MINISTRY OF AGRICULTURE OF THE REPUBLIC OF KAZAKHSTAN
"NJSC "S. SEIFULLIN KAZAKH AGROTECHNICAL UNIVERSITY"

Approve
NJSC "Saken Seifullin Kazakh
Deputy Chairman of the Management
Board Academic Activity-Rector
_____ A.M Abdyrov.
«_____» _____ 2021.

CATALOG OF ELECTIVE COURSES

For students in groups of educational programs

6B09101“Veterinary Safety”

Nur-Sultan, 2021

MINISTRY OF AGRICULTURE OF THE REPUBLIC OF KAZAKHSTAN
"NJSC "S. SEIFULLIN KAZAKH AGROTECHNICAL UNIVERSITY"

Brief description of elective disciplines of the educational program

Veterinary Epidemiology

1	Name of course	Physiology and biochemistry of animals
2	Code of course	FBZh 2206/FBZh 2208 /FBZh 2211
3	Cycle of course	BD
4	Amount of credits	10
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	2
8	Prerequisites	General biology, mathematician, chemistry, biochemistry, morphology of animals
9	Postrequisites	Pathophysiology, clinical diagnostics
10	Course summary	Introduction to physiology and biochemistry. The subject, methods and brief history of the development of the discipline. The basic principles of the structural and functional organization of animals. Homeostasis. The principles of nervous and humoral regulation of physiological functions. Physiology of the central nervous system and the autonomic nervous system. Cortex of the cerebral hemispheres. Modern ideas about ethology. Physiology of the circulatory system, digestive and respiratory systems. Physiology of endocrine glands. General characteristics of the endocrine glands, their functions, regulation. Prostaglandins, their action in animals. The biological significance of metabolism and energy. Metabolism: carbohydrates, lipids, proteins, minerals, water. Energy exchange. Physiology of the excretory system. Urination mechanism; processes of filtration, reabsorption, secretion, synthesis. Excretory functions of the digestive tract, respiratory organs. Hormones. Enzymes Squirrels. Nucleotides and nucleosides, DNA structure, RNA. Nucleic acid biosynthesis. Aminoacyl tRNA synthetases. Genetic code. Stages of protein synthesis, multienzyme mechanism of protein synthesis. Recombinant molecules and problems of genetic engineering. Hybridization methods. Southern blotting method. Polymerase chain reaction. Vitamins Protein biosynthesis. Biochemistry of blood, muscle tissue, urination, milk and milk formation.
11	Learning outcomes	To know: essence of physiological processes in an animal organism; conformities to law of biochemical processes aleak in an organism. Be able to define the physiological state of productive animals on the physiological constants of homoeostasis; to analyse the mechanisms of physiological processes and use them for professional activity; to conduct physiological experiments; to determine the major physiological indexes of animals; -to use theoretical biochemical knowledge and skills in professional practical and research activity To own skills: conduct a physiological experiment on the study of physiological processes and functions of animal organism at operating on them different factors of environment, using necessary devices and laboratoryequipment here.

1	Name of course	Veterinary microbiology
2	Code of course	VM 2207/ VM 2210
3	Cycle of course	BD
4	Amount of credits	10
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	2
8	Prerequisites	Biology, chemistry, organic chemistry, biochemistry, physics, physiology, botany, zoology, histology, genetics, veterinary microbiology
9	Postrequisites	Feeding of agricultural animals, veterinary hygiene, veterinary radio-biology, veterinary obstetrics, surgery, epizootology, physiopathilogy, pathoanatomy, clinical diagnostics, veterinary sanitary examinatio
10	Course summary	The study of the morphology, systematics and physiology of microorganisms. The spread of microorganisms in nature. Bacteriological methods: microscopy, staining with simple and complex and special methods for staining microbes, studying the mobility of microbes, preparing nutrient media. Methods for isolating a pure culture of microorganisms. Microflora of water, milk, soil, air. 2. The study of the influence of environmental factors on microorganisms, the genetics of microorganisms, the principles and methods of sanitary-microbiological research, the study of infection and immunity, specific factors of the body's defense, allergies, the practical application of the phenomena of immunity. The study of the cultural and biochemical properties of microorganisms. Determination of the sensitivity of microorganisms to antibiotics and bacteriophages. Methods of infection in laboratory animals. 3. The causative agents of the main infectious diseases: pathogenic cocci, the family of enterobacteria, brucellosis, tuberculosis, swine erysipelas, listeriosis, leptospirosis, anthrax, pathogenic anaerobes, pathogenic spirils, and dermatomycoses. Diagnosis and specific prevention of infectious diseases.
11	Learning outcomes	To know the features of the most significant for biotechnology prokaryotes and eukaryotes. To be able to show the general biological significance of achievements in the field of veterinary microbiology and immunology, to highlight the role of microorganisms in the development of the agricultural sector. To possess practical skills in general and private microbiology and immunology, as well as to reveal the role of bacteria and fungi in the nutrition of farm animals, in the occurrence of pathological processes. The student must possess modern methods of microbiological research, knowledge of the functions of microorganisms and their role in nature. The student should be able to use the beneficial properties of microorganisms in different areas of production.

1	Name of course	Veterinary virology
2	Code of course	VV 3212
3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	3
8	Prerequisites	Biology, chemistry, organic chemistry, biochemistry, physics, physiology, botany, zoology, histology, genetics, veterinary microbiology and immunology
9	Postrequisites	Feeding of agricultural animals, veterinary microbiology and immunology, veterinary hygiene, veterinary radio-biology.
10	Course summary	Characterization, classification and reproduction of viruses, environmental resistance of viruses, genetics and ecology of viruses, pathogenesis of viral infections, antiviral immunity of the body, diagnosis and specific prevention of viral diseases of farm animals
11	Learning outcomes	To have an idea about the nature and variety of viruses, virological processes, safety when working with viruses, about achievements in the field of virology, about the use of viruses for the diagnosis and prevention of viral diseases and the industrial production of diagnostics and biological products useful for humans and animals. To know the nature and variety of viruses, virological processes in agricultural practice, the basics of general virology, infection, immunity, genetics and selection of viruses, the main diagnostic methods for viral diseases of farm animals, the methods of serological diagnostics used to diagnose viral infections. To be able to work with pathological material: microscopy, ovoscopy, methods for isolating and cultivating viruses, and conducting basic methods of virological research. Own a set of diagnostic measures related to issues of general virology, take samples of their transportation and preparation of relevant documents, carry out the necessary work on microbiological research.

1	Name of course	Veterinary hygiene

2	Code of course	VG 3213
3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	3
8	Prerequisites	Veterinary microbiology, veterinary virology, clinical diagnostics, animal husbandry, economics of agricultural production, physics, chemistry, physiology, ecology
9	Postrequisites	Pathomorphology, veterinary sanitary examination of livestock and poultry products, general clinical radiobiology, epidemiology, parasitology and invasive animal diseases, technology, sanitation and veterinary sanitation of meat and dairy products
10	Course summary	Introduction Tasks, goals of the discipline. The history of development. Methods of zoo-genic indoor climate control. Temperature and air control. The effect of humidity, air mobility and atmospheric pressure on the body of animals. Definition of illumination. Air research. Determination of the amount of dust in the air. Bacterial contamination of the air. Determination of noise and vibration. Comprehensive assessment of the microclimate. Soil hygiene. Sanitary and hygienic assessment of various methods of removal, storage and disinfection of manure. Veterinary sanitary research of water. Water disinfection. Evaluation of feed quality. Veterinary standards and requirements for feed quality. Sanitary requirements for livestock buildings. Sanitary assessment of ventilation of livestock buildings. Zoohygienic requirements for the maintenance of agricultural animals. Fundamentals of designing livestock buildings. Calculation of air exchange and heat balance of livestock buildings. Zoogenic requirements for the transport of animals. Private hygiene.
11	Learning outcomes	To know: the theoretical foundations of the influence of environmental factors on the animal organism; basic sanitary and hygienic requirements, standards and rules for the operation, maintenance, feeding, watering, care and raising of different species, various age and sex and production groups of animals, taking into account their zoning zones. To be able to: independently carry out the necessary studies of environmental factors, sanitary-hygienic control and assessment of all microclimate parameters of rooms for animals; on the basis of information data, draw up a veterinary-hygienic conclusion with specific proposals, addressing negative causes and improving the technology for the operation of farm animals in general. Own: research methods of environmental objects; methods for determining the microclimate parameters of livestock buildings; using methods of sampling air, soil, water, independently work with devices and examine livestock facilities.

1	Name of course	Clinical diagnosis with X-ray studying
2	Code of course	KDR 3209
3	Cycle of course	BD
4	Amount of credits	4

5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	2
8	Prerequisites	Anatomy, physiology and biochemistry of animals
9	Postrequisites	Internal animal diseases, laboratory diagnostics
10	Course summary	The concept of clinical diagnosis. History of development, basic terms. Methods of clinical study of animals (general, special). General study of animals. The study of the respiratory system. The main syndromes of damage to the respiratory system. Digestive system research. The main digestive system syndromes. Study of the cardiovascular system. The main syndromes of the defeat of the cardiovascular system. The study of the blood system. General blood analysis. The study of the urinary system. Laboratory analysis of urine. The main syndromes of diseases of the urinary system. The study of the nervous system. Study of the autonomic nervous system. The main syndromes of damage to the nervous system. Diagnosis of metabolic disorders. Fundamentals of biogeocenotic diagnosis. Ecological characteristics of animal populations and biogeocenoses for the diagnosis of endemic diseases. Special diagnostic methods: X-ray diagnostics, endoscopy, ultrasound diagnostics, DNA diagnostics
11	Learning outcomes	To know the technique of clinical examination of animals, the clinical manifestation of pathologies, be able to evaluate the results of clinical and laboratory research, have medical thinking.

1	Name of course	Veterinary pharmacology and toxicology
2	Code of course	VFT 3215 VFT 3217 VFT 3219
3	Cycle of course	BD
4	Amount of credits	8
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	3
8	Prerequisites	Physiology, microbiology, general biology, molecular biology, chemistry, biochemistry, botany, biophysics

9	Postrequisites	Internal noncontagious illnesses, veterinary фармация, clinical pharmacology, clinical toxicology, judicial toxicology, veterinary sanitary examination, hygiene and sanitation, parasitology and invasion illnesses, veterinary surgery, obstetrics and gynaecology.
10	Course summary	The general effect of poisons on the body. Substances that inhibit the central nervous system. Narcotic and analgesic substances. Non-narcotic analgesics. Analeptics. Substances acting on the efferent and afferent innervation. Substances acting on individual physiological processes in the body. Substances that stimulate metabolic processes. Chemotherapeutic substances. General toxicology. Toxicity criteria. Private toxicology and toxicological analysis. Chemical toxicosis. Feed toxicosis. Mycotoxicosis.
11	Learning outcomes	The student must have an idea, know, be able, possess, be competent: -about the main mechanisms of the influence of drugs on the body, the conditions for increasing their pharmacological effectiveness with minimal negative effects - methods of research on toxicity of pesticides, poisonous plants, feed additives - identify the causes of poisoning of farm animals - treatment methods and first aid in case of poisoning - to analyze the toxicological situation and give a toxicological assessment of the quality of livestock products in case of poisoning.

1	Name of course	Veterinary obstetrics and gynecology
2	Code of course	VAG 3301 VAG 4304 VAG 4310
3	Cycle of course	BD
4	Amount of credits	10
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	3, 4
8	Prerequisites	Anatomy, genetics, histology and embryology, physiology, biochemistry, Latin veterinary terminology, animal feeding, animal husbandry, pathological physiology, pharmacology, microbiology and immunology, virology
9	Postrequisites	Studying the course will allow you to create a professional basis for a veterinarian in the knowledge of the norm and pathology of fertilization, pregnancy, childbirth and the postpartum period of females of the disease of the newborn and breast
10	Course summary	Norms and pathologies of sexual processes, insemination, fertilization, pregnancy, childbirth, the postpartum period, illness of the newborn, breast, infertility, diagnosis, treatment and prevention of gynecological pathologies

11	Learning outcomes	Demonstrate knowledge and understanding in the field of veterinary obstetrics To be able to: develop arguments, apply knowledge in the use of drugs for the treatment and prevention of obstetric and gynecological diseases of animals, identify sexual phenomena and pregnancy, diagnose infertility, treat and prevent obstetric and gynecological diseases, provide assistance in difficult births, perform delivery surgeries, decide and organize many issues of animal reproduction. To possess: information for making judgments taking into account social and scientific considerations. Own methods of diagnosing pregnancy, obstetric care, treatment of obstetric and gynecological pathologies, diseases of newborns and mammary gland.

1	Name of course	Veterinary sanitary examination of livestock products
2	Code of course	VSEPZh 4307 VSEPZh 4313 VSEPZh 5316
3	Cycle of course	MD
4	Amount of credits	10
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	4, 5
8	Prerequisites	Morphology of animals, histology with to bases of cytology, physiology and biochemistry of animals, veterinary microbiology and virology, pathology of animal and other, veterinary sanitary examination of livestock products
9	Postrequisites	Veterinary radiobiology; veterinary sanitary examination of products of plant, fish-farming, beekeeping; veterinary sanitary parasitology
10	Course summary	Definition of discipline. The doctrine of meat. Raw materials for the meat processing industry. Basics of technology and hygiene of slaughter of animals. Post-mortem VSE carcasses and internal organs. FEV of carcases and internal organs in non-communicable diseases. FEV products of slaughter of animals and raw materials for invasive diseases. FEV carcasses, organs and other products of slaughter when detecting infectious diseases of animals. Veterinary sanitary examination of rabbit slaughter products. FEE and the basics of milk production technology. VSE milk of sick animals. FEV of livestock raw materials (leather and fur, keratin-containing, offal, intestinal). FEE of poultry and egg meat. VSE poultry products for diseases.

11	Learning outcomes	know: - the rules of veterinary services for slaughtered animals during their transportation, acceptance, maintenance and pre-slaughter training at slaughter and processing enterprises; - the basics of technology and hygiene of the primary processing of animals and the methodology of the post-slaughter veterinary-sanitary examination of organs and carcasses of animals; - rules for sampling from objects of veterinary control; - methods of vetsan examination and quality assessment of livestock products; - methods for determining the nutritional and biological value of livestock products; - measures for the prevention of foodborne diseases; - rules for the use and disposal of meat and raw materials of compelled animals; be able to: - conduct vetsan events at all stages of the technology for processing meat and dairy products; - carry out sanitary-hygienic control of the meat and dairy industry; - conduct pre-slaughter training of animals; carry out veterinary and sanitary examination and sanitary assessment of products and raw materials of animal origin in case of infectious, invasive, non-contagious diseases and poisoning of animals; - determine the benignity of products and raw materials of animal origin; - carry out the conservation of animal raw materials. own: - skills in technology and hygiene of processing livestock products; - sanitary-hygienic methods of research and sanitary assessment of livestock products.

1	Name of course	Veterinary Epidemiology
2	Code of course	VE 4303 VE 4308 VE 5318
3	Cycle of course	MD
4	Amount of credits	10
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	4, 5
8	Prerequisites	Animal anatomy, animal physiology and biochemistry, veterinary microbiology, veterinary virology, pathomorphology, veterinary hygiene
9	Postrequisites	Technology, sanitation and veterinary sanitary examination of meat and dairy products, industrial practice
10	Course summary	Introduction to Epizootology. The subject and tasks of epizootology. The role of domestic scientists in the development of epizootology. Methods of epizootology. Infection, its types and their epizootological significance. Infectious disease. The doctrine of the epizootic process. Theory of the epizootic process. Epizootic chain and its obligatory links. Epizootological aspects of reactivity, resistance, immunity. Antiepizootic measures. General and special events. Private epizootology. The scheme for the study of infectious diseases. Diseases common to different species of animals. Anthrax. Tuberculosis. Paratuberculosis. Brucellosis. Foot and mouth disease. Rabies. Aujeszky's disease. Leptospirosis. Listeriosis. Pasteurellosis. Chlamydia Colibacillosis. Salmonellosis. Streptococcal infection. Campylobacteriosis. Clostridiosis.
11	Learning outcomes	to have skills: in conducting an epizootological analysis and drawing up its act, making a nosological and epizootological diagnosis, drawing up a plan of health measures be competent: in the knowledge of the purpose and research methods of epizootology, the nature of infection and infectious disease, the basis and patterns of development of the epizootic process, the epizootic focus and foci of the disease, the nomenclature and classification of infectious diseases, preventive and health measures. be able to properly maintain documentation on veterinary records and reporting

1	Name of course	Veterinary surgery
2	Code of course	VH 3302 VH 4305 VH 4311
3	Cycle of course	MD
4	Amount of credits	10
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	3, 4
8	Prerequisites	Morphology of animals with Latin veterinary terminology, physiology and biochemistry of animals, veterinary microbiology and virology of animals, veterinary pharmacology with toxicology, animal pathology
9	Postrequisites	The study of the discipline "Veterinary surgery" will deepen knowledge in this area of veterinary medicine
10	Course summary	Introduction The concept of operations and their meanings. Prevention of surgical infection. Injection, infusion, bloodletting, puncture. Anesthesiology, general anesthesia, local anesthesia. Separation and connection of tissues. Bleeding. Dysmurgy, cosmetic and plastic surgery, economic operations to comply with safety precautions. Injury to animals. Surgical infection. Open and closed damage. Thermal, chemical and thermochemical burns, frostbite. Skin diseases. Diseases of the muscles, tendons and burs. Diseases of the joints and bones, blood and lymph vessels, brain injuries and nerve diseases, tumors. Diseases in the head. diseases in the neck, withers and chest. Diseases of the abdomen and urogenital organs. Diseases of the extremities.
11	Learning outcomes	The student must: Demonstrate knowledge and understanding in the field of veterinary surgery, the use of knowledge in a professional manner; be able to apply knowledge and solve problems in the field of veterinary surgery, express their opinions and be able to interpret information to make judgments taking into account social, ethical and scientific considerations; have the ability to bring information, problems and solutions to both specialists and non-specialists The student must: Demonstrate knowledge and understanding in the field of veterinary surgery, the use of knowledge in a professional manner; be able to apply knowledge and solve problems in the field of veterinary surgery, express their opinions and be able to interpret information to make judgments taking into account social, ethical and scientific considerations; have the ability to bring information, problems and solutions to both specialists and non-specialists.

1	Name of course	Internal diseases of animals
2	Code of course	VBZh 4306 VBZh 4312 VBZh 4315
3	Cycle of course	MD
4	Amount of credits	10
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	4
8	Prerequisites	Anatomy, genetics, histology, physiology, biochemistry, biophysics, microbiology, virology and immunology, veterinary hygiene, veterinary radiology, clinical diagnostics, pharmacology, veterinary surgery, veterinary obstetrics
9	Postrequisites	The current state of internal diseases of animals in the Republic of Kazakhstan, the problems of distribution and ways to solve them. It determines the role of veterinary science and practice in diagnostics, therapy and prevention, considers development prospects. Critically summarize and analyze the collected material, interpret and draw appropriate conclusions.
10	Course summary	General prevention and therapy for internal diseases of animals, methods and means of physiotherapy and physioprophylaxis, therapeutic equipment. Individual and group methods of giving medicines. Methods of prescribing drugs. Injection Probing, enemas. Private pathology, therapy and prevention of internal diseases of animals. Diseases of the cardiovascular, respiratory, digestive systems. Diseases of the liver, urinary system, blood, nervous system. Poisoning animals. Diseases of the metabolism and endocrine system. Biogeocenotic diagnosis. Non-communicable diseases of young farm animals, birds, fur animals.
11	Learning outcomes	To apply at a professional level theoretical and practical knowledge in the diagnosis of internal diseases of animals. To interpret the results of laboratory studies of biological material. Correctly organize treatment and prophylactic measures Know the methodology for recognizing the disease process, the basic physiological characteristics of animals; the theoretical justification of the main links in the etiology and pathogenesis of the development of diseases. To apply at a professional level theoretical and practical knowledge in the diagnosis of internal diseases of animals. To interpret the results of laboratory studies of biological material. Correctly organize treatment and prophylactic measures Know the methodology for recognizing the disease process, the basic physiological characteristics of animals; the theoretical justification of the main links in the etiology and pathogenesis of the development of diseases.

1	Name of course	Parasitology and invasive animal diseases
2	Code of course	PIBZh 4309 PIBZh 4314 PIBZh 5317
3	Cycle of course	MD
4	Amount of credits	10
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	4, 5
8	Prerequisites	Zoology of invertebrates and vertebrates, clinical diagnostics, pathological physiology (section: invasive diseases), veterinary pharmacology
9	Postrequisites	Forensic veterinary examination, epizootology and infectious diseases, non-communicable internal diseases, organization of veterinary affairs, veterinary sanitary examination
10	Course summary	A brief history of the development of parasitology, the role of domestic scientists. Goals and objectives of veterinary parasitology. The content and scope of veterinary parasitology. General Veterinary Helminthology Private helminthology. Veterinary acarology. Brief description of the structure and biology of arachnids. The taxonomy of ticks. Parasitiform tick-ectoparasites and carriers of pathogens. Ixodid ticks. A brief description of the structure and biology, systematics, geographical distribution, control measures. Argazide ticks. Veterinary protozoology. Veterinary Entomology. Brief description of the structure and biology of insects. Systematics of insects. Cattle hypodermatosis. Horse asthma. Estrosis of sheep. Rhinestrosis of horses. Bestial flies. Wolfartiosis. Gnus.
11	Learning outcomes	The process of studying the discipline is aimed at the formation of the following competencies: features of diagnosis of parasitic diseases and interpretation of the results, the study of zoonotic parasitoses and methods of dealing with them

1	Name of course	Histology with the basics of cytology
2	Code of course	GOC 1220

3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	1
8	Prerequisites	General biology
9	Postrequisites	Animal morphology, animal physiology
10	Course summary	The purpose of teaching the course «Private histology and embryology of animals» is to study the general laws of the histological structure of individual animal organs and their embryonic development, the ultrastructure of all cellular types that provide a specific function of the organ: the occurrence of differences between cells and tissues, their change during ontogenesis, leading to specialization, the relationship of cell proliferation and differentiation during tissue formation. The pre-embryonic development - gametogenesis and postembryonic development is considered. Teachers are given an idea of the main directions of modern embryology and private histology, as well as the importance of these sciences for veterinary practice and biotechnology.
11	Learning outcomes	To know: cell theory, the structure of prokaryotic and eukaryotic cells and their organelles; basic aspects of cell activity, cell division and differentiation, cell response to external influences, apoptosis and necrosis; classification of tissues of animal organisms, especially their development, structure and functioning, morphological foundations of reactivity, adaptation and regeneration of organs and tissues. To be able to: compare data on the ultra-fine organization of cells with the functions performed, navigate by ultrastructure in the degree of differentiation of cells and the stages of the cell cycle; distinguish between the main types and varieties of tissue systems, compare the structure of the tissue with the functional load; to compare individual organs and systems according to morphological and functional features. To be able to use educational and scientific literature, the Internet to expand their knowledge of the subject. To be able to apply the knowledge gained during the study of the discipline for veterinary practice. Own the methods of microscopic study of cells, tissues and organ systems. To acquire practical skills of working with cyto- and histopreparations using the basic methods of microscopy, as well as skills in the analysis of histological preparations and electronic microphotographs.

1	Name of course	PROFESSIONALLY ORIENTED FOREIGN LANGUAGE
2	Code of course	POIYa 2241
3	Cycle of course	BD
4	Amount of credits	3
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine

7	Year	2
8	Prerequisites	For successful study of "English for Specific Purpose" course necessary to assimilate the learning core content subjects such as English, Physiology, Zoology, Morphology, and Genetics with Biometry.
9	Postrequisites	Feeding of agricultural animals, Breeding of agricultural animals, Cattle breeding, Horse breeding, Sheep breeding, Poultry breeding, Fundamentals of scientific research, Scientific analysis of research material
10	Course summary	Discipline object: development monologue and dialogue speech, writing skills within the program, the ability to use a foreign language as a means of professional communication. 5.2 Tasks of the discipline: - to improve communication skills; - Linguistic taxonomy and theoretical knowledge on the topic of research and its practical application; - The development of creative oral and written speech in a foreign language in the field of science and practical communication situations. After studying the discipline students must: Descriptor A - know and understand - basic terms connected with animal breeding;
11	Learning outcomes	Know the use of FOREIGN language, both in everyday and professional communication in the field of veterinary medicine; - Possess knowledge and skills of management, planning, organization and forecasting of the labor market in the field of veterinary medicine

1	Name of course	Zoology
2	Code of course	Zoo 2222
3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	2
8	Prerequisites	Animal morphology, animal physiology and biochemistry, genetics, histology with the basics of cytology, non-infectious internal diseases of dogs and cats, parasitology and invasive animal diseases, veterinary sanitary examination of animal products, ichthyology, hydrobiology, animal husbandry, beekeeping, the basis of animal husbandry, livestock production technology.
9	Postrequisites	General biology

10	Course summary	Multicellular animals. Sponges, lamellar, strewn, worms. Coelomic animals: mollusks, crustaceans. Coelomic animals. Ground arthropods, echinoderms, hemichordates. Type Chordates. Amphibian class. Bird class. Class mammals
11	Learning outcomes	To know the basic levels of organization of animals, to make an idea of the importance of all stages of the individual development of animals, the reasons for the diversity of the animal world and the basic laws of its formation, modern views on the laws of development of the organic world; To be able to apply the obtained data to solve scientific and practical problems; To highlight the biological characteristics of the species, evaluate the role of different groups of animals in the evolution of the plant and animal world of the Earth; To determine the external and internal structure of animals, their species diversity, development, classification of animals, distribution, origin, their relationship with the environment, their importance in nature and for humans. To have skills in analyzing causal relationships between animals and nature in the environment: the ability to work with determinants, pose scientific questions, and conduct research.

1	Name of course	Veterinary genetics with the basics of biostatistics
2	Code of course	VGOB 2221
3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	2
8	Prerequisites	Histology, morphology, computer science, mathematics, microbiology, bioorganic chemistry and organic chemistry, animal physiology
9	Postrequisites	Fundamentals of animal husbandry and feeding of agricultural animals, pathology, obstetrics and gynecology, pet hygiene

10	Course summary	Genetics is the science of heredity and variability, the basis of modern biology. The universal laws of heredity and variability are valid for all organisms. Genetics methods are applicable to any biological research. Achievements of modern genetics are widely used in veterinary medicine and serve as the basis for solving many theoretical and practical issues. The main goal and objectives of the discipline is to form students' modern ideas about the cytological and molecular foundations of heredity, genetic analysis; to lay fundamental scientific knowledge about the mutation process, interspecific and intergeneric hybridization, which will help to further master the theoretical foundations of animal breeding and selection. The course program also reflects issues related to the demands of modern genetics and biostatistics. Since in the professional and scientific work of a future veterinarian, statistical processing of experimental data and a comparative study of the results of observations is important. For the analysis of genetics issues with biostatistics, the use of computers is provided.
11	Learning outcomes	To know the structure, structure, function and patterns of inheritance of chromosomes, genes and genome, changes in signs of living organisms, methods of genetic engineering; To be able to: use the acquired knowledge in the genetics and breeding of farm animals to improve existing and breed new highly productive breeds, analyze the types of gene abnormalities and chromosomal diseases, types of genetic variation. To have the skills to conduct biometric processing of primary veterinary materials or experimental results. Have the skills of individual work and group work. Be able to work with literature To own: research methods of genetics with biostatistics to determine the degree of genetic similarity and diversity of domestic and wild animals, to conduct biometric processing of primary livestock materials and experimental results, scientific and production experiments.

1	Name of course	Veterinary Radiobiology
2	Code of course	VR 2226
3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	3
8	Prerequisites	To master the course «Veterinary Radiobiology» of the discipline, knowledge and skills are needed, skills acquired in the study of physics, chemistry, biology, physiology, etc.
9	Postrequisites	The development of the «Veterinary Radiobiology» course further contributes to the successful development of specialized disciplines: veterinary and sanitary expertise and radiobiology, veterinary and sanitary safety of livestock products.

10	Course summary	Elements of nuclear physics. Modern ideas about the structure of the atom. The law of radioactive decay. Natural radioactive families. The principles of operation of nuclear reactors. Dosimetry and radiometry of ionizing radiation. The concept of dosimetry and radiometry, their tasks and goals. The principle of classification of radiometric devices, their device and purpose. Fundamentals of radioecology and radiotoxicology and its tasks. Artificial sources of ionizing radiation. Migration of radioisotopes along agricultural chains. Technologies for processing livestock products. Sampling and processing of meat, dairy products and fish. The biological effect of ionizing radiation. Direct and indirect effects of ionizing radiation. Dependence of the biological effect of radiation on the dose and its power, ionization density. Radiation sickness and its forms. Radiometric and radiochemical examination of objects of veterinary supervision. Regulations on the radiological department of the veterinary laboratory. Methods of enrichment of samples. Documentation for veterinary radiation examination. Fundamentals of radiation safety and organization of work with radioactive substances. The device, equipment and organization of work of veterinary services. Sorting and primary processing of affected animals. Pre-slaughter examination and sorting of animals. The technological process of primary processing of animals exposed to external radiation.
11	Learning outcomes	The student must demonstrate knowledge and understanding in the field of veterinary radiobiology, the application of knowledge at a professional level; be able to apply knowledge and solve problems in the field of veterinary radiobiology, express their opinions and be able to interpret information to make judgments, taking into account social, ethical and scientific considerations; have the ability to bring information, problems and solutions to both specialists and non-specialists;

1	Name of course	Laboratory diagnostics in veterinary medicine
2	Code of course	LDV 3227
3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	5
8	Prerequisites	Morphology of animals with Latin veterinary terminology, animal physiology and biochemistry, veterinary microbiology and animal virology, veterinary pharmacology with toxicology, animal pathology
9	Postrequisites	Veterinary surgery, epizootology and infectious diseases, specialization disciplines
10	Course summary	Anatomical and topographic data on the structure of hooves and hooves in various animal species. Diseases in the area of the corolla. Diseases in the area of the put joint and crumb. Deformed hooves in various animal species. Diseases of the base of the skin of the hoof. Subdermatitis. Horse shoeing, forge device and equipment. Features of the anatomy and physiology of the organs of vision. Diseases of the eyelids, cornea and conjunctiva. Diseases of all layers of the eyeball and lens, Massive eye diseases
11	Learning outcomes	The student must: Demonstrate knowledge and understanding in the field of orthopedics and ophthalmology, apply knowledge at a professional level; be able to apply knowledge and solve problems, express their opinions and be able to interpret information to make judgments taking into account social, ethical and scientific considerations; have the ability to bring information, problems and solutions to both specialists and non-specialists;

1	Name of course	Veterinary sanitary examination of crop products, fish farming and beekeeping
2	Code of course	VSEPRRP 3223
3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	2
8	Prerequisites	Veterinary sanitary examination of animal products, Veterinary sanitary examination of crop products, pathology, epizootology, parasitology.
9	Postrequisites	Knowledge of the theoretical and practical foundations of the discipline “Technology, hygiene and veterinary sanitary examination of meat and dairy products” is leading in the formation of a veterinary sanitary doctor, the scientific knowledge and practical skills acquired by students will allow them to be applied in production activities.
10	Course summary	Technology, hygiene and veterinary sanitary examination of meat and dairy products, the basics of technology of traditional types of meat and dairy products, the nature and justification of the technological processes of their production, nutritional value, classifications, basic requirements for the quality of raw materials and finished products. In addition, the basic methods of quality control of meat and milk raw materials and meat and dairy products, including organoleptic, physico-chemical and technological evaluation, are described.
11	Learning outcomes	In the process of studying the course, the student should know: - chemical composition and nutritional value of products; - technology and hygiene of food production; - methods of sanitary control at all stages of production; - rules for the transportation, storage and sale of products; - modern methods of sanitary-hygienic research and sanitary assessment of products; In the process of studying the course, the student should be able to: - monitor the sanitary condition of production at meat and dairy enterprises; - carry out quality control of primary and secondary raw materials; - carry out quality control of finished products; - exercise control during transportation, storage and sale; - own modern product research methods

1	Name of course	Veterinary control at the border and transport
2	Code of course	VKGT 3228
3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	3
8	Prerequisites	Anatomy, physiology, virology, microbiology, veterinary hygiene and sanitation, veterinary and sanitary examination, epizootology, parasitology, organization of veterinary medicine
9	Postrequisites	Veterinary and sanitary surveillance and control at the border and transport
10	Course summary	Veterinary and sanitary control at the border and transport is one of the leading disciplines by which a veterinary and sanitary doctor is formed, since the student masters the knowledge of organizing movements of animals, products and raw materials of animal origin by all means of transport, measures to prevent the spread of diseases along the route, and performing veterinary -sanitary requirements during transportation and the main thing, the protection of the state from the introduction of infectious diseases, human health and the environment
11	Learning outcomes	To know: the structure of the transport veterinary service of the Republic of Kazakhstan; - a list of goods controlled by veterinary control (supervision) in transport; - Veterinary and sanitary requirements and rules for the movement of animals, products and raw materials of animal origin in road, rail, water and air transport; To be able to: - draw up veterinary accompanying documentation; - the procedure for inspecting objects controlled by veterinary control (supervision) in transport during loading, unloading, along the route and transit; - carry out a set of measures to combat infectious and invasive diseases of animals during movements; To own: using basic laws of the Republic of Kazakhstan governing the quality and safety of raw materials and animal products Be competent in the field of veterinary and sanitary control when importing and exporting products, raw materials of animal and vegetable origin to preserve the epizootic well-being and biological safety of controlled goods

1	Name of course	Forensic examination
2	Code of course	SE 4231
3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	4
8	Prerequisites	Pathanatomy, epizootology, parasitology, microbiology, virology, physiology, anatomy, histology, standardization and certification of agricultural products.
9	Postrequisites	Veterinary sanitary examination of livestock and poultry products
10	Course summary	Forensic veterinary medicine considers issues of conducting an examination in cases of contention, with intentional falsification, conducting a veterinary autopsy, toxicology and thanatology based on procedural laws.
11	Learning outcomes	To know: the history of forensic veterinary medicine, its relationship with forensic science, biological and veterinary sciences, the organization of forensic science; examination and its role in the analysis of the case. Procedural basis of forensic examination. To be able to: conduct a forensic examination; order of inspection of corpses; select research objects; draw up an expert opinion; veterinary autopsy and exhumation of corpses To possess: skills in conducting forensic examination in controversial cases, in civil cases, with intentional falsification, conducting a veterinary autopsy, toxicology and thanatology based on procedural laws

1	Name of course	Fundamentals of animal reproduction biotechnology
2	Code of course	OBVZh 4230
3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	4
8	Prerequisites	Anatomy, genetics, histology and embryology, physiology, bioorganic and biological chemistry, Latin veterinary terminology, animal feeding, animal husbandry, pathological physiology, pharmacology, microbiology and immunology, virology, operative surgery, veterinary hygiene, clinical diagnostics with radiology, etc.
9	Postrequisites	The study of «Fundamentals of reproduction biotechnology» will create a fundamental basis for future professional activities, specialization in the field of veterinary obstetrics, reproduction biotechnology
10	Course summary	Demonstrate knowledge and understanding in the field of biotechnology of animal reproduction. To be able to develop arguments, apply knowledge and solve problems with artificial insemination and transplantation of embryos. Be able to express their judgment and be able to interpret information to form judgments taking into account social and scientific considerations. Possess the ability and ability to receive and communicate information about infectious diseases, problems and ways to solve them both by specialists and livestock workers. To be able to independently study the material necessary for continuing education
11	Learning outcomes	To have an idea of the structural and physiological characteristics of the reproductive apparatus of females and males, the course of the reproductive cycle, the optimal time and frequency of insemination, the necessary conditions for the normal course of pregnancy, childbirth and the postpartum period, causes of infertility, diseases of the mammary gland and newborns.

1	Name of course	Operative surgery
2	Code of course	OH 3225
3	Cycle of course	BD

4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	3
8	Prerequisites	morphology of animals with Latin veterinary terminology, physiology and biochemistry of animals, veterinary microbiology and virology of animals, veterinary pharmacology with toxicology, animal pathology.
9	Postrequisites	Veterinary surgery, orthopedics and ophthalmology, veterinary obstetrics, epizootology and infectious diseases, parasitology and invasive diseases, specialization disciplines.
10	Course summary	Definition of surgical operation concepts, purpose, and results of surgery. Indications, contraindications for surgery. Preoperative preparation of a sick animal. Classification of surgical operations. The content and stages of the surgical operation. The dangers of surgery. Postoperative complications prevention and treatment methods. Fixation, knocks and immobilization of animals, the use of pharmacological agents for immobilization. Teaching about aseptic and antiseptic. Antiseptic - aseptic method. Sterilization of instruments, suture material, rubber and plastic items, catheters, dressings, surgical underwear and surgical items. Principles and methods for the preparation of hands and the surgical field. Mucosal disinfection. The use of surgical gloves. Maintenance and care of the operating room. Surgery on various parts of the animal's body
11	Learning outcomes	The student must: Demonstrate knowledge and understanding in the field of surgical surgery, the application of knowledge at a professional level; To know the topographic anatomy of organs and tissues of an animal in a specific and age aspect; theoretical basis and technique of surgical operations; theoretical foundations of surgical pathology, principles of prevention and treatment; safety measures when working with animals and conducting mass operations.

1	Name of course	Veterinary Management
2	Code of course	MV 4229
3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	4

8	Prerequisites	Veterinary microbiology. Veterinary Virology. Pathomorphology. Food safety. Veterinary sanitary surveillance and control at the border and transport. Veterinary epidemiology
9	Postrequisites	Parasitology and invasive animal diseases. Veterinary and sanitary examination of livestock and poultry products. Epizootic monitoring and organization of veterinary events.
10	Course summary	General organizational issues. Legislative regulation of veterinary affairs. Organizational structure of veterinary medicine. Leading him across the republic and regions. Organization of state and industrial veterinary and sanitary supervision. Planning for veterinary events. Organization of veterinary events. . The economic efficiency of veterinary measures and the methodology for its determination. Veterinary financing. Training of veterinary specialists and scientific support of the veterinary service. Logistical support of the veterinary service. International veterinary organizations and veterinary services abroad.
11	Learning outcomes	Know and understand - the theoretical and practical foundations of management in veterinary medicine. The history of the formation of the veterinary service. Fundamentals of legislative regulation in veterinary medicine. The structure of the veterinary service and state veterinary institutions. International veterinary organizations. To be able to - in practice, apply the knowledge gained in the field of veterinary activities. Plan and organize veterinary events. Organize veterinary and sanitary supervision and control. Conduct veterinary records and accouting. Own - the principles and methods of work of a veterinarian. The methodology for determining the economic damage and economic efficiency of veterinary measures. To acquire practical skills to determine the economic efficiency of veterinary measures; draw up draft regulatory documents; organize and carry out a set of measures for the prevention and elimination of infectious diseases of animals; develop and maintain veterinary documentation Be competent in financing veterinary activities. In veterinary institutes and veterinary services of foreign countries

1	Name of course	Animal feeding
2	Code of course	KZh 2224
3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	3
8	Prerequisites	Morphology, organic chemistry, physiology and biochemistry of farm animals, microbiology, feed production
9	Postrequisites	Veterinary hygiene, pathomorphology, FEV of livestock products
10	Course summary	The importance and role of feeding in increasing the production of livestock products, the relationship with other disciplines. Contribution of outstanding scientists to the development of science and practice of animal feeding. Nutritional assessment of feed. Stern. Zootechnical analysis. Normalized feeding of animals.

11	Learning outcomes	Have skills in: - taking medium samples and analyzing the chemical composition and nutrition of the feed; - determination of digestibility and productive action of feed; - classification of feed and feed additives; - the organization of normalized feeding of livestock, aimed at maintaining health and ensuring productivity.

1	Name of course	Epizootological monitoring and organization of veterinary events
2	Code of course	EMOVM 5234
3	Cycle of course	MD
4	Amount of credits	4
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	5
8	Prerequisites	Veterinary Microbiology, Veterinary Virology, Clinical Diagnostics, Veterinary Management, Veterinary Epidemiology
9	Postrequisites	Knowledge of the theoretical and practical foundations of epizootological monitoring and organization of veterinary events is one of the leading in the formation of a veterinary medicine doctor and will help the student to combine the knowledge into a system and apply it in scientific and industrial activities
10	Course summary	The concept of the epizootic process and monitoring. Risk analysis and prognosis of an epizootic situation. Analysis of the epizootic situation for infectious diseases and epizootological research. Causes and factors, risk and prognosis of the development of the epizootic process. Route, veterinary and sanitary requirements, planning, the complexity of veterinary measures. Statistics and analysis of epizootological data. Organization of measures to identify the causes of infectious diseases. Veterinary and sanitary requirements for monitoring, zoning and development of antiepizootic plans. Computer processing of statistical data using GIS technologies. Modeling the development of the epizootic process in infectious diseases of animals

11	Learning outcomes	Own methods of epizootological research. Knowledge of the patterns of development of the epizootic process of animal infectious diseases. To be able to conduct epizootological monitoring of the territory for certain diseases. Own methods of organizing preventive and antiepizootic measures.

1	Name of course	Animal Health in Emergent Infections
2	Code of course	OZZhPEI 5233
3	Cycle of course	BD
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	5
8	Prerequisites	Animal anatomy, animal physiology and biochemistry, veterinary microbiology, veterinary virology, veterinary hygiene, veterinary pharmacology and toxicology, clinical diagnosis, pathomorphology
9	Postrequisites	Exotic infectious diseases of animals, prevention and control measures against zooanthroponic diseases, especially dangerous infectious diseases of animals and birds
10	Course summary	Emergent infections are the new challenges of the modern world. Epizootic situation on emergent diseases in the world and the Republic of Kazakhstan. Prevention and control measures for viral diarrhea in cattle. Features of the epizootic process of infectious rhinotracheitis in cattle. Nodular dermatitis in cattle. Bluetang (catarrhal fever). Cattle Ibaraki. Akabane cattle. Flu bird.
11	Learning outcomes	To be competent: - when developing plans for preventive, antiepizootic measures against exotic emergent infections of animals; - when developing measures to protect nature from the accumulation of pathogenic and pathogens of emergent infections of animals in it; - when applying the OIE recommendation on the elimination of emergent infections among animals.

1	Name of course	Professional Kazakh (Russian) language
2	Code of course	PKRYa 2240
3	Cycle of course	BD
4	Amount of credits	3
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	2
8	Prerequisites	Animal morphology, ecology and sustainable development, Kazakh (Russian) language, foreign language, basics of life safety.
9	Postrequisites	Physiology and biochemistry of animals, veterinary microbiology and virology, animal pathology, pharmacology, toxicology and toxicological analysis, veterinary hygiene, veterinary and sanitary examination of animal products, primary veterinary care, clinical and applied diagnostics, veterinary radiobiology, veterinary and sanitary control at the border and transport , veterinary and sanitary examination of poultry products, fish farming, beekeeping and plant growing, veterinary sanitary parasitology, epizootology and infectious diseases of animals, management in veterinary medicine, technology, hygiene.
10	Course summary	The goal of teaching this discipline is to form students' holistic understanding of language as a cultural phenomenon and the specifics of the culture of speech, teaching effective communication skills in various communication conditions, disclosing the variety of stylistic possibilities of the Russian language, improving the general, professional speech culture in the field of veterinary medicine.
11	Learning outcomes	Learning outcomes: As a result of studying the discipline, the student must: - Know the use of the Russian (Kazakh) language, both in everyday and professional communication in the field of veterinary medicine; - Possess knowledge and skills of management, planning, organization and forecasting of the labor market in the field of veterinary medicine - To master the principles and methods of labor market management in the field of veterinary medicine, the requirements for the formation and use of labor resources, their professional training and retraining;

MINISTRY OF AGRICULTURE OF THE REPUBLIC OF KAZAKHSTAN
"NJSC "S. SEIFULLIN KAZAKH AGROTECHNICAL UNIVERSITY"

Brief description of elective disciplines of the educational program

Kazakh(Russian) language

1	Name of course	Anatomy of animals
2	Code of course	AZh 1203.,AZh 1204, AZh 1205
3	Cycle of course	BD
4	Amount of credits	10
5	Level of preparation	Undergraduate studies
6	Department	Veterinary medicine
7	Year	1
8	Prerequisites	Bases of general biology, zoology, histology
9	Postrequisites	Pathoanatomy, clinical diagnostics, therapy, surgery, obstetrics, parasitology
10	Course summary	Introduction History, purpose and objectives, methods of study and the relationship of discipline with other sciences. The role of domestic scientists in the development of the theory and practice of the subject. General patterns of animal body structure. Departments and areas of the animal's body. Osteology, myology, syndesmology. The development, shape and structure of bones. Bone joints (joints, ligaments, tendons). Morphofunctional muscle types. The structure of the skin of mammals and birds. The structure of the digestive system. Features of the structure and function of the digestive organs of birds. The apparatus of urination and reproduction. Features of the structure and position of the reproductive organs of male and female in animals of different species. The apparatus of urination and reproduction. The structure and significance of the respiratory system. Dividing them into departments. Hematopoietic organs, endocrine system. The system of blood and lymph circulation. The heart of animals, its structure, position, innervation and blood supply. The structure of the wall of blood vessels. The main arteries and venous arteries. Big and small circles of blood circulation. Lymphatic system and its structure. Central and peripheral nervous system. The brain and spinal cord. Analyzers (organ of vision, organ of hearing, organ of smell, touch, organ of taste).
11	Learning outcomes	- to know the structure of the bone, muscular system, features of structure at the different types of animals; - to know areas and bodies of animal and most often used anatomic terms, their applied value for merchandizing of животного raw material; - to know the morphological features of structure of organs and systems of organism of animals from development and intercommunication; - to know a comparative anatomy and age-related features of organs; - able to apply basic methodologies of the anatomic preparing, technique of removal of the cutaneous covering; - able to use fundamental gain knowledge for mastering of material of the special disciplines of curriculum