S.Seifullin Kazakh Agrotechnical Research University

Confirm
Dean of the Faculty CSandVT
Ibyshev E.S.
«21» 06 2023 y.

CATALOG OF ELECTIVE DISCIPLINES

For students in the direction of preparation 6B061 Information and communication technologies

Brief description of the elective disciplines of the educational program

EPG	EP	Form of education	The name of discipline	Code of subject	Discipline cycle	Component	Number of credits	Level of training	Cafedra	Course	Academic period	Pre-requisitions	Post-requisitions	Brief content of the discipline	Key learning outcomes	Name of the alternative discipline
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Fundamentals of animal husbandry	OZh 2244	BS	Elective subjects	5.0	Bachelor	Technology of production of products of stock-raising	2	1	School zoology course	Animal Physiology	Formation of knowledge of the biological features of the main species and breeds of animals bred in farms of different regions of the country. Reproduction of the herd and directed rearing of young animals. Feeding, keeping, breeding of farm animals and poultry. Technologies of the production of livestock products.	Demonstrate the skills of designing and calculating the structures of agrotechnological machines, substantiating the system of machines and equipment for cultivation, harvesting, storage and processing of crop and livestock products.To make an economic assessment of the main production resources on the basis of a critical assessment of the forms and methods of modern management and regulatory legal documents, procedures for creating small and medium-sized businesses in agriculture, in the field of animal husbandry and agrotechnical services.	Fundamentals of agronomy
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Fundamentals of agronomy	OA 2261	BS	Elective subjects	5.0	Bachelor	Agriculture and plant growing	2	1	School biology course	Plant Physiology	Types of agricultural crops, conditions and technologies of their cultivation. Varieties and varieties of cultivated plants. The peculiarities of growing individual crops, taking into account their biological characteristics. The main cultivated plants, their origin, the possibilities of economic use of cultivated plants. Basic techniques and methods of crop production.	Demonstrate the skills of designing and calculating the structures of agrotechnological machines, substantiating the system of machines and equipment for cultivation, harvesting, storage and processing of crop and livestock products.	Fundamentals of animal husbandry

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Animal Morphology	MZh 2238	BS	Elective subjects	5.0	Bachelor	Microbiology and biotechnology	2	2	Livestock Basics	Animal Physiology	Discipline studies the anatomical structure of the organism of farm animals and its organs, features of the body structure of various types of farm animals, basics of cell structural organization, body tissues of farm animals, students master the basics of cytology, general and private embryology and histology, the nervous system, the circulatory system and lymph formation, the immune system, respiration, digestion, lactation, metabolism, energy, reproduction process	Will be able to work in any operating system and with databases; apply methods and means of information protection; work with spreadsheets, perform data consolidation, build diagrams Is able to find the necessary experimental and technological bases on which it is most effective and most accurate to achieve higher profitability of agro-industrial production Will be able to work with the main regulatory and reference documents on the calculation, design of livestock farms, buildings and structures, heat and gas supply systems, ventilation, water supply, and sewerage, and the organization of agricultural production	Botany
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Botany	Bot 2263	BS	Elective subjects	5.0	Bachelor	Biological science	2	2	Basics of agronomy	Plant Physiology	The discipline studies the anatomical, morphological structure of plants, the structure and functions of the vegetative and generative organs of plants, their significance and the diversity of species common in the experimental sites of the region under study;the main characteristics of plants of various systematic groups.Knowledge of the characteristics of these objects is an important foundation for a deeper consolidation of the studied course.	Will be able to work in any operating system and with databases, apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Is able to find the necessary experimental and technological bases on which it is most effective and most accurate to achieve higher profitability of agro-industrial production. Will be able to work with the main regulatory and reference documents on the calculation, design of livestock farms, buildings and structures, heat and gas supply systems, ventilation, water supply, and sewerage, and the organization of agricultural production	Animal Morphology
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Modeling systems inagriculture	SMSH 2254	BS	Elective subjects	3.0	Bachelor	Information systems	2	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures, Electronics and circuitry	Automatic control theory, Digital devices and microprocesses	Basic concepts of the theory of systems modeling. Mathematical methods of modeling information processes and systems. Network models. Queuing systems. Petri nets. Generalized A-circuit models. Conceptual, algorithmic, static models, modeling of processes in agriculture, to carry out simulation modeling when using agricultural machinery or the operation of an electrical network, to conduct a simulation experiment on a computer	Will be able to use the tools of a programming language when addressing agricultural problems and knows how to interpret the results of a comprehensive analysis of agro processes, identify trends, make forecasts. Will be able to find the necessary experimental and technological bases on which it is most effective and accurate to recreate the necessary properties of the agro model. Will be able to work with the main regulatory and reference documents on the calculation, design of livestock farms, buildings and structures, heat and gas supply systems, ventilation, water supply, and sewerage, and the organization of agricultural production	Fundamentals of computer modeling in agriculture

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Fundamentals of computer modeling in agriculture	OKMSH 2268	BS	Elective subjects	3.0	Bachelor	Information systems	2	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures, Electronics and circuitry	Automatic control theory, Digital devices and microprocesses	The discipline is the basic training of students in the theory of mathematical and computer modeling and computer-aided design of systems. Conducting interactive lectures, practical classes and/or active laboratory work using computer presentations. Using a computer testing form/ticket to check students" independent work.	Will be able to use the tools of a programming language when addressing agricultural problems and knows how to interpret the results of a comprehensive analysis of agro processes, identify trends, make forecasts. Will be able to find the necessary experimental and technological bases on which it is most effective and accurate to recreate the necessary properties of the agro model. Will be able to work with the main regulatory and reference documents on the calculation, design of livestock farms, buildings and structures, heat and gas supply systems, ventilation, water supply, and sewerage, and the organization of agricultural production	Modeling systems inagriculture
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Intelligent logistics systems in the agro-industrial complex	ISUA 3309	AS	Elective subjects	4.0	Bachelor	Information systems	3	1	Algebra and geometry, Mathematical analysis, Algorithms and data structures, Electronics and circuitry	Embedded systems and the Internet of things in the agro-industrial complex	Intelligent control systems. Automation of production is the highest stage of mechanization, computerization of production is the highest stage of its automation, intellectualization of production is the highest stage of computerization. The course includes consideration of intelligent control systems for agricultural machinery, robotic field management systems, intelligent control systems for dairy farms, pig farms and poultry farms, etc. Robots for animal care are considered	Will be able to work in any operating system and with databases, apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Is able to find the necessary experimental and technological bases on which it is most effective and most accurate to achieve higher profitability of agro-industrial production. Competent in the operation of engineering systems, management, economics and environmental protection	Digitalization of agricultural services
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Digitalization of agricultural services	CAS 3316	AS	Elective subjects	4.0	Bachelor	Information systems	3	1	Algebra and geometry, Mathematical analysis, Algorithms and data structures, Electronics and circuitry	Embedded systems and the Internet of things in the agro-industrial complex	To master the modern principles of technical service in the system of the agro-industrial complex Summary: Means of digitalization of the agro-technical service, as well as the system of technical service (TO). The content of digitalization and technology of maintenance of tractors and machines. Types and frequency of maintenance.	Will be able to work in any operating system and with databases, apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Is able to find the necessary experimental and technological bases on which it is most effective and most accurate to achieve higher profitability of agro-industrial production. Competent in the operation of engineering systems, management, economics and environmental protection	Intelligent logistics systems in the agro-industrial complex

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Professionally oriented English	POIYa 3221	BS	Elective subjects	3.0	Bachelor	Foreign language	3	1	Foreign language	Internship	Forms the professional foreign language speech of future specialists to increase the level of professional competence, proficiency in a professional foreign language for the implementation of written and oral information exchange, further development of speech activity. Rules of speech behavior in accordance with situations of professional communication, depending on the style and nature of communication in the social, household and academic spheres.	"Will be able to work in any operating system and with databases; apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Develop and / or use software, hardware, information, mathematical, and functional support for information systems, including algorithms and methods of information security, and design database, software, and information system architectures. Can explain the principles of functioning of agricultural systems, use agrotechnical knowledge in professional activities."	English for special purposes
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	English for special purposes	AYaDSC 3260	BS	Elective subjects	3.0	Bachelor	Foreign language	3	1	Foreign language	Internship	The discipline is aimed at studying general scientific terminology and terminology for the language of the corresponding specialty in English, forms skills in four types of communicative activity: reading with a full understanding of authentic texts in the specialty, the ability to write an essay on a specialty problem, the ability to listen to authentic messages containing professional information, the ability to discuss specialty issues	Possess knowledge of socio-humanitarian and economic disciplines, willingness to demonstrate a well-formed worldview, civic and moral position of a highly educated person with a broad outlook and a culture of thinking. Has the skills of practical proficiency in the specialty language for the active use of Russian, state and foreign languages in professional communication. Knows professional terminology in English.	Professionally oriented English
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Modern agricultural machinery	SST 3253	BS	Elective subjects	5.0	Bachelor	Mechanization of technological processes	3	1	Physics, Electronics and circuit design	Embedded systems and the Internet of things in the agro-industrial complex	The main directions of development of mechanization of agricultural production. Advanced models of foreign agricultural machinery. The study of the designs of the main mechanisms and equipment of agricultural machinery and the latest equipment and GPS systems that ensure the performance of agricultural work using precision farming technologies.	Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products. Will be able to work with the main regulatory and reference documents on the calculation, design of livestock farms, buildings and structures, heat and gas supply systems, ventilation, water supply, and sewerage, and the organization of agricultural production	Precision agriculture basics
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Precision agriculture basics	OTZ 3264	BS	Elective subjects	5.0	Bachelor	Mechanization of technological processes	3	1	Physics, Electronics and circuit design	Embedded systems and the Internet of things in the agro-industrial complex	The course is aimed at mastering students' theoretical and practical knowledge of modern methods of agricultural production, familiarization with new high-tech approaches in agriculture, agronomy and crop production based on the use of digitalization and geoinformation systems, gaining skills in assessing the heterogeneity of field properties.	Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products. Will be able to work with the main regulatory and reference documents on the calculation, design of livestock farms, buildings and structures, heat and gas supply systems, ventilation, water supply, and sewerage, and the organization of agricultural production	Modern agricultural machinery

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Unmanned vehicles and autopilots	BAADSST 3311	AS	Elective subjects	3.0	Bachelor	Information systems	3	1			The course introduces the principles of construction and operation of modern unmanned aerial vehicles. Gives concepts about aerodynamics, the main design features of UAV models. the course discusses the features of the use of UAVs in the study of the soil cover of pastures. Attention is also paid to unmanned tractors and other mechanisms. Parallel driving. The issues of the use of UAVs and autopilots in precision animal husbandry are considered.	Will be able to work with the main regulatory and reference documents on the calculation, design of livestock farms, buildings and structures, heat and gas supply systems, ventilation, water supply, and sewerage, and the organization of agricultural production. Competent in the operation of engineering systems, management, economics and environmental protection	Geoinformation technologies in agriculture
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Geoinformation technologies in agriculture	GTA 3320	AS	Elective subjects	3.0	Bachelor	Information systems	3	1			Data sources are direct measurements in the fields with subsequent interpolation and processing of images from aircraft and space satellites. GIS can solve the problems of accounting for farmland, determining the value of land, monitoring the activities of agricultural enterprises, determining damage and compensation payments in emergency situations, GIS analytical tools solve the problems of increasing the sustainability of agricultural production and reducing its cost.	Competent in the operation of engineering systems, management, economics and environmental protection	Unmanned vehicles and autopilots
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Animal Physiology	FZh 3265	BS	Elective subjects	5.0	Bachelor	Microbiology and biotechnology	3	1	Morphology of animals, Fundamentals of animal husbandry	Undergraduate practice	The discipline forms theoretical knowledge the structural and functional organization of animals, homeostasis, principles of nervous and humoral regulation of functions, physiology of the central nervous system, cardiovascular, digestive and respiratory systems. It studies the physiological processes occurring in the body of animals, the role and physiology of the endocrine glands, the biological significance of energy and metabolic processes, the processes of excretion of vital products of the body.	To apply theoretical and practical knowledge of the anatomical and morphological structure of agricultural animals and birds, to understand the significance of the principles of features and patterns of physiological processes and functions of individual body systems of agricultural animals and birds; to know the physiological, biological, biochemical, morphological methods of scientific research for different animal species and to apply them in the area under study.	Plants physiology
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Plants physiology	FR 3266	BS	Elective subjects	5.0	Bachelor	Technology of production of products of stock-raising	3	1	Basics of agronomy, Botany	Undergraduate practice	Physiology of plant cells. The main parts and properties of the cell. Water regime of plants. Mineral nutrition of plants. Plant respiration. Photosynthesis. Transformation and transport of organic substances in plants. Growth and development of plants. Integration of physiological processes in the plant. Plant protection and resistance mechanisms.	To apply theoretical and practical knowledge of the anatomical and morphological structure of agricultural animals and birds, to understand the significance of the principles of features and patterns of physiological processes and functions of individual body systems of agricultural animals and birds; to know the physiological, biological, biochemical, morphological methods of scientific research for different animal species and to apply them in the area under study.	Animal Physiology

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Network administration	AS 3269	BS	Elective subjects	4.0	Bachelor	Information systems	3	1	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Undergraduate practice	The study of the discipline involves the formation of knowledge and practical skills in the use of modern technologies for the construction and administration of a local network at the enterprise level. It allows you to get acquainted with the basic data transmission protocols in modern networks, to master modern tools used for local network administration. It helps to master modern software tools that are used in network administration.	To apply theoretical and practical knowledge of the anatomical and morphological structure of agricultural animals and birds; to understand the significance of the principles of features and patterns of physiological processes and functions of individual body systems of agricultural animals and birds; to know the physiological, biological, biochemical, morphological methods of scientific research for different animal species and to apply them in the area under study	Administration of cloud systems
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Administration of cloud systems	AOS 3274	BS	Elective subjects	4.0	Bachelor	Information systems	3	1	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Undergraduate practice	Basic concepts, logical and physical principles of building computer and telecommunications networks; principles of interaction of computers and network equipment at the hardware and software level; basic knowledge of network technologies that are used at the beginning of work as a network specialist, principles of functioning of computer networks, principles of interaction of network elements, methods of calculation and network construction.	To apply theoretical and practical knowledge of the anatomical and morphological structure of agricultural animals and birds, to understand the significance of the principles of features and patterns of physiological processes and functions of individual body systems of agricultural animals and birds; to know the physiological, biological, biochemical, morphological methods of scientific research for different animal species and to apply them in the area under study	Network administration
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Machine Learning	MO 3251	BS	Elective subjects	5.0	Bachelor	Information systems	3	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Embedded systems and the Internet of things in the agro-industrial complex	The course introduces students to the theoretical foundations and algorithms of machine learning, their possible practical implementations and application in solving real problems. Within this course, students should get an idea of the problems solved with the help of the considered theory, and the principles of construction of some basic classifiers	Will be able to work in any operating system and with databases; apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Will be able to find the necessary experimental and technological bases on which it is most effective and accurate to recreate the necessary properties of the agro model. Will be able to perform design work in the agro-industrial complex with the use of IT technologies, design engineering systems, mechanical and electrical equipment and means of mechanization using modern innovative developments in the field of energy saving	Machine-oriented programming

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Machine-oriented programming	MOP 3270	BS	Elective subjects	5.0	Bachelor	Computer science	3	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Embedded systems and the Internet of things in the agro-industrial complex	The main types of registers, the rationale for using the operational and system registers of the microprocessor; the scope of the system command application of microprocessors; system functions and their parameters; flows and processes that are recorded in instances; error handling mechanisms. Conducting interactive lectures, practical classes and/or active laboratory work using computer presentations.	Will be able to work in any operating system and with databases; apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Will be able to find the necessary experimental and technological bases on which it is most effective and accurate to recreate the necessary properties of the agro model. Will be able to perform design work in the agro-industrial complex with the use of IT technologies, design engineering systems, mechanical and electrical equipment and means of mechanization using modern innovative developments in the field of energy saving	Machine Learning
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Information technology inagriculture	ITSSH 3321	AS	Elective subjects	3.0	Bachelor	Informati on systems	3	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Embedded systems and the Internet of things in the agro-industrial complex	The basic concepts of the theory of systems modeling are given. Mathematical methods of modeling information processes and systems. Network models. Queuing systems. Petri nets. Generalized A-circuit models. Conceptual, algorithmic, static models. Modeling of processes in agriculture, the formation of skills, skills to carry out simulation modeling of a separate operation when using agricultural machinery, the operation of an electrical network, to conduct a simulation experiment on a computer.	Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Is able to find the necessary experimental and technological bases on which it is most effective and most accurate to achieve higher profitability of agro-industrial production. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products.	Digital technologies in agriculture
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Digital technologies in agriculture	CTSH 3321	AS	Elective subjects	3.0	Bachelor	Ecology	3	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Embedded systems and the Internet of things in the agro-industrial complex	The discipline examines various aspects of the digital transformation of the agricultural sector and is aimed at training students who are able to effectively apply digital technologies in this area, formulate digitalization tasks, evaluate the results of their implementation and implementation	Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Is able to find the necessary experimental and technological bases on which it is most effective and most accurate to achieve higher profitability of agro-industrial production. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products.	Information technology inagriculture

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Logistics in the agro-industrial complex	ILSA 3302	AS	Elective subjects	5.0	Bachelor	Information systems	3	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Embedded systems and the Internet of things in the agro-industrial complex	The use of methods, technologies and artificial intelligence systems in the field of logistics in the agro-industrial complex and supply chain management, ideas about modern concepts and knowledge management systems of the organization. work with intelligent systems in the management of logistics processes. Introduces methods and technologies of knowledge representation and formalization, principles of knowledge management in agricultural organizations, technologies of intelligent search and linguistic data analysis.	Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Will be able to perform design work in the agro-industrial complex with the use of IT technologies, design engineering systems, mechanical and electrical equipment and means of mechanization using modern innovative developments in the field of energy saving. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products	Intelligent logistics systems of livestock enterprises
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Intelligent logistics systems of livestock enterprises	ILSPZh 3324	AS	Elective subjects	5.0	Bachelor	Information systems	3	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Embedded systems and the Internet of things in the agro-industrial complex	Formation of knowledge and skills of using methods, technologies and artificial intelligence systems in the field of logistics in enterprises and supply chain management, as well as ideas about modern concepts and management systems of the organization. The discipline is focused on obtaining knowledge and practical skills of working with intelligent systems in the management of logistics processes.	Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Will be able to perform design work in the agro-industrial complex with the use of IT technologies, design engineering systems, mechanical and electrical equipment and means of mechanization using modern innovative developments in the field of energy saving. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products	Logistics in the agro-industrial complex
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Database theory	TBD 3317	AS	Elective subjects	4.0	Bachelor	Information systems	3	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Undergraduate practice	The concept of a database system, relational databases (tabular models). Transition from data abstraction to transaction management with additional materials to improve query performance. Current trends in the design of database systems, which also determine the latest developments in the broader history of data storage technologies.	Will be able to use the tools of a programming language when addressing agricultural problems and knows how to interpret the results of a comprehensive analysis of agro processes, identify trends, make forecasts. Develop and / or use software, hardware, information, mathematical, and functional support for information systems, including algorithms and methods of information security, and design database, software, and information system architectures. Competent in the operation of engineering systems, management, economics and environmental protection	Database management systems

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Logistics in the agro-industrial complex	ILSA 3302	AS	Elective subjects	5.0	Bachelor	Information systems	3	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Embedded systems and the Internet of things in the agro-industrial complex	The use of methods, technologies and artificial intelligence systems in the field of logistics in the agro-industrial complex and supply chain management, ideas about modern concepts and knowledge management systems of the organization. work with intelligent systems in the management of logistics processes. Introduces methods and technologies of knowledge representation and formalization, principles of knowledge management in agricultural organizations, technologies of intelligent search and linguistic data analysis.	Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Will be able to perform design work in the agro-industrial complex with the use of IT technologies, design engineering systems, mechanical and electrical equipment and means of mechanization using modern innovative developments in the field of energy saving. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products	Intelligent logistics systems of livestock enterprises
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Intelligent logistics systems of livestock enterprises	ILSPZh 3324	AS	Elective subjects	5.0	Bachelor	Information systems	3	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Embedded systems and the Internet of things in the agro-industrial complex	Formation of knowledge and skills of using methods, technologies and artificial intelligence systems in the field of logistics in enterprises and supply chain management, as well as ideas about modern concepts and management systems of the organization. The discipline is focused on obtaining knowledge and practical skills of working with intelligent systems in the management of logistics processes	Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Will be able to perform design work in the agro-industrial complex with the use of IT technologies, design engineering systems, mechanical and electrical equipment and means of mechanization using modern innovative developments in the field of energy saving. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products	Logistics in the agro-industrial complex
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Database theory	TBD 3317	AS	Elective subjects	4.0	Bachelor	Information systems	3	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Undergraduate practice	The concept of a database system, relational databases (tabular models). Transition from data abstraction to transaction management with additional materials to improve query performance. Current trends in the design of database systems, which also determine the latest developments in the broader history of data storage technologies.	Will be able to use the tools of a programming language when addressing agricultural problems and knows how to interpret the results of a comprehensive analysis of agro processes, identify trends, make forecasts. Develop and / or use software, hardware, information, mathematical, and functional support for information systems, including algorithms and methods of information security, and design database, software, and information system architectures. Competent in the operation of engineering systems, management, economics and environmental protection	Database management systems

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Basics of anti-corruption culture	OAK 3123	GER	Elective subjects	5.0	Bachelor	Economy	3	2	Political science and sociology, Cultural studies and psychology, Philosophy	Embedded systems and the Internet of things in the agro-industrial complex	The course forms a system of knowledge on combating corruption, and the development on this basis of a civil position in relation to this phenomenon. As a result of mastering the discipline, students will be able to: navigate the legislation, analyze and apply legal acts in specific situations, follow moral	Analyze in a logical and quantitative way the conditions for the development of production and evaluate the competitiveness of created products on the principles of engineering, study innovative entrepreneurship and anti-corruption culture, formulate inventions	Basics of economics and law, Ecology and life safety fundamentals, Entrepreneurship, Methodology of academic research
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Ecology and life safety fundamentals	EOBZh 3124	GER	Elective subjects	5.0	Bachelor	Ecology	3	2	Political science and sociology, Cultural studies and psychology, Philosophy	Embedded systems and the Internet of things in the agro-industrial complex	The course forms practical skills in identifying dangerous and harmless natural conditions, in preventing the causes and conditions for the occurrence of dangerous situations, in protecting the population and the production facility from the possible consequences of dangerous situations. Features of labor protection for women and youth, supervision and control.	To be able to analyze the influence of environmental factors on the vital activity of living organisms and the environment; Possess the basics of economic and legal knowledge in the forestry sector, know and understand the goals and methods of state regulation of the economy. Evaluate and integrate the basic theories of motivation, leadership and power to solve strategic and operational management tasks, understand the importance of the principles and culture of academic integrity and anti-corruption culture.	Basics of anti-corruption culture, Basics of economics and law, Entrepreneurship, Methodology of academic research
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Breeding and selection of agricultural animals	RSSZh 4245	BS	Elective subjects	5.0	Bachelor	Technology of production of products of stock-raising	4	1	Morphology of animals, Fundamentals of animal husbandry	Undergraduate practice	The discipline studies the basic laws of inheritance signs and principles of heredity in the individual development of agricultural animals, exterior, interior and constitution of agricultural animals; comprise the selection and assortment, genetic parameters of selection, the doctrine of the breed; students master methods of breeding animals, analyzes selection and breeding work in animal husbandry.	Develop and / or use software, hardware, information, mathematical, and functional support for information systems, including algorithms and methods of information security, and design database, software, and information system architectures. Perform installation, configuration, testing, and maintenance of system and application software for computer systems and networks. Will be able to work with the main regulatory and reference documents on the calculation, design of livestock farms, buildings and structures, heat and gas supply systems, ventilation, water supply, and sewerage, and the organization of agricultural production	Selection and seed production of agricultural crops
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Selection and seed production of agricultural crops	SSSK 4266	BS	Elective subjects	5.0	Bachelor	Agriculture and plant growing	4	1	Basics of agronomy, Botany	Undergraduate practice	The course studies the concept of a variety, the source material and methods of its creation, the types of plant breeding, the use of biotechnology in breeding, the methods of selection and evaluation of breeding material, the organization of the selection process, the state variety testing and regionalization of varieties and hybrids, seed production processes, the organization of seed production of individual crops in modern conditions, varietal and seed control in seed cultivation of field crops, varietal change and varietal renewal.	Develop and / or use software, hardware, information, mathematical, and functional support for information systems, including algorithms and methods of information security, and design database, software, and information system architectures. Perform installation, configuration, testing, and maintenance of system and application software for computer systems and networks. Will be able to work with the main regulatory and reference documents on the calculation, design of livestock farms, buildings and structures, heat and gas supply systems, ventilation, water supply, and sewerage, and the organization of agricultural production	Breeding and selection of agricultural animals

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Automation of technological processes in animal husbandry	ATPZh 4306	AS	Elective subjects	5.0	Bachelor	Information systems	4	1	Morphology of animals, Fundamentals of animal husbandry	Undergraduate practice	The main feature of the development of automation in animal husbandry is the inextricable connection of technology with biological objects, variable parameters (in time) – animals and birds. The connection of technology and biological objects as a human-machine system, which is caused by Complexity and diversity of production processes, a variety of technological processes and equipment. Poultry and livestock industries are also characterized by all groups of automation objects.	Will be able to work in any operating system and with databases, apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products	Automation of technological processes in crop production agriculture
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Automation of technological processes in crop production agriculture	ATPRZ 4326	AS	Elective subjects	5.0	Bachelor	Information systems	4	1	Basics of agronomy, Botany	Undergraduate practice	The discipline is aimed at mastering the principles of automation of calculations of technological maps and production plans of agricultural production. The study of methods of composing technological mapping of agricultural crops of various crops, the preparation of production plans with the calculation of the required volumes of work, a large number of agricultural machinery and working equipment, stocks of fuel and electric energy, as well as the financing of wages	Will be able to work in any operating system and with databases, apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products	Automation of technological processes in animal husbandry
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Information technology in crop production	ITR 4267	BS	Elective subjects	5.0	Bachelor	Agriculture and plant growing	4	1	Basics of agronomy, Botany	Undergraduate practice	The discipline is aimed at studying the theoretical and practical knowledge of students about modern geographical information systems, remote sensing of the earth, information systems of control, accounting and monitoring in relation to agricultural technology; mastering methods of differentiated application of fertilizers and plant protection products, creating a database for the production of crop products, studying statistical and applied programs in crop production.	Develop and / or use software, hardware, information, mathematical, and functional support for information systems, including algorithms and methods of information security, and design database, software, and information system architectures. Perform installation, configuration, testing, and maintenance of system and application software for computer systems and networks. Will be able to work with the main regulatory and reference documents on the calculation, design of livestock farms, buildings and structures, heat and gas supply systems, ventilation, water supply, and sewerage, and the organization of agricultural production	Innovative technologies in livestock

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Innovative technologies in livestock	ITZh 4271	BS	Elective subjects	5.0	Bachelor	Technology of production of products of stock-raising	4	1	Morphology of animals, Fundamentals of animal husbandry	Undergraduate practice	The discipline considers innovative technologies of keeping and feeding animals. Innovative technologies to produce of animal meat, such as beef, lamb, horse meat, poultry and rabbit meat. Innovative technologies to produce of animal milk in various branches like cattle breeding, horse breeding, camel breeding, sheep breeding and goat breeding. Innovative technologies to produce of eggs from different kind of poultry. Innovative technologies to produce of bee products.	Develop and / or use software, hardware, information, mathematical, and functional support for information systems, including algorithms and methods of information security, and design database, software, and information system architectures. Perform installation, configuration, testing, and maintenance of system and application software for computer systems and networks. Will be able to work with the main regulatory and reference documents on the calculation, design of livestock farms, buildings and structures, heat and gas supply systems, ventilation, water supply, and sewerage, and the organization of agricultural production	Information technology in crop production
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Metrology, standardization and quality assurance in crop production and agriculture	SSMPKRZ 4272	BS	Elective subjects	5.0	Bachelor	Стандартизация, метрология и сертификация	4	1	Basics of agronomy, Botany	Undergraduate practice	Legislative and regulatory frameworks used by the state system of standardization and certification and metrology in crop production, the use of normative and technical documents of the standardization and certification system, metrology of the CIS countries to overcome technical barriers preventing entry into the world market. Methodology for determining quality indicators in accordance with standards and confirmation in accordance with the Law on Technical regulation	Will be able to work in any operating system and with databases, apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products	Metrology, standardization and quality assurance in animal husbandry
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Metrology, standardization and quality assurance in animal husbandry	SSMPKZh 4273	BS	Elective subjects	5.0	Bachelor	Стандартизация, метрология и сертификация	4	1	Morphology of animals, Fundamentals of animal husbandry	Undergraduate practice	Get basic information about standardization, certification and technical metrological measurements, equipment for determining the quality of products in the agro-industrial complex. Interchangeability and standardization of equipment and parts, technical measurements of parts, quality of manufacture, modern agricultural equipment used to assess the quality of livestock products.	Will be able to work in any operating system and with databases, apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products	Metrology, standardization and quality assurance in crop production and agriculture

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Design and development of Internet applications	PRIP 4327	AS	Elective subjects	5.0	Bachelor	Information systems	4	1	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Undergraduate practice	Internet technologies. Classification and types of web applications. Web application development tools: HTML5, CSS3; JavaScript and jQuery libraries; basic tools of the Web Matrix development environment. Client-server interaction. Development of client-server applications. Web design.	Will be able to work in any operating system and with databases; apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products	Web technologies
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Web technologies	WT 4328	AS	Elective subjects	5.0	Bachelor	Computer science	4	1	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Undergraduate practice	Classification and types of web applications. Web application development tools: HTML, HTML5, CSS3. Client-server interaction. Technologies for developing client-server applications. Installed a website. JavaScript and jQuery libraries. Platform Node.js . Vue frameworks.js , Angular 2 and React 15. CMS systems. A programming interface for accessing and managing the DOM API supported by the web page.	Will be able to work in any operating system and with databases, apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products	Design and development of Internet applications
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Production technology of animal husbandry products	TPPZh 4319	AS	Elective subjects	5.0	Bachelor	Technology of production of products of stock-raising	4	2	Morphology of animals, Fundamentals of animal husbandry	Undergraduate practice	Course studies the modern methods of breeding agricultural animals; economic prerequisites of organization and production of livestock products in farms, peasant farms, joint-stock farms of the Republic of Kazakhstan, the CIS countries and other foreign countries; applies the production technologies of livestock products.	Will be able to use the tools of a programming language when addressing agricultural problems and knows how to interpret the results of a comprehensive analysis of agro processes, identify trends, make forecasts. Perform installation, configuration, testing, and maintenance of system and application software for computer systems and networks. Will be able to perform design work in the agro-industrial complex with the use of IT technologies, design engineering systems, mechanical and electrical equipment and means of mechanization using modern innovative developments in the field of energy saving	Production technology of plant growing products

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Production technology of plant growing products	TPPR 4323	AS	Elective subjects	5.0	Bachelor	Agriculture and plant growing	4	2	Basics of agronomy, Botany	Undergraduate practice	Theoretical foundations of crop production. Ways to increase the production of field crops. Factors determining the growth, development of plants, yield and quality of the crop. Programming of harvests of field crops. Theoretical foundations of component compatibility in mixed and joint crops. Models of energy-saving technologies for the production of biologically pure agricultural products. Methods of energy assessment of technological techniques. Fundamentals of soil conservation crop production.	Will be able to use the tools of a programming language when addressing agricultural problems and knows how to interpret the results of a comprehensive analysis of agro processes, identify trends, make forecasts. Perform installation, configuration, testing, and maintenance of system and application software for computer systems and networks. Will be able to perform design work in the agro-industrial complex with the use of IT technologies, design engineering systems, mechanical and electrical equipment and means of mechanization using modern innovative developments in the field of energy saving	Production technology of animal husbandry products
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Automation of traceability of livestock products	APZhP 4307	AS	Elective subjects	4.0	Bachelor	Information systems	4	2	Morphology of animals, Fundamentals of animal husbandry	Undergraduate practice	Owns the principles of automation of agricultural production in animal husbandry Summary: Automation of technologies for processing, storage and transportation of livestock products. Automation of feed production and animal husbandry. Automation of power supply and water supply	Will be able to work in any operating system and with databases, apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Develop and / or use software, hardware, information, mathematical, and functional support for information systems, including algorithms and methods of information security, and design database, software, and information system architectures. Is able to find the necessary experimental and technological bases on which it is most effective and most accurate to achieve higher profitability of agro-industrial production	Automation of traceability of crop production
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Automation of traceability of crop production		AS	Elective subjects	4.0	Bachelor	Information systems	4	2	Basics of agronomy, Botany	Undergraduate practice	The study of the discipline is aimed at mastering the principles of automation of agricultural production. Automation of processing, storage and transportation of agricultural products, phytosanitary safety, the ability to control and monitor processes at all stages of processing and transportation of products. Automation of post-harvest processing and storage modes.	Will be able to work in any operating system and with databases; apply methods and means of information protection, work with spreadsheets, perform data consolidation, build diagrams. Develop and / or use software, hardware, information, mathematical, and functional support for information systems, including algorithms and methods of information security, and design database, software, and information system architectures. Is able to find the necessary experimental and technological bases on which it is most effective and most accurate to achieve higher profitability of agro-industrial production	Automation of traceability of livestock products

B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Fundamentals of mechanotronics and robotics	OMR 4308	AS	Elective subjects	4.0	Bachelor	Information systems	4	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Undergraduate practice	Fundamentals of the design and use of software tools, programming of robotic devices. Mastering knowledge of the theoretical and practical foundations of the design of robotic devices; mastering knowledge about the purpose and capabilities of software for controlling robotic devices; forming skills of working with software and using software tools to solve problems of automation of control of robotic devices.	Will be able to work in any operating system and with databases, apply methods and means of information protection; work with spreadsheets, perform data consolidation, build diagrams. Perform installation, configuration, testing, and maintenance of system and application software for computer systems and networks. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products	Theory of electric chains
B057 - «Information technology»	6B06115 - «Digital agricultural systems and complexes»	Full-time (bachelor 4 years) semester	Theory of electric chains	TEC 4322	AS	Elective subjects	4.0	Bachelor	Radio Engineering, electronics bend telecommunication	4	2	Algebra and geometry, Mathematical analysis, Algorithms and data structures	Undergraduate practice	The course has been designed to introduce fundamental principles of circuit theory commonly used in engineering research and science applications. Techniques and principles of electrical circuit analysis including basic concepts such as voltage, current, resistance, impedance, Ohm's and Kirchoff's law, basic electric circuit analysis techniques, resistive circuits, 1st order and 2nd order circuits; circuits with DC and AC sources.	Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions. Will be able to perform calculations of structures of agrotechnological machines, including with the use of modern software products	Fundamentals of mechanotronics and robotics

The catalog of elective disciplines was reviewed and approved by the faculty council, protocol № 101 "28" 08 2023 y.

Head of department of Information Systems _____ Shushenova A.G.