Ministry of Agriculture of the Russian Federation
Federal State Budgetary Educational Institution of Higher Education
«St. Petersburg State University of
Veterinary medicine»

APPROVED BY
Vice-Rector
for educational work
and youth policy
A.A. Sukhinin
June 27, 2025

Department of Biochemistry and Physiology

EDUCATIONAL WORK PROGRAM

for the discipline

"PHYSIOLOGY OF ANIMALS"
Level of higher education
SPECIALITY
Specialty 36.05.01 Veterinary Medicine
Profile: «General clinical veterinary medicine»
Full-time education
Year starts in 2025

Considered and accepted
at the meeting of the department
on June 25, 2025.
Protocol №14
Head of the Department of Biochemistry and Physiology
Doctor of Biological Sciences, Professor
L.Yu.Karpenko

Saint Petersburg
2025

1. AIMS AND OBJECTIVES OF THE DISCIPLINE

The main **objective** of the discipline in the training of veterinarians is to provide students with a fundamental morphological knowledge of the functioning, developing and adapting organism.

In order to achieve the objective, the following tasks need to be **accomplished**:

a) The general educational objective is to provide students with fundamental and professional knowledge of physiological processes and functions in the organism of mammals and birds, their qualitative uniqueness in the organism of productive farm animals, domestic, laboratory and exotic animals, necessary for the veterinary surgeon for scientific justification of measures related to the creation of optimal conditions for keeping, feeding and exploitation of animals, prevention of diseases, assessment of health, nature and degree of injury

b) The applied task highlights issues related to functional, evolutionary and clinical physiology and creates a conceptual basis for the realization of interdisciplinary structural and logical links in order to develop skills of medical thinking.

c) The special task is to familiarize students with modern directions and methodological approaches used in physiology to solve problems of animal husbandry and veterinary medicine, as well as available achievements in this field.

2. LIST OF PLANNED LEARNING OUTCOMES OF THE DISCIPLINE (MODULE), CORRELATED WITH THE PLANNED LEARNING OUTCOMES OF THE EDUCATIONAL PROGRAM

As a result of mastering the discipline, the student is prepared for the following types of activities, in accordance with the educational standard FGOS VO 36.05.01 "Veterinary Medicine".

Area of professional activity:

13 Agriculture

Types of professional activity tasks:

- Physician;

Competencies of the student, formed as a result of mastering the discipline

(a) General professional competencies (GPC):

GPC)-1 Able to determine the biological status and normative clinical indicators of organs and body systems of animals:

GPC-1ID-1-Know the safety and personal hygiene rules when examining animals, methods of their fixation; schemes of clinical examination of the animal and the order of examination of individual systems of the body, including the help of digital technologies; methodology of recognizing the pathological process;

GPC-1ID-2-To be able to collect and analyze anamnestic data, conduct laboratory and functional studies with the help of digital computer technologies necessary to determine the biological status of animals;

GPC-1ID-3-Possess practical skills to independently conduct clinical examination of an animal using classical research methods and digital technologies.

GPC-2-Able to interpret and evaluate in professional activity the influence of natural, socio-economic, genetic and economic factors on the physiological state of the animal organism:

GPC-2ID-1-Know the ecological factors of the environment, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecies relationships of animals and plants, predator and prey, parasites and hosts; ecological features of some species of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on animal organism;

GPC-2ID-2-To be able to use environmental factors and laws of ecology in agricultural production; to apply the achievements of modern microbiology and ecology of microorganisms

in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treatment of animals; to use methods of environmental monitoring in the environmental expertise of agro-industrial complex objects and agricultural production, including the use of digital technologies; to assess the impact of anthropogenic and economic factors on animal organism;

GPC-2ID-3-Possess the idea of the origin of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the organism; the basis for the study of ecological cognition of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including the use of digital technologies.

3. PLACE OF THE DISCIPLINE IN THE STRUCTURE OF THE MPEP

The discipline B1.O.24 "Physiology of animals" is a compulsory discipline of Block 1 of the mandatory part of the federal state educational standard of higher education in the specialty 36.05.01 "Veterinary Medicine" (specialist level).

It is studied at full-time form of education in 3-4 semesters.

When studying the discipline "Physiology of animals" the knowledge and skills obtained by students in the mastering of disciplines of zoology, anatomy, histology and embryology, biochemistry, biophysics are used.

The discipline "Physiology of animals" is a basic discipline on which most of the following disciplines are based, such as: 1. Pathological physiology

2. Pharmacology
3. General surgery
4. Operative surgery with topographical anatomy.
5. Clinical diagnostics.
6. Internal non-communicable diseases.
7. Pathologic anatomy and forensic veterinary examination.
8. Veterinary and sanitary expertise.
9. Obstetrics and gynecology.
10. Immunology.
11. Diseases of laboratory, small and exotic animals.
12. Diseases of birds.

4. SCOPE OF THE DISCIPLINE "PHYSIOLOGY OF ANIMALS"

4.1. Volume of the discipline "Animal Physiology" for full-time education form

Type of academic work	**Total hours**	**Semesters**	
		3	**4**
Auditorium classes (total)	**135**	**50**	**85**
Including:		**-**	
Lectures, including interactive forms	50	16	34
Practical lessons (PL), including interactive forms	85	34	51
Practical training (PT)	16	6	10
Independent work (total)	**126**	**58**	**68**
Control	**27**	**-**	**27**
Type of intermediate certification (test, exam)	**test** **exam**	**test**	**exam**
Total labor input hours / credit units	**288/8**	**108/3**	**180/5**

5. DISCIPLINE CONTENT
“PHYSIOLOGY OF ANIMALS”
5.1. Content of the discipline "Animal Physiology" for full-time students

№	Name	Formative competences	Semester	Types of academic work, including independent work of students and labor intensity (in hours)			
				L	PL	PT	IW

1.	The subject of the study of physiology. Homeostasis. Regulation of physiological functions.	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	-	1		2

2.	Physiology of excitable tissues. The concept of excitability. Structural and functional characteristics of the cell membrane	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	2	2		4

3	The main provisions of the membrane-ion theory of the origin of biopotentials	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**		2	2	4

4.	Nerve fiber and muscle physiology	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	2	2		4

5.	**Colloquium on physiology of excitable tissues**	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	**-**	**2**		4

6.	General physiology of the central nervous system	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	2	2	2	4

7.	Private physiology of the Central nervous system	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	2	2		4

8.	**Colloquium on CNS physiology**	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	-	**2**		2

9.	Physiology of internal secretion. General characterization and regulation of hormone secretion	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	2	1		4

10.	Physiological significance of the glands of internal secretion	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	2	1		4

11.	**Colloquium on physiology of internal secretion**	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	-	**2**		2

12.	Properties of the heart muscle. Cardiac cycle, heart tones.	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	2	2		4

13.	Cardiac regulation	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	-	2		4

14.	Laws of blood movement through blood vessels	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	-	2		4

15.	Regulation of blood pressure and vascular tone	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	2	1	2	4

16.	**Colloquium on physiology of the cardiovascular system**	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**3**	-	**2**		4

ONLY FOR 3RD SEMESTER	**16**	**28**	**6**	**58**

17.	Respiratory physiology. Spirometry	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	-	2		9

18.	**Colloquium on respiratory physiology**	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	**-**	**2**		**-**

19.	Blood Physiology. Blood formation and its regulation	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	4	6	3	6

20.	**Colloquium on blood physiology**	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	-	2		-

21.	Physiology of the immune system	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	4	2		9

22.	**Colloquium on the physiology of the immune system**	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	**-**	**2**		**-**

23.	Introduction to Gastroenterology. Functions of the digestive organ system. Types of digestion. Digestion in the oral cavity	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	2	2	2	6

24.	Digestion in the stomach	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	2	2	2	6

25.	Peculiarities of digestion in agricultural animals and birds	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	2	2		6

26.	Digestion in the intestines	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	2	2		6

27.	**Colloquium on physiology of digestion**	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	-	2		2

28.	General laws of metabolism of substances and energy in the body. Exchange of fats and carbohydrates. Its regulation. Thermoregulation. Features of temperature homeostasis in agricultural animals	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	4	2		9

29.	Physiology of the excretory system	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	2	3	3	9

30.	**Colloquium on physiology of the excretory system**	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	**-**	**2**		**3**

31.	Physiology of the reproductive system	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	4	2		6

32.	Physiology of lactation	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	2	2		6

33.	Physiology of the analyzers	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	2	2		6

34.	Ethology and higher nervous activity	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	**4**	4	2		6
ONLY FOR 4TH SEMESTER				**34**	**41**	**10**	**95**
TOTAL BY COURSE				**50**	**69**	**16**	**153**

6. LIST OF EDUCATIONAL AND METHODOLOGICAL SUPPORT FOR INDEPENDENT WORK OF STUDENTS

6.1. Guidelines for independent work

1. Physiology of animals: a textbook for 2nd year students of the veterinary faculty. Part 1. Regulation of physiological functions, physiology of excitable tissues, blood, digestion, analyzers / comp. : V. G. Skopichev [etc.]; SPbGAVM. - St. Petersburg: SPbGAVM, 2015. - 79 p. – Text: electronic. – URL: https://clck.ru/VdS3g (accessed: 25.06.25). – Access mode: for authorized users of the SPbSUVM EB.
2. Physiology and ethology of animals: a textbook for 2nd year students. Part 2. Immunity, blood circulation, respiration, excretory system, reproduction and lactation / comp.: V. G. Skopichev [and others]; SPbGAVM. - St. Petersburg: SPbGAVM, 2016. - 102 p. – Text: electronic. – URL: https://clck.ru/VdT4E (accessed: 25.06.25). – Access mode: for authorized users of the SPbSUVM EB.
3. Physiology of animals: a textbook for 2nd year students of the veterinary faculty. Part 3. Metabolism, internal secretion, central nervous system, higher nervous activity, ethology / comp. V. G. Skopichev [and others]; SPbGAVM. - St. Petersburg: SPbGAVM, 2014. - 80 p. – Text: electronic. – URL: https://clck.ru/VdS9E (accessed: 25.06.25). – Access mode: for authorized users of the SPbSUVM EB.

6.2. Literature for independent work

1. Smolin, S. G. Physiology and ethology of animals: textbook / S. G. Smolin. — 2nd ed., erased. — St. Petersburg: Lan, 2021. — 628 p. — ISBN 978-5-8114-2252-4. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/169072 (accessed: 25.06.25). — Access mode: for authorization users.
2. Skopichev, V. G. Private physiology. Book 1. Physiology of productivity: textbook / V. G. Skopichev. - 2. - St. Petersburg: Quadro, 2022. - 312 p. — ISBN 978-5-906371-72-6. — Text: electronic // Electronic library system Elibrica: [website]. — URL: https://elibrica.com/61bba68f-0c86-4f6b-9b1f-d6d5a4868bfb (accessed: 25.06.25). — Access mode: for authorized users.
3. Skopichev, V.G. Private physiology. Book 2. Physiology of productive animals: textbook / V. G. Skopichev, V. I. Yakovlev. - 2. - St. Petersburg: Quadro, 2022. - 561 p. — ISBN 978-5-906371-72-7. — Text: electronic // Electronic library system Elibrica: [website]. — URL: https://elibrica.com/060227f5-c549-4ea1-9002-bd0fad63baa6 (accessed: 25.06.25). — Access mode: for authorized users.
4. Skopichev, V. G. (ed.) Private physiology. Book 3. Physiology of dogs and cats: textbook / V. G. Skopichev (ed.), T. A. Eisymont, L. Y. Karpenko, A. I. Enuka-shvili, N. A. Panova, I. O. Bogolyubova, L. V. Zhichkina. - 2. - St. Petersburg: Quadro, 2022. - 464 p. — ISBN 978-5-906371-74-4. — Text: electronic // Electronic library system Elibrica: [website]. — URL: https://elibrica.com/4177069a-f1aa-4a49-b4e2-37e4fc165f81 (accessed: 25.06.25). — Access mode: for authorized users.
5. Eliseev, A.P. Anatomy and physiology of farm animals: a textbook for secondary vocational education / A.P. Eliseev, N.A. Safonov, V.I. Boyko. — 4th reprint. - St. Petersburg: Quadro, 2020. - 456 p. — ISBN 978-5-906371-26-3. — Text: electronic // Electronic library system Elibrica: [website]. — URL: https://elibrica.com/74d5c581-00e3-4346-91fc-03cf53209dca (accessed: 25.06.25). — Access mode: for authorized users.
6. Skopichev V.G. Morphology and physiology of farm animals: a textbook for secondary vocational education / Skopichev V.G., Maksimyuk N.N. - St. Petersburg: Quadro, 2021. - 412 p. — ISBN 978-5-906371-19-5. — Text: electronic // Electronic library system

Elibrica: [website]. — URL: https://elibrica.com/fbf470c0-eb27-4160-aa31-0f1f57047911 (accessed: 25.06.25). — Access mode: for authorized users.

7. LIST OF BASIC AND ADDITIONAL LITERATURE, NECESSARY TO MASTER DISCIPLINE

A) Main literature

1. Physiology of animals: a textbook for 2nd year students of the veterinary faculty. Part 1. Regulation of physiological functions, physiology of excitable tissues, blood, digestion, analyzers / comp.: V. G. Skopichev [and others]; SPbGAVM. - St. Petersburg: SPbGAVM, 2015. - 79 p. – Text: electronic. – URL: https://clck.ru/VdS3g (accessed: 25.06.25). – Access mode: for authorized users of the SPbSUVM EB.
2. Physiology of digestion and metabolism: textbook / I. N. Medvedev, S. Yu. Zavalishina, T. A. Belova, N. V. Kutafina. - St. Petersburg: Lan, 2021. - 144 p. — ISBN 978-5-8114-2047-6. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/168889 (accessed: 25.06.25). — Access mode: for authorization users.
3. Physiology of blood and blood circulation: textbook / S. Yu. Zavalishina, T. A. Belova, I. N. Medvedev, N. V. Kutafina. - St. Petersburg: Lan, 2021. - 176 p. — ISBN 978-5-8114-1824-4. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/168772 (accessed: 25.06.25). — Access mode: for authorizations. users. Gerunova, L.K.
4. Physiology of the cardiovascular system and drug regulation of its functions in animals [Electronic resource]: textbook / L.K. Gerunova, V.I. Maksimov. — Elektron.dan. - St. Petersburg: Lan, 2013. - 160 p. — Access mode: https://e.lanbook.com/book/4871 — Cap. from the screen.(accessed: 25.06.25)

Б) additional literature

1. Skopichev, V. G. Morphology and physiology of animals: textbook / V. G. Skopichev, V. B. Shumilov. - St. Petersburg: Lan, 2021. - 416 p. — ISBN 5-8114-0592-8. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/167718 (accessed: 25.06.25). — Access mode: for authorization users
2. Skopichev, V. G. Physiological and biochemical foundations of animal resistance: textbook / V. G. Skopichev, N. N. Maksimyuk. — St. Petersburg: Lan, 2021. — 352 p. — ISBN 978-5-8114-0934-1. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/167804 (accessed: 25.06.25). — Access mode: for authorization users.
3. Skopichev, V. G. Animal behavior: textbook / V. G. Skopichev. - St. Petersburg: Lan, 2021. - 624 p. — ISBN 978-5-8114-0868-9. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/167780 (accessed: 25.06.25). — Access mode: for authorization users.
4. Sein, O. B. Regulation of physiological functions in animals: textbook / O. B. Sein, N. I. Zherebilov. — 2nd ed., rev. - St. Petersburg: Lan, 2021. - 288 p. — ISBN 978-5-8114-0933-4. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/167799 (accessed: 25.06.25). — Access mode: for authorization users.
5. Physiology of the muscular and nervous systems: textbook / I. N. Medvedev, S. Yu. Zavalishina, N. V. Kutafina, T. A. Belova. - St. Petersburg: Lan, 2021. - 176 p. — ISBN 978-5-8114-1982-1. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/168867 (accessed: 25.06.25). — Access mode: for authorization users.
6. Medvedev, I. N. Physiological regulation of the body: textbook / I. N. Medvedev, S. Yu. Zavalishina, N. V. Kutafina. - St. Petersburg: Lan, 2021. - 392 p. — ISBN 978-5-8114-2250-0. — Text: electronic // Lan: electronic library system. — URL:

https://e.lanbook.com/book/168967 (accessed: 25.06.25). — Access mode: for authorization users.
7. Maksimov, V. I. Fundamentals of physiology: textbook / V. I. Maksimov, I. N. Medvedev. - St. Petersburg: Lan, 2021. - 192 p. — ISBN 978-5-8114-1530-4. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/168576 (accessed: 25.06.25). — Access mode: for authorization users.
8. Maksimov, V.I. Fundamentals of physiology and ethology of animals: textbook / V.I. Maksimov, V.F. Lysov. — 2nd ed., rev. and additional — St. Petersburg: Lan, 2019. — 504 p. — ISBN 978-5-8114-3818-1. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/116378 (accessed: 25.06.25). — Access mode: for authorization users.
9. Gudin, V. A. Physiology and ethology of farm birds: textbook / V. A. Gudin, V. F. Lysov, V. I. Maksimov. - St. Petersburg: Lan, 2021. - 336 p. — ISBN 978-5-8114-0941-9. — Text: electronic // Lan: electronic library system. — URL: https://e.lanbook.com/book/167817 (accessed: 25.06.25). — Access mode: for authorization users.
10. Skopichev, V. G. Microelementoses of animals: textbook / V. G. Skopichev, L. V. Zhichkina, O. M. Popova, etc. - St. Petersburg. : Prospekt Nauki, 2015. - 288 pp. http://prospektnauki.ru/ebooks/books/copypaste/miel.php (accessed: 25.06.25)

8. LIST OF RESOURCES OF THE INTERNET INFORMATION AND TELECOMMUNICATION NETWORK NECESSARY FOR MASTERING THE DISCIPLINE

1. https://meduniver.com – Medical information site.
2. https://www.twirpx.com – Everything for the student

Electronic library systems:

1. EBS "SPBGUVM"
2. EBS "Lan Publishing House"
3. Legal reference system "ConsultantPlus"
4. University information system "RUSSIA"
5. Scientific electronic library ELIBRARY.RU
6. Russian Scientific Network
7. The IQlib electronic Library system
8. Database of international scientific citation indexes WebofScienceFull-text interdisciplinary database on agricultural and environmental sciences ProQuest AGRICULTURAL AND ENVIRONMENTAL SCIENCE DATABASE
9. Electronic books from the publishing house “Prospekt Nauki” http://prospektnauki.ru/ebooks/
10. Collection “Agriculture. Veterinary" publishing house "Kvadro" https://elibrica.com/

9. METHODOLOGICAL INSTRUCTIONS FOR STUDENTS ON MASTERING DISCIPLINE

Methodological recommendations for students are a set of recommendations and explanations that allow a student to optimally organize the process of studying a given discipline.

The content of methodological recommendations, as a rule, may include:

- Tips for planning and organizing the time needed to study the discipline. Description of the sequence of student actions, or “scenario for studying the discipline.”

The morning time is the most fruitful for educational work (from 8-14 o'clock), then the afternoon (from 16-19 o'clock) and the evening time (from 20-24 o'clock). The most difficult material is recommended to be studied at the beginning of each time interval after rest. After

1.5 hours of work, a break (10-15 minutes) is required; after 4 hours of work, the break should be 1 hour. Part of the scientific organization of labor is mastering the technique of mental work. Normally, a student should devote about 10 hours a day to studying (6 hours at the university, 4 hours at home).

- Recommendations for working on lecture material

When preparing for a lecture, the student is recommended to:

1) review the recordings of the previous lecture and recall previously studied material in memory;

2) it is useful to review the upcoming material of the future lecture;

3) if independent study of individual fragments of the topic of the last lecture is assigned, then it must be completed without delay;

4) prepare yourself psychologically for the lecture.

This work includes two main stages: taking notes of lectures and subsequent work on the lecture material.

Note-taking means drawing up notes, i.e. a brief written statement of the content of something (oral presentation - speech, lecture, report, etc. or a written source - document, article, book, etc.).

The method of work when taking notes on oral presentations differs significantly from the method of work when taking notes from written sources.

By taking notes from written sources, the student has the opportunity to repeatedly read the desired passage of text, reflect on it, highlight the main thoughts of the author, briefly formulate them, and then write them down. If necessary, he can also note his attitude to this point of view. While listening to a lecture, the student must postpone most of the complex of work mentioned above for another time, trying to use every minute to record the lecture, and not to comprehend it - there is no time left for this. Therefore, when taking notes from a lecture, it is recommended to separate fields on each page for subsequent entries in addition to the notes.

After recording a lecture or taking notes, you should not leave work on the lecture material until you begin preparing for the test. It is necessary to do as early as possible the work that accompanies taking notes of written sources and which was not possible to do while recording the lecture - read your notes, deciphering individual abbreviations, analyze the text, establish logical connections between its elements, and in some cases show them graphically, highlight the main ideas, note questions that require additional processing, in particular, consultation with the teacher.

When working on the text of a lecture, the student needs to pay special attention to the problematic questions posed by the teacher when giving the lecture, as well as to his assignments and recommendations.

For each lecture, practical lesson and laboratory work, the number, topic, list of issues covered, volume in hours and links to recommended literature are provided. For classes conducted in interactive forms, their organizational form must be indicated: computer simulation, business or role-playing game, analysis of a specific situation, etc.

- Recommendations for preparing for practical classes

Practical (seminar) classes constitute an important part of students' professional training. The main goal of conducting practical (seminar) classes is to develop analytical, creative thinking in students by acquiring practical skills. Practical classes are also conducted with the aim of deepening and consolidating the knowledge gained at lectures and in the process of independent work on regulatory documents, educational and scientific literature. When preparing for a practical lesson for students, it is necessary to study or repeat theoretical material on a given topic.

When preparing for a practical lesson, the student is recommended to adhere to the following algorithm;

1) get acquainted with the plan of the upcoming lesson;

2) study the literary sources that were recommended and familiarize yourself with the introductory comments to the relevant sections.

Methodological instructions for practical (seminar) classes in the discipline, along with the work program and schedule of the educational process, refer to methodological documents that determine the level of organization and quality of the educational process.

The content of practical (seminar) classes is recorded in the working curriculum of the disciplines in the sections "List of topics for practical (seminar) classes."

The most important component of any form of practical training is assignments. The basis of the assignment is an example, which is analyzed from the perspective of the theory developed in the lecture. As a rule, the main attention is paid to the formation of specific skills and abilities, which determines the content of students' activities - problem solving, laboratory work, clarification of the categories and concepts of science, which are a prerequisite for correct thinking and speech.

Practical (seminar) classes perform the following tasks:

- stimulate regular study of recommended literature, as well as attentive attention to the lecture course;
- consolidate the knowledge gained in the process of lecture training and independent work on literature;
- expand the scope of professionally significant knowledge, skills and abilities;
- allow you to check the correctness of previously acquired knowledge;
- instill skills of independent thinking and oral presentation;
- promote free use of terminology;
- provide the teacher with the opportunity to systematically monitor the level of students' independent work.

Methodological instructions for practical (seminar) classes in the discipline should be focused on modern business conditions, current regulatory documents, advanced technologies, on the latest achievements of science, technology and practice, on modern ideas about certain phenomena of the reality being studied.

- Recommendations for working with literature.

Working with literature is an important stage of a student's independent work in mastering a subject, contributing not only to consolidation of knowledge, but also to broadening his horizons, mental abilities, memory, ability to think, present and confirm his hypotheses and ideas. In addition, research skills necessary for further professional activities are developed.

When starting to study literature on a topic, it is necessary to make notes, extracts, and notes. It is imperative to take notes on the works of theorists, which allow one to comprehend the theoretical basis of the study. For the rest, you can limit yourself to extracts from studied sources. All extracts and quotations must have an exact "return address" (author, title of work, year of publication, page, etc.). It is advisable to write an abbreviated name of the question to which the extract or quotation relates. In addition, it is necessary to learn how to immediately compile a card index of specialized literature and publications of sources, both proposed by the teacher and identified independently, as well as refer to bibliographic reference books, chronicles of journal articles, book chronicles, and abstract journals. In this case, publications of sources (articles, book titles, etc.) should be written on separate cards, which must be filled out in accordance with the rules of bibliographic description (surname, initials of the author, title of the work. Place of publication, publisher, year of publication, number of pages , and for journal articles - the name of the journal, year of publication, page numbers). On each card, it is advisable to record the thought of the author of the book or a fact from this book on only one specific issue. If the work, even in the same paragraph or phrase, contains further judgments or facts on another issue, then they should be written out on a separate card. The presentation should be concise, precise, without subjective assessments. On the back of the card you can make your own notes about this book or article, its contents, structure, what sources it was written on, etc.

- Explanations about working with test materials for the course, recommendations for doing homework.

Testing is a check that allows you to determine whether the actual behavior of the program corresponds to the expected behavior by performing a specially selected set of tests. A test is the fulfillment of certain conditions and actions necessary to verify the operation of the function being tested or its part. Each question in the discipline must be answered correctly by choosing one option.

- Recommendations for completing course work (if it is included in the curriculum), defining their thematic focus, goals and objectives of implementation, requirements for content, volume, design and organization of management of their preparation by departments and teachers.

According to the guidelines presented in the list of guidelines.

10. EDUCATIONAL WORK

As part of the implementation of the discipline, educational work is carried out to form a modern scientific worldview and a system of basic values, the formation and development of spiritual, moral, civil and patriotic values, a system of aesthetic and ethical knowledge and values, attitudes of tolerant consciousness in society, the formation in students of the need to work as the first vital necessity, the highest value and the main way to achieve success in life, to understand the social significance of your future profession.

11. LIST OF INFORMATION TECHNOLOGIES USED IN THE EDUCATIONAL PROCESS

11.1 Information technology

The educational process in the discipline provides for the use of information technologies:

• conducting practical classes using multimedia;

• interactive technologies (conducting dialogues, collective discussion of various approaches to solving a particular educational and professional task);

• interaction with students via email;

• joint work in the Electronic Information and Educational Environment of St. Petersburg State University of Mathematics and Mathematics: https://spbguvm.ru/academy/eios/

11.2. Software

List of licensed and freely distributed software, including domestically produced ones

п/п	Name of technical and computer training aids recommended by sections and topics of the program	License
	MS PowerPoint	67580828
	LibreOffice	free software
	OS Alt Education 8	AAO.0022.00
	ABIS "MARK-SQL"	02102014155
	MS Windows 10	67580828
	System ConsultantPlus	503/CL
	Android OC	free software

12. MATERIAL AND TECHNICAL BASE REQUIRED FOR THE IMPLEMENTATION OF THE EDUCATIONAL PROCESS IN THE DISCIPLINE

Name of the discipline (module), practice in accordance	**Name of special premises and premises for independent work**	**Equipping special rooms and rooms for independent work**

with the curriculum		
Physiology of animals	**206** (196084, St. Petersburg, Moskovsky prospect, building 99) 30.4 m2 / 25 seats. Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification	*Specialized furniture: desks, chairs, stools, teaching board.* *Technical teaching aids: TV and DVD player, microscopes.*
	211 (196084, St. Petersburg, Moskovsky Prospekt, building 99) 26.7 m2 / 25 seats. Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification	*Specialized furniture: desks, chairs, stools, teaching board.* *Technical teaching aids: TV and DVD player, microscopes.*
	205 (196084, St. Petersburg, Moskovsky prospect, building 99) 23.5 m2 / 24 seats. Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate	*Specialized furniture: desks, chairs, stools, teaching board,* *Technical teaching aids: TV and DVD player, microscopes, computer.*
	203 (196084, St. Petersburg, Moskovsky Prospekt, building 99) 20.4 m2 / 12 seats. Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification	*Specialized furniture: desks, chairs, stools, teaching board.* *Technical training aids: centrifuge, dry-heat oven, FEC.*
	203 b (196084, St. Petersburg, Moskovsky prospect, building 99) Educational laboratory of the department 11.7 m2	*Specialized furniture: tables, chairs, stainless steel sink.* *Technical training aids: table scales, centrifuge, thermostat.*
	206 Large reading room (196084, St. Petersburg, Chernigovskaya str., building 5) Room for independent work	*Specialized furniture: tables, chairs* *Technical teaching aids: computers with an Internet connection and access to the electronic information and educational environment*
	214 Small reading room (196084, St. Petersburg, Chernigovskaya str., building 5) Room for independent work	*Specialized furniture: tables, chairs* *Technical teaching aids: computers with an Internet connection and access*

		to the electronic information and educational environment
	324 Information Technology Department (196084, St. Petersburg, Chernigovskaya str., building 5) Room for storage and preventive maintenance of educational equipment	*Specialized furniture: tables, chairs, special equipment, materials and spare parts for preventive maintenance of educational equipment*
	Box № 3 Carpentry workshop (196084, St. Petersburg, Chernigovskaya str., building 5) Room for storage and preventive maintenance of educational equipment	*Specialized furniture: tables, chairs, special equipment, materials for preventive maintenance of specialized furniture*

Developer:
Candidate of Veterinary Sciences, Associate Professor  A. L. Sepp

Annex 1

Ministry of Agriculture of the Russian Federation
Federal State Budgetary Educational Institution of higher education
«St. Petersburg State University of
Veterinary medicine»

Department of Biochemistry and Physiology

FUND OF ASSESMENT TOOLS
for the discipline
«PHYSIOLOGY OF ANIMALS»
Level of higher education
SPECIALTY
Specialty 36.05.01 Veterinary Medicine
Profile: «General clinical veterinary medicine»
Full-time education
Education starts in 2025

Saint Petersburg
2025

1. PASSPORT OF THE APPRAISAL FUND

Table 1

№	Emerging competencies	Supervised sections (topics) Of the Discipline	Evaluation tool
1.	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental	The subject of the study of physiology and its role in veterinary medicine. Physiological functions and the main mechanisms of their regulation	Tests

	assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.		
2.	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental	Physiology of excitable tissues	Colloquium, tests

	modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.		
3.	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	Central nervous System Physiology	Colloquium, tests
4.	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the	The physiology of internal secretion	Colloquium, tests

	pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.		
5.	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals:	Physiology of the cardiovascular system	Colloquium, tests

	GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and		

	economic factors on living objects, including using digital technologies.		
6.	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and	The physiology of respiration	Colloquium, tests

	unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.		
7.	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of	Blood Physiology	Colloquium, tests

	anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.		
8.	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	Physiology of the immune system	Colloquium, tests

9.	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	Physiology of digestion	Colloquium, tests
10.	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional	Physiology of metabolism and energy in the body	Tests

	studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.		
11.	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical	Physiology of the excretory system	Colloquium, tests

	study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.		
12.	**GPC-1** Is capable of determining the	Physiology of the	Abstracts

	biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation,	reproductive system	

	comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.		
13.	**GPC-1** Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals: GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process; GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals; GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies. **GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of	Physiology of lactation	Abstracts

	organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.		
14.	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body: GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	Physiology of analyzers	Abstracts
15.	**GPC-2** Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body:	Ethology and GNI	Abstracts

	GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body; GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body; GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.		

An approximate list of evaluation tools **Table 2**

	Name of the evaluation tool	Short description of the evaluation tool	Presentation of an evaluation tool in the fund
1.	Colloquium	A means of controlling the assimilation of educational material of a topic, section or sections of a discipline, organized as an educational activity in the form of an interview between a teacher and students	Questions on topics/sections of the discipline
2.	Tests	A system of standardized tasks that allows you to automate the procedure for measuring the level of knowledge and skills of a student	The fund of test tasks
3.	Report	The product of the student's independent work, which is a written summary of the results of the theoretical analysis of a certain scientific (educational and research) topic, where the author reveals the essence of the problem under study, provides various points of view, as well as his own views on it	Topics of the essays

2. INDICATORS AND CRITERIA FOR ASSESSING COMPETENCIES AT VARIOUS STAGES OF THEIR FORMATION, DESCRIPTION OF ASSESSMENT SCALES

Table 3

Planned results of competence development	The level of development				Evaluation tool
	Unsatisfactory	satisfactory	Well	excellent	
GPC-1 Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals.					
GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process.	The level of knowledge is below the minimum requirements, gross errors have occurred	The minimum acceptable level of knowledge, many blunders have been made	The level of knowledge in the volume corresponding to the training program, several blunders were made	The level of knowledge in the volume corresponding to the training program, without errors	Colloquium, tests
GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals.	Basic skills were not demonstrated when solving standard tasks, and gross errors occurred	Basic skills have been demonstrated, typical tasks with minor errors have been solved, all tasks have been completed, but not in full	All the basic skills have been demonstrated, all the main tasks have been solved with blunders, all tasks have been completed in full, but some with flaws	All basic skills have been demonstrated, all major tasks have been solved with some minor flaws, and all tasks have been completed in full	Colloquium, tests
GPC-1id-3-Have practical skills to independently conduct a clinical	Basic skills were	There	Basic skills are	Demonstrated skills in	Colloquium,

examination of an animal using classical research methods and digital technologies.	not demonstrated when solving standard tasks, and gross errors occurred	is a minimal set of skills for solving standard tasks with some shortcomings	demonstrated in solving standard tasks with some shortcomings	solving non -standard tasks without errors and shortcomings	tests
GPC-2 Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body.					
GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body.	The level of knowledge is below the minimum requirements, gross errors have occurred	The minimum acceptable level of knowledge, many blunders have been made	The level of knowledge in the volume corresponding to the training program, several blunders were made	The level of knowledge in the volume corresponding to the training program, without errors	Colloquium, tests, abstract
GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive	Basic skills were not demonstrated when solving standard tasks , and gross errors occurred	Basic skills have been demonstrated , typical tasks with minor errors have been solved , all tasks have been	All the basic skills have been demonstrated, all the main tasks with minor errors have been solved, all the tasks	All basic skills have been demonstrated, all major tasks have been solved with some minor flaws, and all tasks have been completed in	Colloquium, tests, abstract

diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body.		completed, but not in full	have been completed in full, but some with flaws	full	
GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.	Basic skills were not demonstrated when solving standard tasks , and gross errors occurred	There is a minimal set of skills for solving standard tasks with some shortcomings	Basic skills are demonstrated in solving standard tasks with some shortcomings	Demonstrated skills in Solving non -standard tasks without errors and shortcomings	Colloquium, tests, abstract

3. LIST OF CONTROL TASKS AND OTHER MATERIALS REQUIRED FOR ASSESSMENT OF KNOWLEDGE, SKILLS, ABILITIES AND EXPERIENCE OF ACTIVITY

3.1Model assignments for the current control of academic progress

3.1.1 Colloquium questions

Questions to assess the competence

GPC-1 «Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals»:

GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process.

Under the heading Physiology of the cardiovascular system:

1. *Heart tones, cardiac push, systolic and minute blood volumes. Heart rate in different animal species, electrocardiography.*
2. *Features of blood movement in the arteries, capillaries, veins. Arterial and venous pulse.*
3. *Methods of measuring blood pressure. The magnitude of blood pressure in different vessels of the vascular bed. What factors affect blood pressure?*

Under Respiratory Physiology:

4. *Breathing during muscular exertion.*
5. *Breathing under reduced barometric pressure.*
6. *Breathing at increased barometric pressure.*

Types of breathing. Frequency of respiratory movements in different species of animals.

Under Blood Physiology:

7.How to derive the white blood cell count?

8.How to determine the blood group in the ABO system?

9.Leukocyte formula and its peculiarities in different animal species.

Under Physiology of the excretory system:

10.Glucosuria and its possible causes.

11.Ketone bodies in the urine.

12.Proteinuria.

GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals.

Under the section Physiology of the cardiovascular system:

13.Linear and volumetric blood flow velocity.

14.The magnitude of blood pressure in different vessels.

15.Vascular reflexes. The importance of vascular reflexogenic zones in the regulation of blood pressure.

Under the heading Physiology of Respiration:

16. *Vital and total lung capacity. Spirometry. Vital capacity of the lungs in different animal species.*
17. *Pulmonary ventilation coefficient. Importance of harmful space in the process of respiration.*

Under the heading of Blood Physiology:

18.How to obtain serum, plasma and defibrinated blood?
19.How to determine the osmotic resistance of red blood cells?
20.How to determine erythrocyte sedimentation rate?
21.How to determine the hematocrit value of blood?

Under the section Physiology of the excretory system:

22.Hematuria.
23.Oliguria and polyuria.
24.Urine pigments.

GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies.

On the section Physiology of the cardiovascular system:

25.Direct (blood) method of blood pressure recording.
26.Cardiac tremor: origin, methods of investigation.
27. Define the concept of ECG.

Under the section Physiology of respiration:

28. Composition of inhaled, exhaled and alveolar air.
29. Exchange of gases between alveolar air and blood, between blood and tissues. The concept of partial pressure and tension of gases.
30. What is a pneumogram.
31. Give a definition of blood oxygenation.

Under the heading of Blood Physiology:

32.How to determine the amount of hemoglobin by colorimetric method?
33.How to calculate the number of erythrocytes and leukocytes in blood counting chamber with Goryaev grid?
34.How to calculate the color index of blood??

Under the section Physiology of the excretory system:

35.Filtration pressure. What does it consist of and on what factors does it depend.
36.Clubular filtration rate. On what factors it depends.
37.Physico-chemical properties of urine (quantity in different animals, reaction, density, color, transparency, smell).

Questions to assess the competence:

GPC-2 Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of

an animal's body:

GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body;

Under the heading of physiology of the excretory system:

1. The structure of the nephron (be able to draw, label its sections).

2. types of nephrons.

3. Features of the blood circulation of the kidney.

4. Functions of the departments of the nephron.

5. Mechanism of primary urine formation. Structure of the filtration barrier.

6. Differences in the composition of blood plasma and primary urine.

7. Mechanism of secondary urine formation. Proximal and distal reabsorption in the renal tubules.

8. How urine concentration occurs. What is the turn-and-reverse mechanism.

9. Secretion and synthesis in the renal tubules.

10. The juxtaglomerular apparatus of the kidney and its importance.

Under the heading Blood Physiology:

11. Significance and functions of blood. Quantity of blood in animals.

12. The index of hematocrit. Deposited blood.

13.Composition of blood. Chemical composition of blood plasma.

14. Viscosity, density, colloid osmotic pressure of blood.

15. Buffer systems of blood. Alkaline reserve. Acidosis and alkalosis.

16. Hemostasis. Platelet thrombus formation.

Under the heading Physiology of digestion:

17. Essence of digestion. The main functions of the digestive apparatus.

18. Classification of types of digestion according to sources of enzymes and site of hydrolysis of nutrients.

19. Digestion in the oral cavity. Composition, properties and importance of saliva.

20. Features of the composition of saliva and salivary secretion in different species of animals. The amount of saliva secreted per day in different species of animals.

21. Regulation of salivary secretion.

22. The act of swallowing and its regulation.

23. Digestion in the stomach. Composition and properties of gastric juice. Enzymes of gastric juice.

24. Hydrochloric acid, its importance and methods of determining acidity.

25. Gastric motility and its regulation.

26. Pyloric reflex and its regulation.

27. The act of vomiting and its regulation.

Under the heading respiratory physiology:

28. The essence of respiration, from what processes it is formed?

29. External respiration (mechanism of inhalation and exhalation). Donders model.

30.The role of negative pressure in the pleural cavity in the process of breathing. Its magnitude, origin.

31. Significance of surfactant in the process of inhalation and exhalation.

32. Oxygen transport by blood. Oxygen capacity of blood.

33. Cellular respiration.

Under the heading Physiology of the immune system*:*

34. Natural biological barriers.

35. Lysozyme and its importance.

36. β-lysins and their importance.

37. The role of interferons in immunity.

38. The complement system and its importance.

39. Phagocytosis and its importance. What is meant by completed and incomplete phagocytosis?

40. Importance of the immune system.

41. Structure of the immune system. Major histocompatibility complex (MHC). Functions of the immune system.

42. Classification of antigens.

43. Properties of antigens.

Physiology of excitable tissues:

44.Classification of stimuli.

45.What are excitability and excitation?

46.What tissues are excitable?

47.Conditions of excitation.

48.Force-duration curve (draw, give notations).

49.What are useful time and chronaxia, which value is greater?

50.What are ion channels?

51.What are ion pumps?

Under the section Physiology of CNS:

52.Concept of reflexes. Classification of reflexes.

53.What is a reflex arc and a reflex ring?

54.What are extero-, intero- and proprioreceptors?

55.Synapses in the CNS. Classification of synapses. Differences in properties of chemical synapses and ephapses. Mediators in CNS synapses.

56.Nerve centers and their properties.

57.Coordination of nervous processes.

On the section Physiology of internal secretion:

58.Concept of internal secretion.

59.Methods of investigation of internal secretion.

60.Glands of mixed, endocrine and exocrine secretion.

61.Chemical structure of hormones.

62.Types of effects of hormones on the body.

63.Mechanisms of action of hormones on target cells.

64.General principles of regulation of internal secretion.
65.Hypothalamic-pituitary system. Releasing factors. Liberins and statins.
66.Hormones of the anterior lobe of the pituitary gland and their importance.
On the section Physiology of cardiovascular system:
67.Structure of the heart: membranes, valves, blood vessels, innervation.
68.Conduction system of the heart.
69.Phases of the cardiac cycle. Significance of the valve apparatus.
70.First phase of the cardiac cycle.
71.Second phase of the cardiac cycle.
72.The third phase of the cardiac cycle.

GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body.

On the section on the physiology of the excretory system:
73. What is the threshold of excretion?
74. What are threshold and thresholdless substances, give examples.
75. Differences in the composition of primary and secondary urine.
76. Nervous regulation of urine formation.
77. Humoral regulation of urine formation.
78. Mechanism and regulation of urinary excretion.
79. Mechanism of painful anuria.
80. Excretory function of the kidneys.
81. The role of the kidneys in metabolism.
82. The role of the kidneys in the regulation of acid-base balance of blood.

Under the heading of blood physiology:
83. Coagulation of blood. Retraction of the blood clot. The fibrinolytic system. The antiplatelet system of blood. Regulation of blood coagulation.
84. Erythrocytes. Quantity in the blood, ESR (erythrocyte sedimentation rate), hemolysis and its causes. Concept of physiologic solutions.
85. Erythrocytosis and its types. Functions of erythrocytes.
86. Hemoglobin and its importance, forms of hemoglobin in blood. Color index of blood.
87. Blood groups and the concept of blood transfusion. Blood groups of farm animals.

On the section Physiology of digestion:
88. Regulation of gastric juice secretion.
89. Peculiarities of gastric digestion in pig and horse.

90. Features of digestion in ruminants.

Digestion in ruminant stomachs of proteins, fiber and lipids.

91. Predigestive motility and its regulation.

92. The ruminant process and its regulation.

93. Digestion in the rennet.

94. Features of digestion in young ruminants.

animals.

95. Digestion in the small intestine. Composition and

importance of pancreatic juice. Regulation of pancreatic secretion.

96. Bile formation and bile secretion. Composition of bile and its importance in the process of digestion.

97. Regulation of biliary secretion.

Under the heading respiratory physiology:

98. Transport of carbon dioxide by the blood. Mechanism of bicarbonate formation.

99. The interrelationship of respiration and circulation.

100.Fetal respiration.

101.Respiratory center.

102.Autonomy of the respiratory center.

103.Self-regulation of inhalation and exhalation. The role of lung mechanoreceptors in this process.

On the section Physiology of the immune system:

104. Antibodies and mechanisms of their interaction with antigens.

105. Classification of antibodies.

106.Serum and secretory immunoglobulins.

107.Microphages and macrophages and their importance in immune reactions.

108.T-lymphocytes: classification, functions. Significance of NK-cells.

109.Migration of T-lymphocytes.

110.B-lymphocytes and their significance.

111.Migration of B-lymphocytes.

112.O-lymphocytes, K-cells and their importance.

113.Receptors and markers of immunocompetent cells.

Section Physiology of Excitable Tissues:

114.Importance of active and passive ion transport in the generation of resting and action potentials.

115.Galvani and Matteucci's experiments.

116.What is a resting potential, how is it formed?

117.Action potential, its phases.

118.How does the excitability of tissue change during excitation?

119.Features of conduction of excitation in myelinated and unmyelinated nerve fibers.

120.Laws of nerve fiber conduction.

121.Structures and properties of the neuromuscular synapse.

122.Theory of muscular contraction.

Under the heading CNS Physiology:

123.Inhibition in the CNS (primary and secondary) and its importance.

124.Spinal cord. Reflexes of the spinal cord.

125.Conductive and reflex functions of the medulla oblongata.

126.Structures and functions of the midbrain.

127.Hypothalamus and its functions.

128.The autonomic nervous system and its structure. The importance of the sympathetic and parasympathetic nervous system. Adaptation and trophic importance of the sympathetic nervous system.

The physiology of internal secretion:

129.Hormones of the middle lobe of the pituitary gland and their significance.

130.Hormones of the posterior lobe of the pituitary gland and their significance.

131.Regulation of pituitary gland activity.

132.The thyroid gland and its hormones and their importance to the body.

133.Hypo- and hyperfunction of the thyroid gland.

134.Regulation of thyroid secretion.

135.Parathyroid glands and their importance to the body. Regulation of secretion.

136.Endocrine function of the medullary layer of the adrenal glands. Significance of hormones for the organism. Regulation of secretion.

The physiology of the cardiovascular system:

137.Properties of cardiac muscle - excitability.

138.Properties of cardiac muscle - conduction.

139.Properties of cardiac muscle - contractility.

140.Properties of cardiac muscle.Autonomy of the heart.

141.Regulation of cardiac function.

GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.

On the physiology of the excretory system:

142.The role of the kidneys in the regulation of osmotic pressure.

143.The role of the kidneys in the regulation of water balance.

144.The role of the kidneys in the regulation of blood ionic composition.

145.The role of the kidneys in the regulation of blood arterial pressure.

146.The role of the kidneys in the regulation of blood coagulation.

147.The role of the kidneys in the regulation of erythropoiesis.

148.Composition and significance of sweat. Palpable and intangible cutaneous perspiration.

149.Regulation of sweating.

150.Cutaneous fat. The gyropot. Regulation of sebaceous glands.

Under the headingPhysiology of the blood:

151.Leukocytes. Classes of leukocytes, their morphological features and significance. Functions.

152. Leukocytoses and their types.

153. Platelets, quantity in blood, functions.

154. Regulation of hematopoiesis. Significance of hematopoietic factors in hematopoiesis.

155. Mechanism of tissue fluid and lymph formation.

Under the heading Physiology of Digestion:

156.Secretory function of the small intestine. Composition of intestinal juice and regulation of secretion.

157.Membrane (wall-to-wall) digestion.

158.Types of contractions of the small intestine and their regulation.

158.Regulation of chyme transfer.

159.Regulation of the transition of chyme from the small intestine to the large intestine.

160.Digestion in the large intestine. Composition and properties of intestinal juice. The importance of the microflora of the large intestine.

161.Types of contractions of the large intestine and its regulation.

162.The act of defecation and its regulation.

163.Absorption in the gastrointestinal tract.

164.The hunger period and its importance to the body.

165.Excretory function of the digestive tract. Excreted substances in digestive juices.

166.Peculiarities of digestion in poultry.

167.Significance of I.P. Pavlov's researches in physiology of digestion.

168.Digestion of proteins, fats and carbohydrates in different parts of the digestive tract (from the oral cavity to the large intestine).

Under the heading of respiratory physiology:

169.The importance of chemoreceptors of vascular reflexogenic zones in the regulation of respiration.

170.Humoral mechanisms of respiration regulation.

171.The role of the autonomic nervous system in the regulation of respiration.

172.The importance of the cortex of the large hemispheres in the regulation of respiration.

173.Mechanism of the first breath of a newborn.

174.Features of breathing in birds.

Under the heading Physiology of the Immune System:

175.Central organs of the immune system and their importance.

176.Peripheral organs of the immune system and their importance.

177.Phases of the immune response.

178.What is antigen presentation?

179.Cooperation of T-lymphocytes and macrophages in the immune response.
180.What is meant by lymphocyte activation?
181.Cellular mechanism of immune response.
182.Humoral mechanism of immune response.
183.Active and passive immunity.
184.What is colostral immunity?
185.What is immunologic memory?

Under the heading Physiology of Excitable Tissues:

186.Contractile properties of muscle (extensibility, elasticity, plasticity)
187.Muscle work. What is the "average load rule"?
188.Types of muscle contraction depending on magnitude of load.
189.Types of muscle contraction depending on the rhythm (frequency) of irritation.
190.Physiologic features of smooth muscles.
191.Energy supply of muscle work: anaerobic phase of muscle contraction.
192.Energy supply of muscle work: aerobic phase of muscle contraction.
193.Muscle fatigue.

Under the heading Physiology of the CNS:

194.Functions of the cerebellum. What changes in the body indicate damage to it?
195.Tonic reflexes of the brainstem.
196.Functions of the brainstem reticular formation.
197.The limbic system and its functions.

Under the heading Physiology of the internal secretion:

200.Endocrine function of the cortical layer of the adrenal glands. Significance of hormones for the body. Regulation of secretion.
201.Intrinsic secretory function of the pancreas. The role of hormones in the regulation of carbohydrate and fat metabolism.
202.Regulation of pancreatic secretion.
203.Ovarian hormones, their significance. Regulation of secretion.
204.Placental hormones. Their significance for the female organism.
205.Secretory activity of the testes. Significance of androgens for the organism. Regulation of secretion.
206.Hormones of thymus and epiphysis, their importance, regulation of secretion.
207.Tissue hormones of the digestive tract, kidneys, heart. Prostaglandins.

On the section Physiology of the cardiovascular system:

208.Cardiac centrifugal nerves and anatomo-physiological characterization.
209.The vasomotor center.
210.Cardiac reflexes (Aschner reflex, Goltz reflex and their receptive fields).

211.Significance of vascular reflexogenic zones in the regulation of cardiac function.
212.Humoral regulation of heart work.

3.1.2. Topics of essays

Topics of essays for competency assessment: GPC-1 «Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals».

GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process.

1. Sexual and physiological maturity and time of their onset in males. Maturation of sperm, functions of the adventitious sex glands. Physico-chemical properties of sperm.
2. Functional characterization of the female sexual system. Timing of sexual and physiological maturity of females. Follicle development, ovulation and formation of the corpus luteum.
3. The concept of lactation. Duration of lactation in different animal species.
4. Biological role of colostrum, milk and their composition.

GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals.

1. The sexual cycle and the factors that determine it.
2. Pregnancy. Its duration in different species of animals.
3. Functional changes associated with pregnancy.
4. Milk excretion and neurohumoral regulation of this process.
5. Physiological basis of machine milking of cows.

GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies.

1. Childbirth. Mechanism and regulation of childbirth.
2. Peculiarities of reproduction in agricultural birds.
12. Functional characteristics of the male sexual system.
13. Physiology of milk formation; precursors of milk constituents;
14. Regulation of milk secretion. Significance of dry period.

GPC-2 Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body.

GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence

of anthropogenic and economic factors on the animal body;
1. Analyzers and their general properties. Classification of analyzers.
2. Visual analyzer.
3. The differences between conditional and unconditional reflexes.
4. The methodology and mechanism of formation of conditioned reflexes and the differences between the reflex arc of the conditioned and unconditional reflex.
5. The concept of a dynamic stereotype.
6. Inhibition of conditioned reflexes: unconditional (external and beyond) and conditional (fading, lagging, differentiating and conditional) and their biological significance.
7. Types of higher nervous activity.

GPC-2id-2-Be able to use environmental environmental factors and environmental laws in agricultural production; apply the achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treat animals; use environmental monitoring methods during environmental assessment of agro-industrial complex objects and production of agricultural products, including using digital technologies; assess the impact of anthropogenic and economic factors on the animal body.
1. The structure and influence of external factors on the auditory analyzer.
2. The structure and influence of external factors on the body balance analyzer.
3. Sleep physiology (types of sleep, physiological changes during sleep, sleep theories).
4. The importance of ethological research in the practice of animal husbandry and keeping pets. Methods of ethology.
5. The main biological forms of behavior and factors influencing animal behavior.
6. Formation of animal behavior. Innate and acquired behaviors.
7. The influence of external factors on the ecology of dogs.

GPC-2id-3-Have an understanding of the emergence of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the body; the basis for the study of ecological knowledge of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including using digital technologies.
1. The impact of anthropogenic and economic factors on the skin analyzer.
2. The impact of anthropogenic and economic factors on the taste and olfactory analyzers.
17. The impact of anthropogenic and economic factors on the etiology of cats.
18. The impact of anthropogenic and economic factors on the etiology of horses.
19. The impact of anthropogenic and economic factors on the ecology of rodents.
20. The impact of anthropogenic and economic factors on the ecology of birds.
21. I.P. Pavlov's teaching on 1 and 2 signaling systems

3.1.3. Tests

Tests for competence assessment: GPC-1 «Is capable of determining the biological status and normative clinical indicators of organs and body systems of animals».

GPC-1id-1-Know safety precautions and personal hygiene rules when examining animals, methods of restraining them; schemes for a clinical study of an animal and the procedure for studying individual body systems, including using digital technologies; methodology for recognizing the pathological process.

1. What is the normal body temperature of a cow?
1 – 37,5-39,0
2 – 36,6-37,0
3 – 40,0
4 – 42

2. What is the normal heart rate in a pig?
1 – 100 beats per minute
2 – 60-80 beats per minute
3 – 5-10 beats per minute
4 -35-40 beats per minute

3. What is the normal concentration of hemoglobin in the horse's blood?
1 – 90-120 g/l
2 – 80-140 g/l
3 – 70-110 g/l,
4 – 90-110 g/l

4. What is the evidence of an increase in ESR?
1 – about the presence of an inflammatory process in the body
2 – the absence of an inflammatory process in the body
3 – lack of water
4- physical activity

5. What method is used to calculate the shaped blood elements?
1 – in a counting chamber with a Goryaev grid
2 – by the Sali method
3 – by centrifugation
4- by adding anticoagulants

6. What is the pH of the blood?
1 – 7,35-7,45
2 – 7,2-7,25
3 - 6,0-7,0
4- 1-2

7. What is the osmotic pressure of the blood?

1 – 7.6 atm
2 – 4.2 atm
3 – 3.5 atm
4- 5.1 atm

8. At what blood pH value does uncompensated acidosis occur?
1 – 7,20;
2 – 7,35;
3 – 7,40;
4 – 7,55

9. What function do lymphocytes perform?
1 – oxygen transport,
2– phagocytosis,
3 – carbon dioxide transport
4 – synthesis of adrenaline

10. What is oncotic blood pressure?
1 – the pressure created by proteins in the blood
2 – pressure created by dissolved particles in the blood
3 - the pressure created by moving blood on the walls of blood vessels
4- fluid pressure on the vessel walls

11. What is the oncotic blood pressure?
1 – 15-35 mm Hg
2– 10-45 mm Hg
3– 1-3 mm Hg
4 – 8-14 mm Hg

12. What is the pressure in the pleural cavity with a calm inhalation?
1 – atmospheric pressure,
2 – 25-30 mm Hg below atmospheric,
3 – 1.5 – 3 mm Hg below atmospheric,
4 – 5-10 mm Hg above atmospheric.

13. What is meant by reabsorption in the renal tubules?
1 – formation of primary urine
2- absorption of substances from the renal tubules into the blood
3 – excretion of substances from the blood into the renal tubules
4 – synthesis of substances in renal tubule cells

GPC-1id-2-Be able to collect and analyze anamnestic data, conduct laboratory and functional studies using digital computer technologies necessary to determine the biological status of animals.

14. Which of the listed substances is non-threshold?

1 – amino acids,
2 – glucose,
3 – urea,
4 – ammonium phosphate

15. What is the amount of blood in a dog as a percentage of body weight?
1 – 5,6,
2 – 9,8
3 – 6,4-6,7
4– 4,6

16. Where is membrane (wall) digestion carried out?
1 – in the stomach cavity
2 – on the membranes of epithelial cells of the small intestine
3 – on the membranes of epithelial cells of the colon
4- in the oral cavity

17. What enzymes are contained in gastric juice?
1 – pepsins, lipase
2 – trypsin, lipase, amylase
3 – pepsin, trypsin, enterokinase
4- amylase

18. What is the pH of gastric juice?
1 – 0,8-1,0
2 – 6,8-7,2;
3 – 7,2-7,5;
4 – 7,5-8,2

19. What type of contractions are normally absent in the small intestine of mammals?
1 – pendulum - shaped,
2 – rhythmic segmentation,
3 – peristaltic,
4 - antiperistaltic

20. What function do proteolytic enzymes perform?
1 – protein breakdown,
2 – protein synthesis,
3 – hydrolysis of polysaccharides
4 – splitting of triglycerides

21. What substances cause the emulsification of fat in the intestine?
1 – enzymes
2 – hydrochloric acid

3 – bile pigments
4 – bile acids

22. Where is the defecation center located?
1 – in the spinal cord
2 – in the medulla oblongata
3 – in the middle brain
4– in the hypothalamus

23. What substances does fiber turn into in the rumen?
1 - Peptones and amino acids.
2 - Ammonia and urea
3 - Mono- and disaccharides and VFA
4- Ammonia and amino acids

24. What enzymes are contained in rennet juice?
1 - Amylase, invertase and maltase
2 – pepsin, chymosin and lipase
3 - Trypsin and amylase
4 - Enterokinase and glucosidase

25. What is the number of red blood cells in a cat's blood?
1 – 5-10 T/L
2 – 1-2 T/L
3– 40-80 T/L,
4- 60-90 T/L

26. What is hemolysis?
1 – the destruction of red blood cells and the release of hemoglobin from them
2 - synthesis of red blood cells
3 – formation of heparin
4- histamine formation

GPC-1id-3-Have practical skills to independently conduct a clinical examination of an animal using classical research methods and digital technologies.

27. In what phase of blood clotting is thrombin formed?
1 – in the first place
2 - the second
3 – the third
4 – in all three phases

28. What is oxyhemoglobin?
1 – the compound of hemoglobin with carbon monoxide,
2 – the compound of hemoglobin with carbon dioxide

3 - the connection of hemoglobin with oxygen
4- the combination of hemoglobin with nitrogen

29. What does lymph form from?
1 – tissue fluid
2 – gastric juice
3 – saliva
4 – primary urine

30. What function do neutrophils perform in the blood?
1 – oxygen transport
2 – phagocytosis
3 – synthesis of antibodies
4 – synthesis of heparin and histamine

31. What are hematopoietins?
1 – substances that destroy (hemolyze) blood
2 – substances that stimulate hematopoiesis
3 – cells formed in the red bone marrow
4- substances that increase blood pressure

32. Where is the "core" of the respiratory center?
1 – in the cerebral cortex
2 – in the hypothalamus
3 – in the medulla oblongata
4 – in the spinal cord

33. What processes occur in the renal tubules?
1 – filtration and ultrafiltration
2 – filtration and secretion
3 – ultrafiltration and reabsorption
4 – secretion and reabsorption

34. What is ovulation?
1 – the release of the egg from the follicle
2 – formation of the corpus luteum
3 – implantation of the embryo
4- formation of the placenta

35. Where does fertilization take place?
1 – in the uterus
2 – in the oviducts
3 – in the ovary
4 – in the vagina

36. What hormones are necessary for the manifestation of sexual hunting in females?
1 – testosterone
2 – follicle stimulating hormone
3 – estrogens
4 – adrenaline

37. What is the duration of pregnancy?
1 – 90-120 days
2 – 180-200 days
3 - 280-300 days
4 – 310-330 days

38. What is a synapse?
1 – the place of contact between any cells
2 – the place of contact between the axon and some other cell
3 – the place of contact between two fibers of the striated muscle
4-the place of contact between the endothelium of the vessel and the blood

39. What is the percentage of free hydrochloric acid in gastric juice?
1 – 0,1-0,5%
2 – 0,001-0,002%
3 – 0,6-1,0%
4 – 0,7-0,8%

40. What is the pH of intestinal juice?
1 – 7,5-7,7
2 – 1-2
3 – 8,2-8,7
4- 9-10

GPC-2 Able to interpret and evaluate in professional activities the influence of natural, socio-economic, genetic and economic factors on the physiological state of an animal's body:

GPC-2id-1-Know environmental environmental factors, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecific relationships between animals and plants, predator and prey, parasites and hosts; environmental features of certain types of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal body;

1. What natural factors contribute to the synthesis of vitamin D?
   1 – sunlight
   2 – rain

3 – wind
4 – darkness

2. At what time of the day does the pineal gland produce serotonin?
1 – during the daytime with the highest illumination
2 – at night
3 – in the twilight
4 – not related to the time of day

3. What hormone is produced during stress?
1 - thyroxine
2 - serotonin
3 - adrenaline
4 - insulin

4. At what time of the day does the pineal gland produce melatonin?
1 – during the daytime with the highest illumination
2 – at night
3 – at dusk
4 – not related to the time of day

5. Which trace element affects the synthesis of vitamin B12?
1 – cobalt
2 – zinc
3 – molybdenum
4 – selenium

6. How does an increase in GABA affect the postsynaptic membrane?
1 – causes arousal,
2 – causes inhibition,
3 – has no effect
4 – excites slightly

7. How does an increase in the concentration of carbon dioxide in the blood affect breathing?
1 – increases the frequency and depth of breathing
2 – the frequency and depth of breathing decreases
3 – has no effect
4 –slightly decreases the frequency and depth of breathing

8. How does a decrease in the concentration of carbon dioxide in the blood affect breathing?
1 – increases the frequency and depth of breathing
2 – the frequency and depth of breathing decreases
3 – has no effect

4 –slightly increases the frequency and depth of breathing

9. How does the pH change with decompensated alkalosis?

1 – shifts to the acidic side
2 – abruptly shifts to the alkaline side
3 – does not change
4 – slightly shifts to the sour side

10. How does the concentration of lactic acid in the blood affect respiration?

1 – speeds up
2 – slows down
3 – does not change
4 – stops

11. What factors cause polyuria?

1 – increasing the amount of water intake
2 – decrease in the amount of water consumed
3 – rainy weather
4 – lack of sunlight

12. How does the dry period affect the mammary gland?

1 – no effect
2 – structural and functional reorganization of the mammary gland
3 – limits the volume of fluid in the body and blood volume
4 – increases the work of the gastrointestinal tract

13. What is the effect of increasing blood concentration of natriuretic hormone on urine production?

1 – reduces
2 – does not affect
3 – increases
4 – reduces insignificantly

GPC-2$_{\text{id-2}}$**-** Ability to use ecological factors of environment and laws of ecology in agricultural production; to apply achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine for the purpose of prevention of infectious and invasive diseases and treatment of animals; to use methods of ecological monitoring at ecological expertise of objects of agro-industrial complex and production of agricultural products, including with the use of digital technologies; to evaluate the impact of anthropogenic and economic factors on animal organism.

14. What is the effect of pre-milk massage on the cow's mammary gland?

1 – inhibits blood circulation in the mammary gland
2 – provides mammary gland hygiene
3 – stimulates oxytocin production
4 – stimulates the production of adrenaline

15. Which hormone increases lipid synthesis?

1 – prolactin
2 – somatotropic
3 – adrenaline
4 – thyroxine

16. What is the effect of stress on the number of white blood cells in the blood?

1 – decreases
2 – has no effect
3 – increases
4 – decreases slightly

17. What is characteristic of vitamin A deficiency in the diet?

1 – diarrhea
2 – increased salivation
3 – development of "chicken blindness"
4 – increased cardiac activity

18. What is the effect of stress on the caronary vessels?

1 – dilates
2 – narrows
3 – causes spasm
4 – has no effect

19. What develops against the background of STH deficiency?

1 – gigantism
2 – dwarfism
3 – bulimia
4 – endemic goiter

20. What is the effect of stress on adrenal cortex hormones?

1 – reduces hormone synthesis
2 – has no effect
3 – increases hormone synthesis
4 – decreases synthesis slightly

21. How does nitrogen deficiency affect protein metabolism?

1 – decreases protein synthesis
2 – increases protein synthesis
3 – has no effect
4 – causes obesity

22. How does lack of water in the diet affect kidney function?

1 – increases urine production
2 – has no effect
3 – decreases urination
4 – increases sweating

23. How does an increase in body temperature affect heart function?

1 – has no effect
2 – decreases heart rate
3 – increases heart rate
4 – normalizes heart function

24. Какие корма вызывают обильное газообразование в рубце?

1 – green grass
2 – concentrates
3 – straw
4 – hay

25. What is the effect of acetylcholine on the conduction of excitation at the neuromuscular synapse?

1 – excites the presynaptic membrane
2 – disrupts the mediator at the postsynaptic membrane
3 – transfers excitation from the presynaptic membrane to the postsynaptic membrane
4 – inhibits the postsynaptic membrane

26. Which animals lack vitamin C synthesis?

1 – ruminants
2 – guinea pigs, birds
3 – primates
4 – bats

GPC-2$_{id\text{-}3}$- Possess the idea of the origin of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the organism; the basis for the study of ecological cognition of the surrounding world,

the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including the use of digital technologies.

27. How do organophosphorus pesticides act on the nervous system during poisoning?

1 – block cholinesterase
2 – synthesize GABA
3 – destroy acetylcholine
4 – make you feel better

28. What can oliguria be caused by?

1 – increase in the amount of fluid intake
2 – decrease in fluid intake
3 – obesity
4 – vitamin D deficiency

29. How is hypovitaminosis of vitamin E in animals?

1 – dry, flaky skin
2 – improves metabolic processes
3 – has no effect
4 – increases urine formation

30. How does the pregnancy of a female affect the hormonal background?

1 – the concentration of estrogen and progesterone increases
2 – estrogen and progesterone concentration decreases
3 – concentration of gonadotropins increases
4 – testosterone concentration increases

31. How does vitamin K hypovitaminosis manifest itself on the body?

1 – multiple pinpoint hemorrhages appear
2 – increased contraction of smooth muscles
3 – has no effect
4 – hematopoiesis increases

32. What is the effect of iron deficiency on the body?

1 – causes improvement of health
2 – has no effect
3 – causes anemia
4 – increases the absorption of chlorine

33. What is the effect of iodine deficiency on the animal's body?

1 – causes thiraxin deficiency
2 – improves metabolism
3 – has no effect
4 – increases blood pressure

34. In which animal species is it possible to replace dietary protein with urea?

1 – rabbits
2 – ruminants
3 – guinea pigs
4 – hamsters

35. Which animal species is not deficient in essential fatty acids when consuming plant protein?

1 – bears
2 – ruminants
3 – rabbits
4 – bats

36. Which factor affects physical thermoregulation?

1 – light
2 – ambient temperature
3 – temperament of the animal
4 – time of day

37. What is the significance of chemical thermoregulation?

1 – the process of generating heat,
2 – the process of heat release
3 – protein synthesis
4 – process of heat generation and heat release

38. What factors contribute to the acceleration of COE?

1 – hemolysis
2 – pregnancy
3 – physical activity
4 – vitamin C deficiency

39. What is the difference between colostrum and milk?

1 – the presence of immunoglobulins

2 – the presence of trace elements
3 – the presence of microelements
4 – no difference

40. What factors contribute to the slowing down of COE?

1 – hemolysis
2 – pregnancy
3 – physical activity
4 – vitamin C deficiency

3.2. Model tasks for interim certification

3.2.1. Questions for the credit

Competence to be formed: GPC -1 «Able to determine the biological status and normative clinical indicators of organs and systems of animal organism».

GPC-1$_{id-1}$-Know the safety technique and rules of personal hygiene in the examination of animals, methods of their fixation; schemes of clinical examination of the animal and the procedure for the study of individual systems of the body, including with the help of digital technologies; methodology of recognizing the pathological process.

1. *Heart tones, cardiac push, systolic and minute blood volumes. Heart rate in different species of animals, electrocardiography.*
2. *Phases of the cardiac cycle. Importance of the valve apparatus.*

GPC-1$_{id-2}$-Abtain the ability to collect and analyze anamnestic data, perform laboratory and functional studies using digital computer technology necessary to determine the biological status of animals.

3. *Give the definition of ECG.*
4. *Regulation of cardiac function.*
5. *Decipher the meaning of cogs on ECG.*

GPC-1$_{id-3}$-Possess practical skills to independently conduct clinical examination of an animal using classical research methods and digital technologies.

6. *Significance of the valve apparatus of the heart. Method of examination of heart valves.*
7. *Heart tones, their characterization and origin.*
8. *What refers to the external manifestations of blood circulation, by what methods they are studied.*

Competence to be formed:

GPC-2. Capable of interpreting and evaluating in professional activity the influence of natural, socio-economic, genetic and economic factors on the physiological state of the animal organism.

GPC-2id-1- Know the ecological factors of the environment, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecies relationships of animals and plants, predator and prey, parasites and hosts; ecological features of some species of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the animal organism;

1. *Classification of irritants.*
2. *What are excitability and excitation?*
3. *Conditions of excitation.*
4. *Importance of active and passive ion transport in the generation of resting and action potentials.*
5. *Experiments of Galvani and Matteucci.*
6. *The concept of reflexes. Classification of reflexes.*
7. *What is a reflex arc and a reflex ring?*
8. *Synapses in the CNS. Classification of synapses. Differences in properties of chemical synapses and ephapses. Mediators in the synapses of the CNS.*
9. *Nerve centers and their properties.*
10. *Coordination of nervous processes.*
11. *The concept of internal secretion.*
12. *Glands of mixed, endocrine and exocrine secretion.*
13. *Types of influence of hormones on the body.*
14. *Mechanisms of action of hormones on target cells.*
15. *General principles of regulation of internal secretion.*
16. *Hypothalamic-pituitary system. Releasing factors. Liberins and statins.*
17. *Structure of the heart: membranes, valves, blood vessels, innervation. Conducting system of the heart.*
18. *Properties of cardiac muscle - excitability, conductivity, contractility. Autonomy of the heart.*
19. *Circuits of blood circulation (small, large, supplementary).*

GPC-2id-2-Ability to use ecological factors of environment and laws of ecology in agricultural production; to apply achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treatment of animals; to use methods of ecological monitoring at ecological expertise of objects of agro-industrial complex and production of agricultural products, including the use of digital technologies; to assess the impact of anthropogenic and economic factors on animal organism.

20. *What is the resting potential, how is it formed and on what factors does it depend?*
21. *Action potential, its phases. What external factors affect it?*
22. *How does the excitability of tissue change during excitation?*
23. *Features of excitation conduction in myelinated and unmyelinated nerve fibers.*
24. *Inhibition in the CNS (primary and secondary) and its importance.*

25. Spinal cord, functions. Factors affecting its work?
26. Conductive and reflex functions of the medulla oblongata.
27. Structures and functions of the midbrain. Factors affecting its work?
28. Hypothalamus and its functions. Factors affecting its work?
29. Hormones of pituitary gland and their importance.
30. Thyroid gland and its hormones, their importance for the body. What external factors affect the production of hormones?
31. Parathyroid glands and their importance for the organism. Regulation of secretion.
32. Significance of adrenal hormones for the organism. Regulation of secretion.
33. Intrasecretory function of the pancreas. The role of hormones in the regulation of carbohydrate and fat metabolism.
34. Features of blood movement in the arteries, capillaries, veins. Arterial and venous pulse.
35. Methods of measuring blood pressure. The magnitude of blood pressure in different vessels of the vascular channel.

GPC-2$_{\text{id-3}}$-Possess the idea of the origin of living organisms, levels of organization of living matter, of favorable and adverse factors affecting the organism; the basis for the study of ecological cognition of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including the use of digital technologies.

36. *Laws of nerve fiber conduction.*
37. Structure and properties of neuromuscular synapse. Influence of external factors on synapse operation.
38. Theory of muscle contraction.
39. Contractile properties of muscles (extensibility, elasticity, plasticity).
40. Physiological features of smooth muscles. Influence of external factors on smooth muscle function.
41. Energy supply of muscle work: anaerobic and aerobic phases of muscle contraction.
42. Autonomic nervous system and its structure. The importance of sympathetic and parasympathetic nervous system. Adaptation and trophic value of the sympathetic nervous system.
43. Functions of the cerebellum. What changes in the body indicate its damage?
44. Tonic reflexes of the brainstem.
45. Functions of the brainstem reticular formation. What external factors cause changes in the functioning of the reticular formation?
46. The limbic system and its functions.
47. Ovarian hormones, their importance. Regulation of secretion.
48. Placental hormones. Their significance for the female organism.
49. Secretory activity of the testes. Significance of androgens for the organism. Regulation of secretion.

50. Hormones of the thymus and epiphysis, their importance, regulation of secretion.
51. Tissue hormones of the digestive tract, kidneys, heart. Prostaglandins.
52. The vasomotor center and vasomotor nerves, their importance.
53. Vascular reflexes. Significance of vascular reflexogenic zones in blood pressure regulation.
54. Characteristics of vasoconstrictors and vasodilators.

3.2.2. Examination questions

Competence to be formed: GPC-1«Able to determine the biological status and normative clinical indicators of organs and systems of animal organism».

GPC-1$_{id-1}$-Know safety techniques and rules of personal hygiene when examining animals, methods of their fixation; schemes of clinical examination of the animal and the order of examination of individual systems of the body, including with the help of digital technologies; methodology of recognizing the pathological process.

1. Internal environment of the organism and homeostasis. Basic physiological constants of homeostasis.

2. Nervous and humoral regulation of physiological functions and the development of these forms of regulation in the process of evolution.

3. Blood as an internal medium of the organism. The main functions of blood. Blood volume in animals.

4. Physico-chemical properties of blood: viscosity, specific gravity, osmotic and oncotic pressure.

GPC-1$_{id-2}$-Abtain the ability to collect and analyze anamnestic data, perform laboratory and functional tests using digital computer technology necessary to determine the biological status of animals.

5. *Blood reaction, acid-base equilibrium. Acidosis, alkalosis.*

6. Blood group systems in animals. The concept of blood transfusion.

7. Blood pressure and its regulation. Factors affecting blood pressure.

8. Methods of blood pressure determination. The magnitude of pressure in different parts of the bloodstream.

9. Nervous and humoral influences on blood vessels.

10. Heart tones and the importance of the valve apparatus.

GPC-1$_{id-3}$-Possess the practical skills to independently perform a clinical examination of an animal using classical research methods and digital technology.

11. External respiration. Mechanisms of inhalation and exhalation. Types and frequency of respiration in farm animals.

12. Vital and total lung capacity. Components of vital capacity of lungs. Spirometry.

Competence to be formed: GPC-2. Able to interpret and evaluate in professional activity the influence of natural, socio-economic, genetic and economic factors on the physiological state of the animal organism.

GPC-2$_{id-1}$-Know the ecological factors of the environment, their classification and the nature of relationships with living organisms; basic ecological concepts, terms and laws of bioecology; interspecies relationships of animals and plants, predator and prey, parasites and hosts; ecological features of some species of pathogenic microorganisms; mechanisms of influence of anthropogenic and economic factors on the organism of animals;

1. The essence of the digestive process; types (types) of digestion. The main functions of the digestive apparatus.
2. Digestion in the oral cavity. The composition and importance of saliva, the mechanism of secretion and regulation of salivary secretion. The act of swallowing and its regulation.
3. General laws of gastric digestion. Composition and properties of gastric juice.
4. Phases of gastric secretion.
5. Gastric motility and its regulation. Pyloric reflex.
6. Features of gastric digestion in the pig and horse.
7. Digestive processes in the pre-gastric and rennet of ruminants.
8. Predigestive motility and its regulation. The ruminant process.
9. External secretory activity of the pancreas. Composition and properties of pancreatic juice. Regulation of pancreatic juice secretion.
10. Bile formation and bile secretion. Composition of bile and its importance in the process of digestion. Regulation of bile secretion.
11. Secretory function of the small and large intestine. Composition of intestinal juice and regulation of its secretion.
12. Membrane (wall-to-wall) digestion.
13. Digestion in the large intestine. The act of defecation and its regulation.
14. Absorption in the digestive apparatus.
15. Types of contractions in the small and large intestine and their regulation.
16. Hunger periodization.
17. Excretory function of the digestive tract. Excreted substances in digestive juices.
18. Features of digestion in poultry.
19. Chemical composition of blood (proteins, carbohydrates, lipids, ionic composition). The concept of serum and plasma. Hematocrit.
20. The concept of hemostasis. Microcirculatory (platelet) hemostasis.
21. Mechanism of blood coagulation and anti-coagulation system.
22. Erythrocytes, their properties, quantity and importance for the organism. Erythrocytosis.
23. Hemoglobin and its derivatives. The amount of hemoglobin in the blood of animals. Rate of erythrocyte sedimentation.
24. Leukocytes and their importance for the body. Leukogram. Physiological

leukocytosis.

25. Hematopoiesis and its regulation.

26. Metabolism between blood, tissues and lymph. Mechanism of tissue fluid formation. Lymph, its composition, properties and importance for the body.

27. Factors of nonspecific resistance of the organism.

28. The concept of immunity. Types of immunity - passive and active, innate and acquired immunity.

29. Central and peripheral organs of the immune system. Cellular and humoral mechanisms of immunity.

30. Cycle and phases of cardiac activity.

31. Autonomic activity of the heart. Conducting system of the heart, its structure and importance.

GPC-2$_{\text{id-2}}$-Ability to use ecological factors of environment and laws of ecology in agricultural production; to apply achievements of modern microbiology and ecology of microorganisms in animal husbandry and veterinary medicine in order to prevent infectious and invasive diseases and treatment of animals; to use methods of ecological monitoring at ecological expertise of objects of agro-industrial complex and production of agricultural products, including the use of digital technologies; to evaluate the impact of anthropogenic and economic factors on the organism of animals.

32. Properties of cardiac muscle (excitability, conductivity, contractility). Bioelectrical phenomena in the heart. Electrocardiography and its importance.

33. Regulation of heart activity.

34. General laws of hemodynamics. Linear and volumetric velocity of blood flow.

35. Features of blood movement in arteries, capillaries, veins. Arterial pulse and its properties. Venous pulse.

36. The essence of respiration. Characteristics of the processes that include respiration.

37. Concepts of partial pressure and tension of gases. Exchange of gases between alveolar air and blood. Transfer (transport) of gases by blood. Gas exchange in tissues.

38. Regulation of respiration.

39. Features of respiration in birds.

40. Assimilation and dissimilation as two sides of metabolism in the body. General, basic and intermediate metabolism. Methods of studying metabolism.

41. Protein metabolism and its regulation. Features of protein metabolism in ruminants.

42. Carbohydrate metabolism and its regulation. Features of carbohydrate metabolism in ruminants.

43. Lipid metabolism and its regulation.

44. Macro- and microelements and their biological significance.

45. Water metabolism. Regulation of water-mineral metabolism.

46. Physiological characteristics of fat-soluble vitamins (A, D, E, K).

47. Physiological characteristics of water-soluble vitamins (C, P, B vitamins).

48. Energy metabolism and methods of its determination.

49. Body temperature in animals and mechanisms of its preservation (physical and chemical thermoregulation). The role of the nervous system in temperature homeostasis.
50. Functions of the kidneys.
51. The role of the kidneys in maintaining homeostasis.
52. Mechanism and regulation of urine formation.
53. Urine excretion and its regulation.
54. Skin as an excretory organ. Sweating and its regulation. Fat loss.
55. The concept of internal secretion and methods of its study. General properties of hormones. Mechanisms of action of hormones on target cells.
56. General principles of regulation of internal secretion. Hypothalamic-pituitary system.
57. Internal secretion of the pituitary gland; hormones of the anterior, middle and posterior lobe, their importance in the body.
58. Thyroid gland - its hormones, their importance in the body, regulation of secretion. Physiologic hypo- and hyperfunction of the thyroid gland.
59. Endocrine function of the adrenal glands: their hormones, the importance of hormones for the body, regulation of adrenal activity.
60. Intrasecretory function of the pancreas. The role of pancreatic hormones in the regulation of carbohydrate and fat metabolism.
61. Hormonal function of sex glands. Regulation of sex hormone secretion.
62. Internal secretion of perithyroid glands. Hormones of the thymus and epiphysis.
63. Tissue hormones of the digestive tract and other organs, their importance. Prostaglandins.
64. Functional characterization of the male sexual system Sexual and physiological maturity and the time of their onset in males. Maturation of sperm, functions of adventitious sex glands. Physico-chemical properties of sperm.
65. Functional characterization of the female sexual system. Timing of sexual and physiological maturity of females. Follicle development, ovulation and formation of the corpus luteum.
66. Sexual cycle and factors conditioning it.
67. Pregnancy. Its duration in different animal species. Functional changes associated with pregnancy.
68. Childbirth. Mechanism and regulation of labor.
69. Peculiarities of reproduction in agricultural birds.
Lactation
70. The concept of lactation. Duration of lactation in different species of animals. Biological role of colostrum, milk and their composition.
71. Physiology of milk formation; precursors of milk constituents; regulation of milk secretion. Significance of the dry period.
72. Milk excretion and neurohumoral regulation of this process.
73. Physiological basis of machine milking of cows.

GPC-2$_{\text{id-3}}$-Possess the idea of the origin of living organisms, levels of organization of living matter, favorable and unfavorable factors affecting the

organism; the basis for the study of ecological cognition of the surrounding world, the laws of development of nature and society; skills of observation, comparative analysis, historical and experimental modeling of the impact of anthropogenic and economic factors on living objects, including the use of digital technologies.

74. Concepts of excitability and excitation. Characterization of tissue excitability: excitability threshold (rheobase), chronaxia, lability.
75. Bioelectric phenomena in tissues (biocurrents). Basic provisions of the membrane-ion theory.
76. Changes in tissue excitability during excitation. Optimum and pessimum of irritation strength and rhythm.
77. Physiological properties of muscles (excitability, conductivity, contractility). Features of smooth muscles. Tetanus (smooth and dentate) and muscle tone. Work and fatigue of muscles.
78. Mechanism of muscle contraction. Energy supply of muscle contraction.
79. Basic properties of nerve fiber (excitability, conduction of excitation).
80. Transmission of excitation from the nerve to the working organ. Synapses and their properties. Mediators and their role.
Central nervous system
81. Reflex activity of the nervous system (doctrine of reflexes). Classification of reflexes.
82. Structure and functions of neurons. Synapses in the CNS.
83. Reflex arc and reflex ring. The principle of feedback in the regulation of physiological functions.
84. Nerve centers and their properties. A.A. Ukhtomsky's doctrine of dominance.
85. Inhibition in the CNS and its significance. Primary and secondary inhibition.
86. Functions of the spinal cord. Significance of spinal roots, centers, conductive pathways. Reflexes of the spinal cord.
87. Functions of the medulla oblongata and midbrain.
88. Cerebellum and its functions.
89. Functions of the intermediate brain (thalamus, hypothalamus).
90. Functional significance of the brainstem reticular formation.
91. Functions of the sympathetic nervous system. Adaptation and trophic significance of the sympathetic nervous system.
92. Functions of the parasympathetic nervous system.
93. Differences between conditioned and unconditioned reflexes.
94. Methods and mechanism of formation of conditioned reflexes and differences of the reflex arc of conditioned and unconditioned reflexes. The concept of dynamic stereotype.
95. Inhibition of conditioned reflexes: unconditional (external and inhibitory) and conditional (extinction, delayed, differentiation and conditional) and their biological significance.
96. Types of higher nervous activity.
97. Physiology of sleep (types of sleep, physiologic changes during sleep,

theories of sleep).
98. Analyzers and their general properties. Classification of analyzers.
99. Visual analyzer.
100. Auditory analyzer.
101. Body balance analyzer.
102. Skin analyzer.
103. Gustatory and olfactory analyzers.
104. Significance of ethological research in the practice of animal husbandry and husbandry of domestic animals. Methods of ethology.
105. Basic biological forms of behavior and factors influencing animal behavior.
106. Formation of animal behavior. Congenital and acquired forms of behavior.
107. I.P. Pavlov's doctrine of 1 and 2 signal systems.

4 METHODICAL MATERIALS DEFINING THE PROCEDURES OF ASSESSMENT OF KNOWLEDGE, SKILLS AND EXPERIENCE OF ACTIVITY, CHARACTERIZING THE STAGES OF COMPETENCE FORMATION

Criteria for evaluating the knowledge of students during the colloquium:

- **Mark «excellent»** - the student clearly expresses his point of view on the issues under consideration, giving appropriate examples.
- **Mark «good»** - the student admits some errors in the answer.
- **Mark «satisfactory»** - the student finds gaps in the knowledge of basic educational and regulatory material.
- **Mark «unsatisfactory»** - the student is found significant gaps in knowledge of the basic provisions of the discipline, inability to get the correct solution to a particular practical problem with the help of the teacher.

Criteria for assessing the knowledge of students in testing:

The result of testing is evaluated on a percentage rating scale. Each student is offered a set of test tasks of 25 questions:

- **Mark «excellent»** – 25-22 correct answers.
- **Mark «good»** – 21-18 correct answers.
- **Mark «satisfactory» –** 17-13 correct answers.
- **Mark «unsatisfactory»** – less than 13 correct answers.

Criteria for assessing the knowledge of students when conducting essays:

- **Mark «excellent»** - the problem is identified and its relevance is justified; different points of view on the problem under consideration are analyzed and one's own position is logically stated; conclusions are formulated, the topic is fully

disclosed, the volume is maintained; the requirements for external design are met, the basic requirements for the essay are fulfilled.

- **Mark «good»** - there are defects. In particular, there are inaccuracies in the presentation of the material; there is no logical consistency in the judgments; the volume of the abstract is not maintained; there are omissions in the design, there are significant deviations from the requirements for abstracting.
- **Mark «satisfactory»** - the topic is covered only partially; there are factual errors in the content of the abstract; there are no conclusions, the topic of the abstract is not disclosed.
- **Mark «unsatisfactory»** - there is a significant misunderstanding of the problem or the abstract is not presented at all.

Knowledge criteria for credit:

- **Mark «satisfied»** must meet the parameters of any of the positive grades («excellent», «good», «satisfactory»).
- **Mark «dissatisfied»** should correspond to the parameters of the «unsatisfactory» grade.
- **Mark «excellent»** – all types of academic work provided by the curriculum. The student demonstrates the compliance of knowledge, skills, abilities, skills given in the tables of indicators, operates the acquired knowledge, skills, abilities, skills, applies them in situations of increased complexity. In this case may be admitted inaccuracies, difficulties in analytical operations, transfer of knowledge and skills to new, non-standard situations.
- **Mark «good»** – all types of academic work provided for by the curriculum. The student demonstrates the compliance of knowledge, skills, abilities, skills given in the tables of indicators, operates the acquired knowledge, skills, abilities, skills, applies them in standard situations. There may be minor errors, inaccuracies, difficulties in analytical operations, transfer of knowledge and skills to new, non-standard situations.
- **Mark «satisfactory»** – one or more types of academic work provided by the curriculum are not fulfilled. The student demonstrates incomplete compliance of knowledge, skills, skills given in the tables of indicators, significant errors are made, there is a partial lack of knowledge, skills, skills for a number of indicators, the student has significant difficulties in operating knowledge and skills in their transfer to new situations.
- **Mark «unsatisfactory»** – not fulfilled types of academic work provided by the curriculum. demonstrates incomplete compliance of knowledge, skills, skills given in the tables of indicators, there are significant errors, shows the lack of knowledge, skills, skills in a number of indicators, the student has significant difficulties in operating knowledge and skills in their transfer to new situations.

Criteria of knowledge in the examination:

• **Mark «excellent»** – all types of academic work provided for in the curriculum. The student demonstrates the conformity of knowledge, skills, abilities, skills given in the tables of indicators, operates the acquired knowledge, skills, abilities, skills, applies them in situations of increased complexity. At the same time, there may be inaccuracies, difficulties in analytical operations, transfer of knowledge and skills to new, non-standard situations.

•**Mark «good»** – all types of academic work provided by the curriculum. The student demonstrates the compliance of knowledge, skills, abilities, skills given in the tables of indicators, operates the acquired knowledge, skills, abilities, skills, applies them in standard situations. There may be minor errors, inaccuracies, difficulties in analytical operations, transfer of knowledge and skills to new, non-standard situations.

•**Mark «satisfactory»** – one or more types of academic work provided by the curriculum are not fulfilled. The student demonstrates incomplete correspondence of knowledge, skills, abilities, skills to the indicators given in the tables, significant errors are made, shows partial lack of knowledge, skills, skills for a number of indicators, the learner has significant difficulties in operating knowledge and skills in their transfer to new situations.

•**Mark «unsatisfactory»** – not fulfilled types of academic work provided by the curriculum, demonstrates incomplete compliance of knowledge, skills, skills given in the tables of indicators, there are significant errors, shows the lack of knowledge, skills, skills in a number of indicators, the student has significant difficulty in operating knowledge and skills in their transfer to new situations.

5.ACCESSIBILITY AND QUALITY OF EDUCATION FOR PERSONS WITH DISABILITIES

If necessary, disabled people and persons with disabilities are given additional time to prepare an answer at the test.

When conducting the procedure for assessing the learning outcomes of persons with disabilities and persons with disabilities may use their own technical means.

The procedure for assessing the learning outcomes of persons with disabilities and persons with disabilities in the discipline provides information in forms adapted to the limitations of their health and perception of information:

For persons with visual impairments:	– in printed form in enlarged font, – in the form of an electronic document.
For persons with hearing impairments:	– in printed form, – in the form of an electronic document.
For persons with musculoskeletal disorders:	– in printed form, – in the form of an electronic document.

When carrying out the procedure for assessing the results of training of persons with disabilities and persons with disabilities in the discipline provides the following additional requirements depending on the individual characteristics, students:

а) instruction on the procedure of evaluation procedure is provided in an accessible form (orally, in writing);

б) an accessible form of providing tasks of assessment means (in printed form, in printed form in enlarged font, in the form of an electronic document, tasks are read out by the teacher);

в) available form of providing answers to the tasks (written on paper, typed answers on the computer, orally).

If necessary, for students with disabilities and persons with disabilities, the procedure for assessing the learning outcomes of the discipline can be conducted in several stages.

Carrying out the procedure of assessment of learning outcomes of disabled people and persons with disabilities is allowed using distance learning technologies.