
ON9 To investigate and evaluate the reproduction of soil fertility, to use the main indicators of the model of soil fertility, the scientific basis of soil grading and classification, to develop rational ways of using rain-fed lands.
Learning outcomes by discipline
• to know the essence and social significance of their profession; the basis is the ability to assess the degree of degradation of technogenically disturbed lands of Kazakhstan.
• be able to correctly assess the degree of degradation of natural and technogenically disturbed lands of Kazakhstan.
• possess methods and skills of mastering measures for reclamation, reclamation and restoration of degraded, disturbed and polluted lands.
Prerequisites
Bachelor
Postrequisites
Final examination

Modern forage harvesting systems

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is aimed at studying progressive methods for calculating the balance of green fodder, preparing a green conveyor, energy-saving technologies for growing annual and perennial fodder crops in a green conveyor system, accounting for the quantity, properties, quality of haylage, silage, the need for feed for livestock, the establishment of the area under crops and the calculation of the need for seeds of fodder crops.
Purpose of studying of the discipline
The purpose of studying the discipline is progressive methods of calculating the balance of green feed, the organization of a green conveyor, energy-saving technologies for the cultivation of annual and perennial fodder crops in the green conveyor system, accounting for their quantity, quality of silage,silage, methods for calculating the need for green mass and preservatives in the production of succulent feed, the need for feed for livestock on the farm, calculation determination of the area and calculation of the need for seeds of fodder crops.
Learning Outcomes
ON7 To study the problems of crop production, to recommend modern technologies and methods of forage harvesting and promising crops for agriculture, to make managerial decisions in various branches of crop production.
Learning outcomes by discipline
- Study of crop production issues;
- To offer modern technologies and methods of forage harvesting and promising crops for agriculture;
- Making managerial decisions in various branches of crop production.
Prerequisites
Bachelor
Postrequisites
Promising cultures of Kazakstan

Crop yield programming

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying the programming of a limiting natural factor (humidity, heat, photosynthetic active radiation, soil fertility), the needs of a particular variety of crops for fertilizer, irrigation, the magnitude of the introduction of a regulated factor based on natural causes that affect the crop and the creation of optimal conditions for its formation. A science-based system for growing potential crop yields in different soil-climatic zones with a high yield is considered.
Purpose of studying of the discipline
The purpose of mastering the discipline is to use agrometeorological, agrochemical, agrophysical, agrotechnical factors to develop a system of measures to obtain a given, maximum possible yield in specific soil and climatic conditions, and with sufficient moisture supply - full use of the genetic potential of cultivated varieties.
Learning Outcomes
ON5 Recommend modern, digital technologies in forecasting, programming, production and processing of crop production and apply innovative technologies in crop production.
Learning outcomes by discipline
1. Develop systems of measures to improve the efficiency of crop production.
2. To establish compliance of agro-landscape conditions with the requirements of agricultural crops when they are placed on the land use territory.
3. Choose the optimal types of fertilizers for agricultural crops, taking into account the biological characteristics of crops and soil-climatic conditions.
Prerequisites
Actual problems of crop production

Postrequisites
The research work of a student, including an internship and the implementation of a master s thesis III

Monitoring and integrated plant protection system against harmful organisms

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is focused on the study of modern achievements in the protection of crops from harmful organisms. The discipline includes: consideration of positive results in the application of integrated protection; monitoring in phytosanitary; agroecological assessment of integrated protection and a set of methods for protecting plants from pests adapted to agrolandscape and economic conditions; bioenergetic and economic efficiency of methods of integrated protection of field crops from diseases of pests and weeds.

Purpose of studying of the discipline
The purpose of the discipline is to study modern achievements in the protection of agricultural crops from harmful organisms, positive results in the application of integrated protection; phytosanitary monitoring; integrated protection in major crops; agroecological assessment of integrated protection.

Learning Outcomes
ON3 Diagnose plant pests, plant diseases, draw up technological schemes for crop protection based on knowledge of the economic thresholds of harmfulness of diseases, pests.

Learning outcomes by discipline
1. diagnostics of plant pests, plant diseases, knowledge of the economic limits of the harmfulness of diseases, pests.
2. application of the basic laws of natural disciplines to solve standard problems in the field of agronomy using information and communication technologies.
3. implementation of seed preparation, organization of sowing and care of agricultural crops; clarification of the plant protection system against harmful organisms and adverse weather events.

Prerequisites
Masters degree course

Postrequisites
The research work of a student, including an internship and the implementation of a master s thesis II

Phytosanitary monitoring of crop disease

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying plant protection, taking into account the theoretical, methodological foundations of the monitoring system for harmful organisms, environmental factors affecting them. Gives an idea of phytosanitary monitoring of agricultural crops, lands on the territory of the economy to establish foci, the area of its level of infection with harmful objects, quarantine pests and diseases, with the determination of the limits of their distribution on the territory of the Republic of Kazakhstan.

Purpose of studying of the discipline
The purpose of studying the discipline is to build a modern plant protection system and technologies for its implementation based on knowledge and skills in phytosanitary control and monitoring of agrocenoses, agricultural plants and agricultural products.

Learning Outcomes
ON3 Diagnose plant pests, plant diseases, draw up technological schemes for crop protection based on knowledge of the economic thresholds of harmfulness of diseases, pests.

Learning outcomes by discipline
1. diagnose harmful, including quarantine, organisms and their damage to plants;
2. conduct phytosanitary monitoring of agricultural land;
3. to assess the economic and economic damage of harmful organisms to the crop yield.

Prerequisites
Actual problems of crop production

Postrequisites
Final examination

Innovative technologies and methods of quality control in the storage of crop products

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is aimed at studying the methods and methods of storage technology for crop products, the basic requirements for quality, the reasons for the deterioration of quality and safety in the process of storing products. The discipline considers the use of digital technologies in the storage of crop products, product quality control software using the achievements of scientific and technological progress to rationally reduce losses and increase the efficiency of preserving raw materials of plant origin.

Purpose of studying of the discipline
The purpose of the discipline is the systematic deepening of knowledge and skills in the field of assessing the quality of grain products in terms of safety indicators, consumer properties, confirmation of product quality compliance with the requirements of technical

regulations and other regulatory documents.

Learning Outcomes

ON5 Recommend modern, digital technologies in forecasting, programming, production and processing of crop production and apply innovative technologies in crop production.

Learning outcomes by discipline

1. to substantiate the methods of harvesting agricultural crops, primary processing of crop production and laying it for storage;
2. implement schemes for harvesting agricultural crops, primary processing of crop products and laying them for storage;
3. have the skills to justify and plan the harvesting of agricultural crops, the primary processing of crop products and its storage.

Prerequisites

Bachelor

Postrequisites

IT technologies in crop production

Methodology of research work

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course forms the methods of theoretical research, the problems of forecasting in scientific research and helps to choose the right direction of scientific research. The discipline "Methodology of research work" includes: methodological basic principles of scientific knowledge, philosophical aspects, the study of the structure and key stages of research work, the use of modern technologies for organizing the collection and processing of data and their interpretation, the rules for preparing reports on research works.

Purpose of studying of the discipline

The purpose of this discipline is to study the methodology of organizing and conducting research, modern methods and techniques of scientific research, the formation of skills and abilities to independently carry out scientific research in the field of agronomy and the preparation of scientific qualification (dissertation) work.

Learning Outcomes

ON2 Possess the methodology and methodology of agronomic research, determine and organize the direction of research, process and analyze scientific results and patent research data.

Learning outcomes by discipline

1. to choose and implement methods of conducting scientific research, analyze and summarize the results of research, bring them to practical implementation;
2. rationally plan experimental research;
3. perform statistical processing of experimental results.

Prerequisites

Bachelor

Postrequisites

The research work of a student, including an internship and the implementation of a master s thesis I

Organization and planning of research

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline is focused on the study of key areas of scientific research in agronomy. The issues of requirements for experiments and description of the results of observations, methodological bases of scientific knowledge. The choice of a scientific direction and the stages of scientific research work, the search, analysis and processing of scientific data, forecasting in scientific and industrial creativity, experimental experiments, processing the results of empirical research, forming the results of scientific work, research productivity.

Purpose of studying of the discipline

The study of the elements of scientific research methods for the development of effective artistic thinking and the organization of optimal thinking activities.

Learning Outcomes

ON2 Possess the methodology and methodology of agronomic research, determine and organize the direction of research, process and analyze scientific results and patent research data.

Learning outcomes by discipline

- To show basic knowledge in the field of differentiation of theoretical and scientific practical research, to formulate conclusions and proposals;
- The ability to formulate the purpose, objectives and conclusions of scientific research, to compare the theoretical prerequisites of scientific experience;
- Use the results of processing various techniques and evaluation of shortcomings

Prerequisites

Bachelor

Postrequisites

The research work of a student, including an internship and the implementation of a master s thesis I

Agro-soil science with the scientific foundations of adaptive agriculture

Discipline cycle	Profiling discipline
Course	1

Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is aimed at studying soil fertility, soil transformation in the process of anthropogenic use. The discipline considers the problems of the course of the soil-forming stage and the importance of soil-forming factors, various types of soil, water regime, the main characteristics and models of agro- soil fertility, the agrotechnical and coordinating- economic significance of crop rotations, the systematization and basics of their construction, minimum and zero land cultivation system.

Purpose of studying of the discipline
The purpose of the discipline is to study new socio-economic and environmental conditions and problems affecting the evolution of soils and their fertility, patterns of development in arable soils of the cultural (naturally anthropogenic) process of soil formation.

Learning Outcomes
ON9 To investigate and evaluate the reproduction of soil fertility, to use the main indicators of the model of soil fertility, the scientific basis of soil grading and classification, to develop rational ways of using rain-fed lands.

Learning outcomes by discipline
1. Master the techniques and methods of landscape analysis of the territory of the region, district, economy;
2. Master the techniques and methods of agroecological assessment of landscapes and their components;
3. Own techniques and methods of allocation of land in need of reclamation.

Prerequisites
Bachelor

Postrequisites
Final examination

Scientific basis of the use of fertilizers

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is focused on the study of the rational use of organic and mineral fertilizers for crops. Considers the factors affecting the efficiency of fertilizers, technologies for calculating doses of mineral fertilizers, reasonable doses, timing and methods of using fertilizers for major crops, taking into account their biological characteristics, the degree of expected yield and agro-soil conditions. The course is aimed at mastering the problems associated with plant nutrition and the optimal use of fertilizers.

Purpose of studying of the discipline
The purpose of the discipline "Scientific foundations of the use of fertilizers" is to study the issues of rational use of organic and mineral fertilizers for agricultural crops, factors affecting the effectiveness of fertilizers, timing and methods of application of fertilizers for the main crops, taking into account their biological characteristics, the level of planned yield and soil conditions.

Learning Outcomes
ON4 Determine and calculate methods, technology and doses of organic and mineral fertilizers, microbiological preparations for the planned harvest.

Learning outcomes by discipline
1. know the basic principles of the organization of an effective fertilizer system.
2. to use the scientific principles of fertilizer application in the crop rotation system, taking into account the properties and potential fertility of soils.
3. design systems, annual and calendar plans for the use of fertilizers and meliorants in agrocenoses, draw up technological schemes for their application, monitor the implementation of the fertilizer system in farms.

Prerequisites
Bachelor

Postrequisites
The research work of a student, including an internship and the implementation of a master s thesis II

System method in agrochemistry

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is focused on the study of modern methods, determining the doses of fertilizers that can increase the yield or change its quality. Considers a methodological systematic approach to conducting fundamental and applied scientific research in the field of agrochemistry, as well as ecologically balanced fertilizer systems, optimizing the balance of nutrients, soil and plant diagnostics of plant mineral nutrition, soil-agrochemical monitoring, system interaction fertilizers with the planned harvest.

Purpose of studying of the discipline
formation of students` practical knowledge and skills in organizing scientific research in the field of agrochemistry.

Learning Outcomes
ON4 Determine and calculate methods, technology and doses of organic and mineral fertilizers, microbiological preparations for the planned harvest.

Learning outcomes by discipline
1. apply the knowledge of modern scientific achievements to solve research and practical problems;
2. conduct agrochemical research in order to solve scientific and scientific-educational tasks;
2. master the methods of setting up agrochemical experiments and statistical methods of processing experimental data.

Prerequisites
Bachelor
Postrequisites
The research work of a student, including an internship and the implementation of a master s thesis II

Adaptive breeding in crop production

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying modern problems of plant adaptation in agriculture. The course covers the current state and prospects for the formation of the domestic agricultural economy, the adaptive potential of cultivated varieties of agricultural plants, strategies for adaptive intensification of crop production, biologization and ecologization of the intensification course of plant adaptation, the basics of the adaptive use of natural, biological and technogenic resources, agro- ecological opportunities for the productivity of crop production in Kazakhstan.
Purpose of studying of the discipline
the study of the problem of plant adaptation in agriculture and the practical solution of the issues of biologization and ecologization of the intensification processes of transition to adaptive development of agriculture.
Learning Outcomes
ON8 Apply new technologies in crop breeding, evaluate the adaptive potential of plants in various soil and climatic conditions.
Learning outcomes by discipline
1. analyze the effectiveness of modern technologies, ways to increase the productivity of the quality of crop production.
2. program crop yields.
3. to assess the adaptive potential of cultivated agricultural crops.
Prerequisites
Actual problems of crop production
Postrequisites
The research work of a student, including an internship and the implementation of a master s thesis II

Scientific and practical basics of designing farming systems

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is aimed at studying the development of modern resource-saving technologies, adaptive-landscape systems of agriculture, the current state of system research. It reveals the scientific foundations of crop rotations, the principles of their construction, methods for implementing modern technological methods of tillage, measures to combat weeds in adaptive-landscape farming systems, taking into account the laws of farming, the methodological foundations of modern adaptive- landscape farming systems, the scientific, practical foundations for designing adaptive-landscape farming systems.
Purpose of studying of the discipline
The purpose of the discipline "Scientific and practical fundamentals of designing farming systems" is to study the essence, structure and classification of modern farming systems, signs and properties of systems, methods of system research, scientific foundations of modern farming systems;
Learning Outcomes
ON6 To introduce elements of innovative technologies in agriculture, irrigation system, to assess the quality of field work.
Learning outcomes by discipline
1. develop and analyze projects for the use of farming systems in specific conditions.
2. to use in practice the techniques of the farming system.
3. analyze the information and identify the most promising farming systems and crop cultivation technologies for specific economic conditions.
Prerequisites
Bachelor
Postrequisites
The research work of a student, including an internship and the implementation of a master s thesis II

Irrigated farming systems

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is focused on studying the intensive technology of irrigated agriculture. Considers improving plant nutrition through the introduction of scientifically based norms of mineral fertilizers and the use of increased norms of organic fertilizers to improve soil fertility in irrigated agriculture, the use of crop varieties that are responsive to irrigation, the use of modern technologies for water supply to the field, computerization of process control processes, the introduction of scientific achievements and excellence.
Purpose of studying of the discipline
The purpose of the discipline "Systems of irrigated agriculture" is to study in scientific justification the principles of application of

systems of basic processing of irrigated soil, providing protection of soils from wind erosion, preservation of soil fertility, productive use of natural and climatic resources of the zone of irrigated agriculture while reducing energy and material costs.

Learning Outcomes

ON6 To introduce elements of innovative technologies in agriculture, irrigation system, to assess the quality of field work.

Learning outcomes by discipline

1. organize the work of irrigation systems, effectively use irrigation and agricultural machinery.
2. make a plan for field work for the period of sowing, care and harvesting of crops.
3. calculate the doses of organic and mineral fertilizers for the planned harvest, determine the method and technology of their application for agricultural crops.

Prerequisites

Bachelor

Postrequisites

The research work of a student, including an internship and the implementation of a master s thesis II

Agroclimatic resources of the rainfed farming

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline is aimed at studying the rational use of agro-climatic resources of the Republic of Kazakhstan. The conditions for the existence of plants, their regulation in rainfed agriculture, the heat and moisture supply of the vegetation stage, innovative agricultural technologies, the aridization of the area, the diversification of crop production are considered. Forms the concept of general methods of cultivation of agricultural crops, the development of the most rational ways to use rainfed lands.

Purpose of studying of the discipline

The discipline allows undergraduates, as well as agricultural production practitioners, to assess and rationally use the agro-climatic resources of the territory and promote the effective use of favorable and overcoming adverse weather phenomena.

Learning Outcomes

ON9 To investigate and evaluate the reproduction of soil fertility, to use the main indicators of the model of soil fertility, the scientific basis of soil grading and classification, to develop rational ways of using rain-fed lands.

Learning outcomes by discipline

1. develop and analyze the use of agro-climatic resources in specific conditions.
2. to use in practice the techniques of the farming system.
3. analyze the information and identify the most promising agro-climatic resources of rain-fed agriculture.

Prerequisites

Actual problems of crop production

Postrequisites

The research work of a student, including an internship and the implementation of a master s thesis II

Scientific basis of irrigation system application

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course is aimed at studying modern methods of rational use of water resources. It contains a reasonable development of the irrigation regime depending on the type of agricultural crops, the correct use of irrigation equipment, the control and improvement of the reclamation state of irrigated areas, the reduction of water losses in canals, the control of land erosion during irrigation, the use of return water for irrigation and the impact of reclamation work on the environment .

Purpose of studying of the discipline

The purpose of the discipline "Scientific fundamentals of irrigation system application" is to study the development of modern high-tech irrigation methods and the development of resource-saving methods of irrigation of agricultural crops, ensuring the formation of high yields.

Learning Outcomes

ON6 To introduce elements of innovative technologies in agriculture, irrigation system, to assess the quality of field work.

Learning outcomes by discipline

1. possess a system of fundamental scientific concepts, methodology and methods of modern soil reclamation;
2. to determine the factors of soil reclamation in various natural conditions;
3. apply methods of protection against soil and landscape degradation.

Prerequisites

Bachelor

Postrequisites

The research work of a student, including an internship and the implementation of a master s thesis II

Operation of irrigation systems

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course aims to study irrigation systems used in agronomy. It includes the classification of irrigation systems, requirements for the quality of irrigation water, irrigation principles, organization of calculation of water used for irrigation, control over the correct use of water, over the groundwater regime, control over the agricultural technology of plants on irrigated lands, elimination of salinization and waterlogging of irrigated areas.
Purpose of studying of the discipline
The purpose of the discipline is to form undergraduates` knowledge about the main directions of improvement and operation of irrigation systems and monitoring to solve specific problems in the field of environmental management and water use in adverse natural conditions, taking into account the economic efficiency of production and environmental requirements
Learning Outcomes
ON6 To introduce elements of innovative technologies in agriculture, irrigation system, to assess the quality of field work.
Learning outcomes by discipline
1. possess methods of rational water use and increase the fertility of irrigated lands.
2. to manage technological processes on hydro-reclamation systems.
3. to regulate the operational regime of irrigation, monitor the reclamation condition of irrigated lands.
Prerequisites
Bachelor
Postrequisites
The research work of a student, including an internship and the implementation of a master s thesis I

Soil fertility models

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is aimed at studying the totality of parametric characteristics of the internal state of the soil, various fertility management programs, the probable consequences of their implementation, as well as the expected economic benefits of management (including environmental impacts), ways of further fertility research. Considers the criteria and models of soil fertility, the principles of modeling and the choice of models, the creation of production models of soil fertility.
Purpose of studying of the discipline
The purpose of the discipline "Models of soil fertility" is to study the essence of the main elements of soil fertility, their assessment, the main methods of regulating soil fertility.
Learning Outcomes
ON9 To investigate and evaluate the reproduction of soil fertility, to use the main indicators of the model of soil fertility, the scientific basis of soil grading and classification, to develop rational ways of using rain-fed lands.
Learning outcomes by discipline
1. To know the zonal patterns of changes in soil fertility;
2. To carry out a diagnostic assessment of the main parameters of soil properties that determine their agronomic potential.
3. Have the skills to build conceptual models of soil fertility.
Prerequisites
Bachelor
Postrequisites
The research work of a student, including an internship and the implementation of a master s thesis II

Scientific foundations of classification and classification of soils

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is aimed at studying the scientific and methodological foundations of grading and classifying soils for various natural zones of Kazakhstan. Analyzes the current state of the land fund and soil resources of Kazakhstan, modern ideas about the theory of soil fertility, which serves as the basis for assessing the quantitative and qualitative properties of land, the basis for state accounting of land properties, categories of their suitability, control over use and territorial protection services.
Purpose of studying of the discipline
The purpose of the discipline "Scientific foundations of soil grading and classification" is to systematize knowledge on the main problems and development of soil grading and classification in the country and abroad.
Learning Outcomes
ON9 To investigate and evaluate the reproduction of soil fertility, to use the main indicators of the model of soil fertility, the scientific basis of soil grading and classification, to develop rational ways of using rain-fed lands.
Learning outcomes by discipline
1. know the main types of soils, characteristic features and properties of the main types of soils;
2. have the skills to assess soil fertility;
3. to carry out the initial bonitization of soils.
Prerequisites
Bachelor
Postrequisites
The research work of a student, including an internship and the implementation of a master s thesis II

Soil assessment

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is aimed at studying a comparative analysis of innovative methods for assessing soils. Reviews the latest methods for assessing soil quality, the main assessment features for the formation of rating scales, various types of assessment of soil properties for practical purposes, as well as specific examples of soil assessment for various purposes and the formation of appropriate cartograms in order to develop various ways of their optimal application.

Purpose of studying of the discipline
The purpose of studying the discipline is to form the skills of undergraduates to conduct land assessment using various approaches and methods, depending on the purpose of the assessment and the use of the results in professional activities.

Learning Outcomes
ON9 To investigate and evaluate the reproduction of soil fertility, to use the main indicators of the model of soil fertility, the scientific basis of soil grading and classification, to develop rational ways of using rain-fed lands.

Learning outcomes by discipline
1. To know the basic principles, methods and tools for assessing lands of various categories of the land fund;
2. To study and conduct practical calculations on soil bonification and economic assessment of land;
3. Work with land cadastral documentation, with planning and cartographic materials.

Prerequisites
Bachelor

Postrequisites
Final examination

Adaptive technology of crop production

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course forms theoretical knowledge on the adaptive potential of cereals, legumes, oilseeds, root crops and tubers, spinning and fodder crops in various soil and climatic conditions. The issues of the adaptive potential of agricultural crops, the possibility of increasing the production of agricultural products and improving their quality, the development of science-based adaptive technologies for the cultivation of field crops with limited use of chemicals are considered.

Purpose of studying of the discipline
The purpose of the discipline is a thorough study of the soil and climatic conditions of the upcoming master`s work, the peculiarities of the development of field crops, requirements for environmental factors and the creation of technological processes for managing growth, development and formation of a high–quality crop.

Learning Outcomes
ON8 Apply new technologies in crop breeding, evaluate the adaptive potential of plants in various soil and climatic conditions.

Learning outcomes by discipline
1. Application of new technologies in crop breeding.
2. Assessment of the adaptive potential of plants in various soil and climatic conditions.
3. Control over the implementation of the technological process of crop production.

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Final examination

Agribusiness management in crop production

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is focused on studying the basics of the commercialization of technological achievements, modeling in agronomy, the basics of managing the production process of field agrosystems, skills in developing and making managerial decisions in crop production, project management in crop production, intensive technologies for the production of grain and industrial crops. Includes: methods of substantiation, adoption and implementation of management decisions, methods of simple investment analysis for the development of management decisions in crop production.

Purpose of studying of the discipline
The purpose of mastering the discipline is to develop students` skills of effective organization and management of agribusiness.

Learning Outcomes
ON7 To study the problems of crop production, to recommend modern technologies and methods of forage harvesting and promising crops for agriculture, to make managerial decisions in various branches of crop production.

Learning outcomes by discipline
1. to know the methods of decision-making in the management of operational (production) activities of organizations.
2. to model business processes and use methods of business process reorganization in the practical activities of organizations.

3. assess the economic and social conditions of entrepreneurial activity, identify new market opportunities and form new business models.

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination

DigitalFarming

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The direction is directed to the study of the development of tillage as well as agricultural technology from clear tillage up to the concepts of agricultural production based on current knowledge. Analyzes the numerical modification of crop production to support the introduction of numerical technologies and platform solutions in order to provide a scientific and technical breakthrough in the agro-industrial ensemble, as well as to achieve an increase in productivity in "digital" agricultural firms.

Purpose of studying of the discipline

The purpose of the discipline is to study digital tools for the use of information resources, platforms and technologies that increase the efficiency of agricultural production.

Learning Outcomes

ON5 Recommend modern, digital technologies in forecasting, programming, production and processing of crop production and apply innovative technologies in crop production.

Learning outcomes by discipline

1. have the skills to solve standard tasks in the field of digitalization of the agro-industrial complex.
2. to use digital technologies and services to create an electronic field passport, conduct agroecological surveys, collect, store and process meteorological data, promptly monitor the state of the crop industry of an agricultural enterprise, and forecast crop processing indicators.
3. to study the system of agriculture, technologies of cultivation, storage and processing of agricultural crops in relation to soil and climatic conditions, taking into account the agro-landscape characteristics of the territory using digital technologies and services.

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination

Promising cultures of Kazakstan

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course is aimed at studying the key aspects, potentials of promising agricultural crops in Kazakhstan in modern conditions. The course examines the state and prospects for the cultivation of new crops such, their agrotechnical significance, expansion of species composition, biological characteristics depending on environmental conditions, patterns of growth, development of plants, optimized techniques for growing promising crops in Kazakhstan, as well as the improvement of these crops by breeding methods to create new highly productive varieties and hybrids.

Purpose of studying of the discipline

The purpose of this discipline is to identify the main current problems and prospects for the development of agriculture, as well as the current state and innovative ways, problems and prospects for the development of promising crops.

Learning Outcomes

ON7 To study the problems of crop production, to recommend modern technologies and methods of forage harvesting and promising crops for agriculture, to make managerial decisions in various branches of crop production.
ON8 Apply new technologies in crop breeding, evaluate the adaptive potential of plants in various soil and climatic conditions.

Learning outcomes by discipline

1. identification of promising crops in crop production
2. knowledge of technologies for promising breeding crops
3. study of the economic efficiency of promising crops

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination