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
_____Sukhinin A.A.
June 27, 2025

Department of clinical diagnostics

EDUCATIONAL WORK PROGRAM

for the discipline

"HEMATOLOGY"

The level of higher education
SPECIALIST COURSE

Specialty 36.05.01 Veterinary Medicine
Profile: «General clinical veterinary medicine»
Full-time education
Education starts in 2025

Reviewed and adopted
at the meeting of the department
on June 23, 2025
protocol no. 7

Head of the department
of clinical diagnostics,
doctor of veterinary medicine, professor
_____ Kovalev S.P.

Saint Petersburg
2025

1. AIMS AND OBJECTIVES OF THE DISCIPLINE

The purpose of the discipline: to teach how to work correctly with blood and its fractions, summarize the results obtained, evaluate the interspecies characteristics of the hematopoietic system of animals, and their dependence on environmental, technological and other conditions.

Objectives of the discipline: determining the state of health and an earlier and more comprehensive study of disorders that occur in the body, allowing one to diagnose the disease, determine its etiology and pathogenesis. With the help of hematological research, work out optimal methods for studying the morphological composition of blood, hemoglobin concentration, erythrocyte sedimentation rate and methods of excretion and analysis of leukograms in animals under normal conditions and pathology, establish the diagnostic role of individual tests and their combinations; identify the features of individual indicators. Master the methodology for carrying out clinical examination of productive animals as a set of planned activities, taking blood from different types of animals, master safety precautions when working with animals and biomaterial, prevent the development of diseases in order to create healthy, highly productive herds.

2. THE LIST OF THE PLANNED RESULTS OF THE DISCIPLINE (MODULE), CORRELATED WITH THE PLANNED RESULTS OF THE REALISED EDUCATIONAL PROGRAM

As a result of mastering the discipline, the student prepares for the following types of activities, in accordance with the educational standard of the FSE on 05.36.01 "Veterinary Medicine".

The field of professional activity:

13 Agriculture

2.1. The student's competencies formed (acquired) as a result of mastering the discipline

Requirements for the results of mastering the discipline: The graduate of the discipline should form the following competencies:

PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program

PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.

PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules.

PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals.

PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis

PC-2 ID-4 To be able to take samples of animal biological material for laboratory research.

PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory

PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis.

PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals

PC-2 ID-8 To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal studies, including X-ray examinations.

PC-2 ID-11 To possess skills of the technique of setting functional tests for animals.

PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material

PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods

PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases

PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies.

PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination.

PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.

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

The discipline Б1.В.13 " HEMATOLOGY " according to the curriculum is a part formed by participants of educational process of the first block, it is mastered in full-time education in the 7th semesters.

When teaching the discipline "Hematology," the knowledge and skills acquired by students in mastering the disciplines of biophysics, zoology, histology and embryology, animal anatomy, biochemistry, physiology, pathological physiology, clinical diagnostics, and laboratory diagnostics are used.

The discipline "Hematology" is the discipline of Block 1 of the Curriculum, on which most subsequent disciplines are built, such as:

1. Internal non-communicable diseases.
2. Operative surgery with topographic anatomy.
3. General and private surgery.
4. Pathological anatomy and forensic veterinary examination.
5. Veterinary and sanitary examination.
6. Obstetrics and gynecology.
7. Diseases of laboratory, small and exotic animals.
8. Epizootology
9. Parasitology

4. THE SCOPE OF DISCIPLINE AND TYPES OF ACADEMIC WORK

4.1. The scope of the discipline for full-time education

Type of educational work	Hours	Semesters
		7
Classroom classes (total)	**72/2**	**72/2**
Including:	**-**	**-**
Lectures, including interactive forms	16	16
Practical lessons (PL), including interactive forms, among which are:	16	16
practical training (PT)	4	4
Self-study	**40**	**40**
Type of intermediate and final certification (test, exam)	Test	Test
Total labor intensity hours/credits	**72/2**	**72/2**

5. THE CONTENT OF THE DISCIPLINE AND TYPES OF CLASSES
5.1. The content of the discipline (full-time education)

#	The title	Achieved competences	Semester	Types of academic work, including students' self-study and labor intensity (in hours)			
				Lectures	Practical lessons	Practical training	Self-study
1.	General information about the blood system. Main stages of development of hematology. Characteristics of the blood system of humans and laboratory animals. Embryonic hematopoiesis. The doctrine of the hematopoietic stem cell. Theories of hematopoiesis. Modern scheme of hematopoiesis. Regulation of hematopoiesis. Introduction to hematology. Introduction to equipment used in hematology. Rules for collecting blood from farm and laboratory animals. Technique for preparing slides, preparing, fixing and staining peripheral blood smears (practical work).	**PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program** PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules. PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals. **PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis** PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals PC-2 ID-8 To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal studies, including X-ray examinations. PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material **PC-3. To set the diagnose based on the analysis of anamnesis, general,**	**7**	**2**	**2**		**5**

		special (instrumental) and laboratory research methods PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination.					
2.	Morphofunctional characteristics of red blood cells in normal and pathological conditions. Erythron kinetics. Erythrocyte. Pathological forms of red blood cells. Red blood cell counting. Hemoglobinometry. Determination of hematocrit, erythrocyte indices (knowledge control, practical work)	**PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program** PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods. PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules. PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals. **PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis** PC-2 ID-4 To be able to take samples of animal biological material for laboratory research. PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis. PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals PC-2 ID-8 To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal studies, including X-ray examinations. PC-2 ID-11 To possess skills of the technique of setting functional tests for	**7**	**2**		**2**	**5**

		animals. PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material **PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods** PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies. PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination. PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.					
3.	Morphofunctional characteristics of white blood cells in normal and pathological conditions. Leukocyte kinetics. Pathological forms of leukocytes. Erythrocytometry. Staining of preparations, counting and studying the morphology of reticulocytes (knowledge control, practical work). Determination of osmotic resistance and erythrocyte sedimentation rate (knowledge control, practical work).	**PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program** PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods. PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules. PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals. **PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis** PC-2 ID-4 To be able to take samples of animal biological material for laboratory research.	**7**	**2**		**2**	**5**

		PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis. PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals PC-2 ID-8 To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal studies, including X-ray examinations. PC-2 ID-11 To possess skills of the technique of setting functional tests for animals. PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material **PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods** PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies. PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination. PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.					
4.	Morphofunctional characteristics of platelets in normal and pathological conditions. Platelet kinetics. The	**PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program** PC-1 ID-5 To be able to establish a preliminary diagnosis based on	**7**	**2**	**2**		**5**

	concept of hemostasis. Vascular-platelet hemostasis (VTH). Methods for assessing the functional state of the growth hormone. Coagulation hemostasis (CH). Methods for assessing the functional state of the CG. Anticoagulants. Fibrinolytic system. Hemorrhagic diathesis and syndromes (etiology, classification, pathogenesis, clinical and laboratory characteristics). Thrombophilia. DIC syndrome. Determination of the total number of leukocytes. Study of the morphology of peripheral blood leukocytes (knowledge control, practical work).	anamnesis analysis and clinical research, using general methods. PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules. PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals. **PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis** PC-2 ID-4 To be able to take samples of animal biological material for laboratory research. PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis. PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals PC-2 ID-8 To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal studies, including X-ray examinations. PC-2 ID-11 To possess skills of the technique of setting functional tests for animals. PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material **PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods** PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases					

		PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies. PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination. PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.					
5.	Anemia. General information (etiology, classification, nonspecific and specific clinical and laboratory manifestations). Posthemorrhagic anemia (etiology, classification, pathogenesis, clinical and hematological picture, laboratory diagnostics). Hemolytic anemia (etiology, classification, pathogenesis, clinical and hematological picture, laboratory diagnostics). Iron-, B12- and folate-deficiency anemia (etiology, classification, pathogenesis, clinical and hematological picture, laboratory diagnostics). Hypo- and aplastic anemia (etiology, classification, pathogenesis, clinical and hematological picture, laboratory	**PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program** PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods. PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules. PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals. **PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis** PC-2 ID-4 To be able to take samples of animal biological material for laboratory research. PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis. PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals PC-2 ID-8 To know the safe rules of operation with digital equipment,	**7**	**2**	**2**		**5**

	diagnostics). Counting and studying platelet morphology. Calculation of leukocyte formula (practical work)	tools and equipment, used in special (instrumental) animal studies, including X-ray examinations. PC-2 ID-11 To possess skills of the technique of setting functional tests for animals. PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material **PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods** PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies. PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination. PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.					
6.	Leukocytosis and leukemoid reactions (etiology, classification, pathogenesis, clinical and hematological picture, laboratory diagnostics). Leukopenia (etiology, classification, pathogenesis, clinical and hematological picture, laboratory diagnostics). Blood coagulation and anticoagulation systems in normal and pathological conditions. Methods for assessing the functional state of vascular-platelet	**PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program** PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods. PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules. PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals. **PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to**	**7**	**2**	**2**		**5**

	and coagulation hemostasis.	**clarify the diagnosis** PC-2 ID-4 To be able to take samples of animal biological material for laboratory research. PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis. PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals PC-2 ID-8 To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal studies, including X-ray examinations. PC-2 ID-11 To possess skills of the technique of setting functional tests for animals. PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material **PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods** PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies. PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination. PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.					

7.	Leukemia. General information (etiology, pathogenesis, clinical and hematological picture, laboratory diagnostics). Classification, differential clinical and hematological characteristics and principles of treatment of acute leukemia. Principles of therapy for chronic leukemia. Methods for collecting bone marrow from farm and laboratory animals. Counting the total number of myelokaryocytes. Preparation, fixation and staining of bone marrow preparations. Study of the morphology of myelokaryocytes. Myelogram counting. Determination of bone marrow indices (practical work).	**PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program** PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods. PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules. PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals. **PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis** PC-2 ID-4 To be able to take samples of animal biological material for laboratory research. PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis. PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals PC-2 ID-8 To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal studies, including X-ray examinations. PC-2 ID-11 To possess skills of the technique of setting functional tests for animals. PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material	**7**	**2**	**2**		**5**

		PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies. PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination. PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.					
8.	Malignant lymphomas (non-Hodgkin's lymphomas, lymphogranulomatosis). Etiology, classification, pathogenesis, clinical and hematological picture, laboratory diagnostics, principles of treatment. Pathological forms of erythrocytes and leukocytes (study of peripheral blood and bone marrow smears).	**PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program** PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods. PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules. PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals. **PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis** PC-2 ID-4 To be able to take samples of animal biological material for laboratory research. PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis. PC-2 ID-7 To know the indication for the use of digital equipment, special	**7**	**2**	**2**		**5**

		(instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals PC-2 ID-8 To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal studies, including X-ray examinations. PC-2 ID-11 To possess skills of the technique of setting functional tests for animals. PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material **PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods** PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies. PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination. PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.					
TOTAL FOR THE 7 TH SEMESTER:				**16**	**12**	**4**	**40**

6. THE LIST OF EDUCATIONAL AND METHODOLOGICAL SUPPORT FOR STUDENTS' SELF WORK

6.1. Guidelines for self -work

1. Methodological instructions for completing course work in the discipline "Clinical Diagnostics" for students in the specialty "Veterinary Medicine" / compiled by: S. P. Kovalev [etc.]; Ministry of Agriculture of the Russian Federation, SPbGAVM. - St. Petersburg: Publishing house SPbGAVM, 2015. - 27 p. – URL: https://clck.ru/Vnb8s (date of access: 23/06/2025). - Access mode: for authorization. users of the SPbSUVM EB.

2. Clinical diagnostics: guidelines for students of the veterinary faculty of distance learning / compiled by: S. P. Kovalev, V. A. Trushkin; Ministry of Agriculture of the Russian Federation, SPbGAVM. – St. Petersburg: Publishing house SPbGAVM, 2013. - 26 p.

3. Methodological recommendations for organizing independent work in the disciplines "Clinical Diagnostics", "Hematology", "Laboratory Diagnostics", "Instrumental Diagnostic Methods" for students studying in the specialty "Veterinary Medicine" / compiled by: S. P. Kovalev [etc. .]; Ministry of Agriculture, SPbGAVM. - St. Petersburg: Falcon Print, 2019. - 26 p. – URL: https://clck.ru/eYPBz (date of access: 23/06/2025). - Access mode: for authorization. users of the SPbSUVM EB.

6.2. Literature for self-work

1. Kesareva, E. A. Clinical interpretation of biochemical parameters of blood serum of dogs and cats / E. A. Kesareva, V. N. Denisenko. - Moscow: KolosS, 2011. - 29 p.

2. Kovalev, S. P. Clinical assessment of hematological studies in farm animals: guidelines / S. P. Kovalev; Ministry of Agriculture of the Russian Federation, SPbGAVM. – St. Petersburg: Publishing house SPbGAVM, 2004. - 40 p.

5. Zelenevsky, N.V. Workshop on veterinary anatomy: textbook: in 3 volumes. T. 1. Somatic systems / N. V. Zelenevsky. - St. Petersburg: ISOT: NIK, 2007. - 304 p.: ill. – URL: https://clck.ru/R6zBq (date of access: 23/06/2025). - Access mode: for authorization. users of the SPbSUVM EB.

6.Zelenevsky, N.V. Workshop on veterinary anatomy: a textbook for university students. T. 2. Splanchnology and angiology / N. V. Zelenevsky. - 3rd ed., revised. and additional – St. Petersburg, Logos, 2006. - 160 p. - URL: https://clck.ru/R77Kh (access date 23/06/2025). - Access mode: for authorization. users of the SPbSUVM EB.

7. Zelenevsky, N.V. Workshop on veterinary anatomy: a textbook for university students. T. 3. Neurology. Sense organs. Features of the structure of poultry / N. V. Zelenevsky, A. A. Stekolnikov, K. V. Plemyashov; ed. N.V. Zelenevsky. - St. Petersburg: Logos, 2005. - 132 p. – URL: https://clck.ru/ebnFX (date of access: 23/06/2025). - Access mode: for authorization. users of the SPbSUVM EB.

7. THE LIST OF BASIC AND ADDITIONAL LITERATURE NECESSARY FOR THE EDUCATION OF THE DISCIPLINE

7.1. Basic literature

1. Clinical diagnostics with radiology: textbook / E. S. Voronin, G. V. Snoz, M. F. Vasiliev [etc.]; ed. E. S. Voronina. - Moscow: KolosS, 2006. - 509 p.: ill. - (Textbooks and study guides for university students).

2. Workshop on clinical diagnostics with radiology: textbook / E. S. Voronin, S. P. Kovalev, G. V. Snoz [etc.]; under general ed. E. S. Voronina, G. V. Snoza. - Moscow: INFRA-M, 2014. - 336 p.

7.2. Additional literature

1. Stekolnikov, A. A. X-ray diagnostics in veterinary medicine: textbook: [approved by the Ministry of Agriculture of the Russian Federation for university students] / A. A. Stekolnikov, S. P. Kovalev, M. A. Narusbaeva. – St. Petersburg: SpetsLit, 2016. - 379 p.
2. Microelementoses of farm animals: a textbook for students of veterinary faculties / S.P. Kovalev, A.P. Kurdeko, Shcherbakov Grigory Gavrilovich [and others]; S. P. Kovalev, A. P. Kurdeko, G. G. Shcherbakov [and others]; ed. S. P. Kovalev; Ministry of Agriculture of the Russian Federation, SPbGAVM. - St. Petersburg: SPbGAVM, 2013. - 132 p. - URL: https://clck.ru/ekrWA (date of access: 23/06/2025). - Access mode: for authorization. users of the SPbSUVM EB.

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

To prepare for laboratory classes and perform self-work, students can use the following online resources:

1. http://fsvps.ru The official website of the Federal Service for Veterinary and Phytosanitary Surveillance.
2. http://www.mcx.ru/ Official website of the Ministry of Agriculture
3. http://vetexpert.pro The portal "Veterinary expertise".
4. http://www.gost.ru Official website of the Federal Agency for Technical Regulation and Metrology.
5. http://www.kodeks.ru The electronic fund of normative documents "Code".
6. https://standartgost.ru An open database of GOST standards and other regulatory documents.
7. http://docs.cntd.ru Electronic fund of legal and regulatory and technical documentation

Electronic library systems

1. ELS "SPBGUVM"
2. Legal reference system "ConsultantPlus"
3. University information system "RUSSIA"
4. Full-text database POLPRED.COM
5. Scientific electronic Library ELIBRARY.RU
6. Russian Scientific Network
7. Full-text interdisciplinary database on agricultural and environmental sciences ProQuest AGRICULTURAL AND ENVIRONMENTAL SCIENCE DATABASE
8. Electronic books of the publishing house "Prospekt Nauki" http://prospektnauki.ru/ebooks/
9. Collection "Agriculture. Veterinary medicine" publishing house "Quadro" ELS "Elibris" publishing house "Quadro" https://elibrica.com/

9. METHODOLOGICAL GUIDELINES FOR STUDENTS ON EDUCATION OF THE DISCIPLINE

Methodological recommendations for students are a set of recommendations and explanations that allow them organize the process of studying this discipline optimally.

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

• Tips on planning and organizing the time needed to study the discipline. Description of the sequence of actions of the student, or the "scenario of studying the discipline".

Morning time is the most effective for academic work (from 8-14 hours), followed by afternoon time (from 16-19 hours) and evening time (from 20-24 hours). 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 is required (10-15 minutes), after 4 hours of work, the break should be 1 hour. Part of the scientific organization of labor is the master of the technique of mental labor. Normally, a student should devote about 10 hours a day to studying (6 hours at university, 4 hours at home).

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

By taking notes of written sources, the student has the opportunity to read again the desired passage of the 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. Listening to the lecture, the student should transist most of the complexity of the above–mentioned works 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 of a lecture, it is recommended, to leave separate fields on each page for subsequent entries in addition to the summary.

After recording a lecture or making a summary of it, you should not leave work on the lecture material before preparing for the test. It is necessary to do as early as possible the work that accompanies takimg notes of written sources, the last could not be done during the recording of the lecture - read your notes, deciphering individual abbreviations, analyze the text, establish logical connections between its elements, in some cases show them graphically, highlight the main thoughts, mark issues, requiring additional processing, in particular, the teacher's consultations.

When working on the text of the lecture, the student should pay special attention to the problematic issues, raised by the teacher, during the lecture, as well as to his assignments and recommendations.

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

• Recommendations for preparing for practical classes

Practical (seminar) classes are an important part of the professional training of students. The main purpose of conducting practical (seminar) classes is to form students' analytical, creative thinking through the acquisition of practical skills. Practical classes are also conducted in order to deepen and consolidate the knowledge gained in lectures and in the process of independent work on normative documents, educational and scientific literature. For student, it is necessary, to study or repeat theoretical material on a given topic when preparing for a practical lesson for students.

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

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

2) study the literature sources that have been recommended and familiarize yourself with the introductory notes to the relevant sections.

Methodological guidelines 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 curricula of the disciplines in the sections "List of topics of practical (seminar) classes".

The most important component of any form of practical training are tasks. The basis of the task is an example that is understood from the standpoint of the theory developed in the lecture. As a rule, the main attention is paid to the formation of specific skills, which determines the content of students' activities - problem solving, laboratory work, clarification of 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 attitude 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 verify the correctness of previously acquired knowledge;

- initiate skills of independent self-thinking, oral presentation;

- contribute to the free use of terminology;

-provide the teacher with the opportunity to systematically monitor the level of independent work of students.

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

• Recommendations for working with literature.

Working with literature is an important stage of the student's self-work on mastering the subject, contributing not only to the consolidation of knowledge, but also to the expansion of horizons, mental abilities, memory, the ability to think, express and confirm personal hypotheses and ideas. In addition, the skills of research work necessary for further professional activityare developed.

When starting to study the literature on the topic, it is necessary to make notes, extracts, notes. It is mandatory to take notes of the works of theorists, which allow us to comprehend the theoretical basis of the study. For the rest, you can limit yourself to summary from the studied sources. All summaries and quotations must have the exact "return address" (author, title of the work, year of publication, page, etc.). It is advisable to write an abbreviated title of the question to which the extract or quotation refers. In addition, it is necessary to learn how to immediately compile a file of special 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, abstract journals. At the same time, publications of sources (articles, book titles, etc.) should be written on separate cards, which must be filled in according to 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 more judgments or facts on another issue, then they should be written out on a separate card. The presentation should be concise, accurate, without subjective assessments. On the back of the card, you can make your own notes about this book or article, its content, structure, on which sources it is written, etc.

• Explanations about working with control and test materials for the course, recommendations for completing homework.

Testing allows you to determine whether the actual behavior of the program corresponds to the expected one 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 under test or part of it. Each question in the discipline must be answered correctly by choosing one option.

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 and moral, civil and patriotic values, a system of aesthetic and ethical knowledge and values, attitudes of tolerant consciousness in society, the formation of students' need for work as the first vital necessity, the highest value and the main way to achieve success in life, to realize the social significance of your future profession.

11. THE LIST OF INFORMATION TECHNOLOGIES USED IN THE IMPLEMENTATION OF THE EDUCATIONAL PROCESS

11.1 Information technologies

For the educational process of the discipline is previewed the use of information technologies:

- **practical classes using multimedia;**
- **interactive technologies (dialogues, collective discussion on various topics for realization a particular educational and professional task);**
- **interaction with students via e - mail;**
- **community work in the electronic information and educational environment of St. Petersburg State University: https://spbguvm.ru/academy/eios/**

11.2. Software

The list of licensed and free- distributed software, including national programs

№ п/п	Technical and computer programs recommended by sections and topics of the program	License
1	MS PowerPoint	67580828
2	LibreOffice	free software
3	OS Alt Education	AAO.0022.00
4	ABIS “ MARK-SQL”	02102014155
5	MS Windows 10	67580828
6	System Consult Plus	503/КЛ
7	Android OS	free software

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

The title of the discipline (module), practice in accordance with the curriculum	**The title of special rooms and rooms for self-work**	**Equipment of special rooms and rooms for self-work**
Veterinary and sanitary expertise	101 (196084, St. Petersburg, Chernigovskaya str., 5, lit.G) Classroom for lecture-type classes, seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification	*Specialized furniture*: desks, chairs *Technical training tools*: video projector, slide presentations on the parts of the discipline

	103 (196084, St. Petersburg, Chernigovskaya str., 5, lit.G) Classroom for lecture-type classes, seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification	*Specialized furniture*: desks, chairs *Technical training tools*: video projector, slide presentations on the parts of the discipline
	109 (196084, St. Petersburg, Chernigovskaya str., 5, lit.G) Classroom for lecture-type classes, seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification	*Specialized furniture*: desks, chairs *Technical teaching aids: table scales, drying cabinet, tripods, KFK, microscopes.*
	206 Large reading room (196084, St. Petersburg, Chernigovskaya str., 5) Room for self-work	*Specialized furniture:* tables, chairs *Technical means of education:* computers connected to the Internet and access to an electronic information and educational environment
	214 Small reading room (196084, St. Petersburg, Chernigovskaya str., 5) Room for self-work	*Specialized furniture:* tables, chairs *Technical means of education:* computers connected to the Internet and access to an electronic information and educational environment
	324 Information Technology Department (196084, St. Petersburg, Chernigovskaya str., 5) Room for storage and preventive maintenance of educational equipment	*Specialized furniture: tables,* chairs, special equipment, materials and spare parts for preventive maintenance of technical training facilities
	Box No. 3 Carpentry workshop (196084, St. Petersburg, Chernigovsaya str., 5) Room for storage and preventive maintenance of educational equipment	*Specialized furniture: tables,* chairs, special equipment, materials and spare parts for preventive maintenance of technical training facilities

Developers:

Head of the department
of clinical diagnostics,
doctor of veterinary medicine, professor — Kovalev S.P.

Associate Professor of the Department of clinical diagnostics,
candidate of veterinary sciences — Trushkin V.A.

Annex 1

Ministry of Agriculture of the Russian Federation
Federal State Budgetary Educational Institution
of higher education
"Saint Petersburg State University of Veterinary Medicine"

Department of clinical diagnostics

FUND OF ASSESMENT TOOLS
for the discipline
"HEMATOLOGY"

Level of higher education
SPECIALIST COURSE

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 FUND OF ASSESMENT TOOLS

№	Acquired competence	Assessed modules of a discipline	Assesment tool
1	**PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program** PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods. PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules. PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals. **PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis** PC-2 ID-4 To be able to take samples of animal biological material for laboratory research. PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis. PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals PC-2 ID-8 To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal	General information about the blood system.	Test
2		Morphofunctional characteristics of red blood cells in normal and pathological conditions	Test
3		Morphofunctional characteristics of white blood cells in normal and pathological conditions	Test
4		Morphofunctional characteristics of platelets in normal and pathological conditions	Test
5		Anemia. General information	Test
6		Leukocytosis	Test
7		Leukemia	Test
8		Pathological forms of erythrocytes and leukocytes	Test

	studies, including X-ray examinations. PC-2 ID-11 To possess skills of the technique of setting functional tests for animals. PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material **PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods** PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies. PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination. PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.		

List of assessment tools

№	Name of the assessment tool	Brief description of the assesment tool	Presentation of the assessment tool in the fund
1.	Test	A system of standardized tasks, which allows to automate the assessment of students knowledge and skills	A fund of test assignments
2.	Credit	A means of monitoring the assimilation of educational material in all sections of the discipline, organized in the form of an interview between the teacher and the students and the student’s answer to test questions	Questions for acception credit

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

Planned results of competency acquaired	The level of development				Assesment tool
	Unsatisfactory	Satisfactory	Good	Exellent	
PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program					
PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.	The level of knowledge is below the minimum requirements, gross errors have occurred	The minimum acceptable level of knowledge, many minor errors have been made	The level of knowledge corresponds to the training program, several minor errors have been made	The level of knowledge corresponds to the training program, no errors have been made	Test, colloquium
PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules.	Basic skills were not demonstrated in solving standard tasks, and gross errors occurred	Basic skills have been demonstrated, typical problems have been solved with minor errors, all tasks have been completed, but not in full	All the basic skills have been demonstrated, all the main tasks have been solved with minor errors, all the tasks have been completed in full, but some with flaws	All basic skills have been demonstrated, all main tasks have been solved with some minor flaws, all tasks have been completed in full	Test, colloquium

PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals.	When solving standard problems basic skills were not demonstrated, gross errors occurred	There is a minimum set of skills to solve standard tasks with some shortcomings	When solving standard problems basic skills were not demonstrated with some flaws	Skills were demonstrated in solving non-standard tasks without errors and flaws	Test, colloquium
PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis					
PC-2 ID-4 To be able to take samples of animal biological material for laboratory research.	The level of knowledge is below the minimum requirements, gross errors have occurred	The minimum acceptable level of knowledge, many minor errors have been made	The level of knowledge corresponds to the training program, several minor errors have been made	The level of knowledge corresponds to the training program, no errors have been made	Test, colloquium
PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory	Basic skills were not demonstrated in solving standard tasks, and gross errors occurred	Basic skills have been demonstrated, typical problems have been solved with minor errors, all tasks have been completed, but not in full	All the basic skills have been demonstrated, all the main tasks have been solved with minor errors, all the tasks have been completed in full, but some with flaws	All basic skills have been demonstrated, all main tasks have been solved with some minor flaws, all tasks have been completed in full	Test, colloquium

PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis.	When solving standard problems basic skills were not demonstrated, gross errors occurred	There is a minimum set of skills to solve standard tasks with some shortcomings	When solving standard problems basic skills were not demonstrated with some flaws	Skills were demonstrated in solving non-standard tasks without errors and flaws	Test, colloquium
PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals	The level of knowledge is below the minimum requirements, gross errors have occurred	The minimum acceptable level of knowledge, many minor errors have been made	The level of knowledge corresponds to the training program, several minor errors have been made	The level of knowledge corresponds to the training program, no errors have been made	Test, colloquium
PC-2 ID-8 To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal studies, including X-ray examinations.	Basic skills were not demonstrated in solving standard tasks, and gross errors occurred	Basic skills have been demonstrated, typical problems have been solved with minor errors, all tasks have been completed, but not in full	All the basic skills have been demonstrated, all the main tasks have been solved with minor errors, all the tasks have been completed in full, but some with flaws	All basic skills have been demonstrated, all main tasks have been solved with some minor flaws, all tasks have been completed in full	Test, colloquium
PC-2 ID-11 To possess skills of the technique of setting functional tests for animals.	When solving standard problems basic skills were not demonstrated, gross errors occurred	There is a minimum set of skills to solve standard tasks with some shortcomings	When solving standard problems basic skills were not demonstrated with some flaws	Skills were demonstrated in solving non-standard tasks without errors and flaws	Test, colloquium

PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material	Basic skills were not demonstrated in solving standard tasks, and gross errors occurred	Basic skills have been demonstrated, typical problems have been solved with minor errors, all tasks have been completed, but not in full	All the basic skills have been demonstrated, all the main tasks have been solved with minor errors, all the tasks have been completed in full, but some with flaws	All basic skills have been demonstrated, all main tasks have been solved with some minor flaws, all tasks have been completed in full	Test, colloquium
PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods					
PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases	Basic skills were not demonstrated in solving standard tasks, and gross errors occurred	Basic skills have been demonstrated, typical problems have been solved with minor errors, all tasks have been completed, but not in full	All the basic skills have been demonstrated, all the main tasks have been solved with minor errors, all the tasks have been completed in full, but some with flaws	All basic skills have been demonstrated, all main tasks have been solved with some minor flaws, all tasks have been completed in full	Test, colloquium
PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies.	The level of knowledge is below the minimum requirements, gross errors have occurred	The minimum acceptable level of knowledge, many minor errors have been made	The level of knowledge corresponds to the training program, several minor errors have been made	The level of knowledge corresponds to the training program, no errors have been made	Test, colloquium

PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination.	Basic skills were not demonstrated in solving standard tasks, and gross errors occurred	Basic skills have been demonstrated, typical problems have been solved with minor errors, all tasks have been completed, but not in full	All the basic skills have been demonstrated, all the main tasks have been solved with minor errors, all the tasks have been completed in full, but some with flaws	All basic skills have been demonstrated, all main tasks have been solved with some minor flaws, all tasks have been completed in full	Test, colloquium
PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.	The level of knowledge is below the minimum requirements, gross errors have occurred	The minimum acceptable level of knowledge, many minor errors have been made	The level of knowledge corresponds to the training program, several minor errors have been made	The level of knowledge corresponds to the training program, no errors have been made	Test, colloquium

3. A LIST OF CONTROL TASKS AND OTHER MATERIALS, NECESSARY FOR THE ASSESSMENT OF KNOWLEDGE, SKILLS AND WORK EXPERIENCE

3.1. Typical tasks for the current control of academic progress

3.1.1 Questions for colloquium

The competence achieved:

PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program

PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.

PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules.

PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals.

1. What is blood? What are its main functions?
2. Briefly outline the history of the development of domestic veterinary hematology.
3. Which of the domestic scientists made the greatest contribution to the development of veterinary hematology. What are the specific merits of each of them?
4. What are the prospects for further development of veterinary hematology?
5. Give a blood test diagram and what does each section include?
6. Briefly describe the methods for determining ESR in animals.
7. What factors of the external and internal environment have the greatest impact on ESR?
8. Indicate the ESR indicators in healthy horses and cattle (in the latter case, with a vertical and inclined position of the tripod).
9. What are the changes in ESR in pathology?
10. What is ESR, what does it indicate and in what diseases is it observed?
11. Physiological functions of hemoglobin and the clinical significance of its determination in the blood?
12. What are oxyhemoglobin, carboxyhemoglobin and methemoglobin? How does the latter differ from the former?
13. Name the methods for determining the amount of hemoglobin. What principles are these methods based on and what is the advantage of one over the other?
14. What changes in the amount of hemoglobin occur in pathology? What are these changes called?
15. Name the diseases. Which are accompanied by a change in the amount of hemoglobin.
16. What are the formed elements of blood? What are the physiological functions of each?
17. What methods can be used to determine the number of red blood cells in the blood of animals? What principles are these methods based on?

PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis

PC-2 ID-4 To be able to take samples of animal biological material for laboratory research.

PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory

PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis.

PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals

PC-2 ID-8 To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal studies, including X-ray examinations.

PC-2 ID-11 To possess skills of the technique of setting functional tests for animals.

PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material

18. Give a complete description of Goryaev's counting chamber: structure, area, dimensions, volume of the entire chamber.

19. How does erythrocyte melangeur differ from leukocyte melangeur, how and how many times is the blood diluted accordingly before counting them?

20. Briefly describe the method of counting erythrocytes and leukocytes in the Goryaev chamber.

21. Indicate and explain the formulas by which the number of erythrocytes and leukocytes is calculated.

22. What is the number of erythrocytes and leukocytes in healthy horses, cattle, small cattle and pigs and what are their changes in pathology?

23. Name at least three diseases that are accompanied by each change in the number of erythrocytes and leukocytes.

24. Why are blood smears made? What does a good blood smear mean?

25. Which blood smears are considered bad? What are the reasons for such smears?

26. What reaction should distilled water have when staining blood smears, how is it determined, and what needs to be done to be able to use it?

27. Indicate the composition of Romanovsky-Giemsa paint and describe the technique for staining blood smears using this method.

28. Why is supravital staining of blood smears performed, what paints are used?

29. Give a classification of leukocytes and explain why each type is called that.

30. Briefly give the morphological and chemical characteristics of granulocytes.

31. Briefly describe the morphology and chemical composition of agranulocytes.

32. What is a leukogram and by what methods can it be obtained?

33. Write leukograms of healthy horses, cattle, pigs and dogs. What are their similarities and differences?

PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods

PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases

PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies.

PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination.

PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.

34. What changes in leukograms occur in pathology and what are these changes called?

35. Name the changes in leukograms during acute septic processes and characterize these changes.

36. Give the classification of leukocytosis.

37. How to distinguish homogeneous leukocytosis from heterogeneous?

38. What types of neutrophilic leukocytosis occur in pathology, how are they characterized and what do they indicate?

39. Name at least three diseases that are accompanied by neutrophilic, lymphocytic, monocytic and eosinophilic leukocytosis.

40. What do they pay attention to when assessing the morphology of leukocytes, what changes occur and what do they indicate?

41. What do you pay attention to when assessing the morphology of erythrocytes.

42. Give a brief description of red blood cells in healthy animals and birds.

43. What are the changes in the morphology of red blood cells and what do these changes indicate?

44. Give the classification of granulocytes. What is the amount of them in the blood of healthy horses, cattle, and pigs?

45. What does an increase in the number of granulocytes in the blood indicate?

46. Why, where and how is bone marrow punctate taken?

47. What is determined in the bone marrow of animals) How do the results of bone marrow studies differ from those of blood in healthy animals?

48. What is the clinical significance of blood testing?

49. Describe anemic syndrome.

50. Hemorrhagic diathesis syndrome.

51. DIC syndrome.

3.1.2. Tests

PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program.

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PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules.

PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals.

PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis.

PC-2 ID-4 To be able to take samples of animal biological material for laboratory research.

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PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies.

PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination.

PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.

CLOSED-TYPE TASKS

PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program.

Tasks of a combined type with the choice of one correct answer from the suggested options

PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.

Task 1.

Read the text and choose the correct answer.

Blood is used for general clinical analysis.:
1.Capillary;
2.Arterial;
3. Venous;
4. It doesn't matter.
correct answer: 3

Task 2.

Read the text and choose the correct answer.

To determine the number of shaped blood elements, use:
1. Stabilized blood;
2. Blood serum;
3. Blood plasma;
4. It doesn't matter.

correct answer: 1

Task 3.

Read the text and choose the correct answer

An increase in the content of red blood cells in the blood is called:
1. Hyperchromia;
2. Erythrocytosis;
3. Thrombocytosis;
4. Erythropenia/
correct answer: 2

Tasks of a combined type with the choice of several correct answers from the suggested options

PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals.

Task 4.

Read the text and choose the correct answers.

Using the Goryaev camera, it is possible to determine the number of:
1.Hemoglobin;
2. Red blood cells;
3. Bilirubin;
4. White blood cells.
correct answers: 2, 4

Task 5.

Read the text and choose the correct answers.

To determine the erythrocyte sedimentation rate (ESR), the method is used:
1. Dervis and Vorobyov;
2. Panchenkov;
3. Westergren;
4. Sali.
correct answers: 2, 3

Closed-type tasks with compliance assignments

PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals.

Task 6.

Read the text and make a match.

Establish a correspondence between the equipment used and the studied indicators for their performance: for each position of the first column, select the corresponding position from the second column.

Equipment		**Investigated indicators**	
A	Goryaev's Camera	1	Determination of hemoglobin
B	The Panchenkov apparatus	2	Counting the shaped elements of blood
C	Hematocrit centrifuge	3	Erythrocyte sedimentation rate
D	Photoelectrocolorimeter	4	Determination of hematocrit

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer:A2, B3, C4, D1.

PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules.

Task 7.

Read the text and make a match.

Establish a correspondence between the terms and their meanings: for each position of the first column, select the corresponding position from the second column.

Term		**Meaning**	
A	Leukocytosis	1	Decrease in platelet count
B	Thrombocytopenia	2	An increase in the amount of hemoglobin
C	Erythrocytosis	3	An increase in the number of white blood cell
D	Hyperchromia	4	An increase in the number of red blood cells

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer: A3, B1, C4, D2

PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.

Task 8.

Read the text and make a match.

Establish a correspondence between the equipment used and the studied indicators for their performance: for each position of the first column, select the corresponding position from the second column.

Term		**Meaning**	
A	Eosinophilia	1	Decrease in the relative content of lymphocytes
B	Lymphocytopenia	2	An increase in the relative content of monocytes
C	Monocytosis	3	An increase in the relative neutrophil count
D	Neutrophilia	4	An increase in the relative content of eosinophils

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer: A4, B1, C2, D3

PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules.

Task 9.

Read the text and make a match.

Establish a correspondence between the equipment used and the studied indicators for their performance: for each position of the first column, select the corresponding position from the second column.

Units of measurement		**Indicators**	
A	mm/hr	1	The amount of hemoglobin
B	g/L	2	Hematocrit
C	%	3	White blood cell count
D	10^9/L	4	Erythrocyte sedimentation rate

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer: A4, B1, C2, D3

PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals.

Task 10.

Read the text and make a match.

Establish a correspondence between the equipment used and the studied indicators for their performance: for each position of the first column, select the corresponding position from the second column.

The reagent		**The research method**	
A	0,9% NaCl	1	Determination of the white blood cell count
B	Turk's Liquid	2	Determination of hemoglobin
C	5% Sodium citrate	3	Determination of the number of red blood cells
D	0.024N ammonia solution	4	Erythrocyte sedimentation rate

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer: A3, B1, C4, G2.

Closed-type tasks for establishing the sequence

PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals.

Task 11.

Read the text and set the sequence.

Arrange the steps for determining the number of white blood cells in the blood in the correct sequence. Write down the numbers in the correct sequence.

1.Add 20 μl of test blood;

2.Mix it up;

3. Fill a test tube with 0.4 ml of Turk liquid,

4. Charge the Goryaev chamber with the solution.

5. Count white blood cells in 100 large squares.

correct answer:3,1,2,4,5

Task 12.

Read the text and set the sequence.

Arrange the stages of painting the May-Grunwald brushstroke in the correct sequence. Write down the numbers in the correct sequence.
1. Add distilled water;
2. Exposure time is 15 minutes;
3. Exposure time is 3 minutes;
4. Apply May-Grunwald dye to the smear;
5. Rinse the smear under running water.
correct answer: 4,3,1,2,5.

Task 13.

Read the text and set the sequence.

Arrange the elements of the process of receiving blood from peripheral veins in the correct sequence. Write down the numbers in the correct sequence.
1. Applying a tourniquet;
2.Removal of hair from the location of the vein;
3. Waiting for the vein to fill;
4.Introduction of a vacuum system silt into a vein;
5.Attaching the tube to the vacuum system;
6.Skin treatment with 70% ethanol.
correct answer: 2,1,6,3,4,5.

Task 14.

Read the text and set the sequence.

Arrange the elements of the process of determining the erythrocyte sedimentation rate using the Panchenkov method in the correct sequence. Write down the numbers in the correct sequence.
1. Fill the blood sample into the Panchenkov capillary twice up to the "K" mark;
2. Fill the Panchenkov capillary with a 5% sodium citrate solution to the "R" mark
3. Blow the contents onto the watch glass;
4.Mix it up;
5.Place the capillary vertically in a tripod for 1 hour;
6. Fill the mixture into the Panchenkov capillary to the mark "0".
correct answer: 2,3,1,3,4,6,5.

Task 15.

Read the text and set the sequence.

Arrange the steps for determining the hemoglobin content according to the Derviz and Vorobyov method in the correct sequence. Write down the numbers in the correct sequence.
1. Collect 20 μl of blood and add it to one of the test tubes;
2.Mix it up;
3.Add 4 ml of 0.024 n ammonia solution to two test tubes.;
4. Convert the optical density of the solution to the hemoglobin content according to the table.
5.Colorimetry on the FEC (green light filter) against 0.024 N ammonia solution.
correct answer: 3,1,2,5,4.

AN OPEN TYPE TASK

PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.

Task 16.

Read the text of the assignment and write down a detailed, reasoned answer.

What are the main reasons for the decrease in red blood cell count? Write down a detailed, reasoned answer.

Answer: most often, a decrease in the number of red blood cells is observed after heavy bleeding, with a number of acute infectious diseases, poisoning with hemolytic poisons, with prolonged auto-intoxication, with blood parasitic diseases, leukemias, and malignant neoplasms.

Task 17.

Read the text of the assignment and write down a detailed, reasoned answer.

Describe the morphology of the segmented neutrophil in the stained blood smear. Write down a detailed, reasoned answer.

Answer: the cell is rounded, medium-sized, the nucleus is elongated with three or more constrictions, the cytoplasm has a fine basophilic grain.

Task 18.

Read the text of the assignment and write down a detailed, reasoned answer.

In what cases does the relative content of eosinophils increase in the leukogram? Write down a detailed, reasoned answer.

Answer: an increase in the relative content of eosinophils (eosinophilia) is observed in: immediate allergic reactions, many parasitic diseases, when biologics (vaccines, serums) are administered to animals, with leukemia, eosinophilic myositis, ulcerative colitis.

PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals.

Task 19.

Read the text of the assignment and write down a detailed, reasoned answer.

What can cause an increase in hematocrit? Write down a detailed, reasoned answer.

Answer: an increase in hematocrit is observed in diarrhea, polyuria, vomiting, emphysema, the formation of edema and watery spots, polycythemia.

Task 20.

Read the text of the assignment and write down a detailed, reasoned answer.

Name the most commonly used substances used to stabilize blood. Write down a detailed, reasoned answer.

Answer: sodium citrate, heparin, EDTA.

CLOSED-TYPE TASKS

PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis.

Tasks of a combined type with the choice of one correct answer from the suggested options

PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory

Task 1.

Read the text and choose the correct answer.

The determination of hemoglobin content in the blood is carried out using:

1. Goryaev's Chambers;
2. Panchenkov's capillary;
3. Hematocrit centrifuge;
4. Photoelectrocolorimeter.

correct answer: 4

Task 2.

Read the text and choose the correct answer

Platelets take part in the process:

1.Oxygen transportation;

2.Synthesis of immunoglobulins;

3. Blood clotting;

4. Elimination of nitrogenous compounds.
correct answer: 3

Task 3.

Read the text and choose the correct answer

To remove leukograms from cattle, the method is used:
1. Four-floor;
2. Three-floor;
3. One-floor;
4. Stepwise.
correct answer: 2

Tasks of a combined type with the choice of several correct answers from the suggested options

PC-2 ID-4 To be able to take samples of animal biological material for laboratory research.

Task 4.

Read the text and choose the correct answers.

To determine the hematocrit, the following method is used:
1. Centrifuge;
2.Settlement account;
3.Chemical;
4. Gravity.
correct answers:1, 2

Task 5.

Read the text and choose the correct answers.

To assess the severity of anemia, it is necessary to take into account the following indicators::
1. The number of red blood cells;
2. White blood cell count;
3. Hemoglobin content;
4. The relative content of lymphocytes.

correct answers:1, 3

Closed-type tasks with compliance assignments

PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory

Task 6.

Read the text and make a match.

Establish a correspondence between the method of leukogram extraction and the scope of its application: for each position of the first column, select the corresponding position from the second column.

Method		**Scope of application**	
A	Four-floor	1	For animals with lymphocytic blood profile
B	Three- floor	2	For animals with neutrophilic blood profile
C	One-floor	3	In the diagnosis of leukemia
D	Stepwise	4	When removing leukograms from primates

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer:A2, B1, C4, G3

Task 7.

Read the text and make a match.

Establish a correspondence between the term and its meaning: for each position of the first column, select the corresponding position from the second column.

Term		**Meaning**	
A	Erythrocytosis	1	Decrease in the number of platelets in the blood
B	Leukopenia	2	Decrease in the number of white blood cells in the blood
C	Thrombocytopenia	3	An increase in the number of lymphocytes in the blood
D	Lymphocytosis	4	An increase in the number of red blood cells in the blood

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer: A4, B2, C1, D3

PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis.

Task 8.

Read the text and make a match.

Establish a correspondence between the reagent and the research method: for each position of the first column, select the corresponding position from the second column.

The reagent		**Method**	
A	May-Grunwald Dye	1	Detection of reticulocytes in a smear
B	1% ammonium oxalate solution	2	Smear staining for leukogram removal
C	Brilliant Cresyl Blue	3	Determination of osmotic resistance of erythrocytes
D	0.7-0.22% NaCl solutions	4	Counting the number of platelets

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer: A2, B4, C1, G3

Task 9.

Read the text and make a match.

Establish a correspondence between units of measurement and indicators: for each position of the first column, select the corresponding position from the second column.

Unit of measurement		**Indicator**	
A	10^{12}/L	1	Blood clotting rate
B	%	2	The number of red blood cells
C	min.	3	The content of various types of leukocytes in the leukogram
D	‰	4	The content of reticulocytes

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer: A2, B3, C1, G4

Task 10.

Read the text and make a match.

Establish a correspondence between the equipment and its field of application: for each position in the first column, select the appropriate position from the second column.

Equipment		**Scope of application**	
A	Hematology Analyzer	1	Making a blood smear
B	Viscometer	2	Receiving venous blood
C	Vacuum system	3	Determination of blood viscosity

D	Ground glass	4	Conducting a general clinical blood test

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer: A4, B3, C2, G1

Closed-type tasks for establishing the sequence

PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals.

Task 11.

Read the text and set the sequence.

Arrange the steps of making a blood smear in the correct sequence. Write down the numbers in the correct sequence.

1.Place the ground glass in front of the blood drop;
2.Bring the ground glass to a drop of blood and distribute it evenly over the polished surface;
3.Apply a drop of blood to the slide, moving away from the edge by 1 cm;
4.Tilt the ground glass relative to the slide at an angle of 40-45%;
With a quick movement, without changing the pressure, distribute a drop of blood over the slide.

correct answer: 3,1,2,4,5.

Task 12.

Read the text and set the sequence.

Arrange the steps of painting the Pappenheim brushstroke in the correct sequence. Write down the numbers in the correct sequence.

1. Apply 20 drops of an aqueous solution of Romanovsky-Giems dye to the smear;
2.Exposure time is 3 minutes;
3.Add 20 drops of distilled water;
4.Exposure for 10-15 minutes;
5. Apply May-Grunwald dye to the smear;
6.Rinse the smear under running water.

correct answer: 5,2,3,1,4,6

Task 13.

Read the text and set the sequence.

Arrange the steps of counting red blood cells in the Goryaev chamber in the correct sequence. Write down the numbers in the correct sequence.

1. Add 20 μl of blood into a test tube;
2.Add 4 ml of saline solution to the test tube;
3. Mix well;
4.Charge the Goryaev chamber with the solution;
5. Count red blood cells in 5 large squares divided by 16 small ones.

correct answer: 2,1,3,4,5.

PC-2 ID-8 To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal studies, including X-ray examinations.

Task 14.

Read the text and set the sequence.

Arrange the steps for determining hematocrit using the centrifuge method in the correct sequence. Write down the numbers in the correct sequence.

1.Place the capillary in a hematocrit centrifuge;
2.Set the number of revolutions of the centrifuge;
3.Draw blood into the hematocrit capillary;
4.Centrifugate for 10 minutes;

5.Seal the end of the capillary with plasticine;
6. Determine the hematocrit according to the scale provided with the device.

correct answer: 3,5,1,2,4,6.

Task 15.

Read the text and set the sequence.

Arrange the order of preparation of the Goryaev chamber for counting blood cells in the correct order. Write down the numbers in the correct sequence.

1.Wipe the camera and cover glass with a clean, dry cloth;
2.Rinse the camera and the cover glass with water.
3.Dry the camera and cover glass in the air;
4.Wipe the camera and the cover glass with 96% ethanol;
5.Rub the cover glass against the camera pads until rainbow rings form.

correct answer: 2,1,4,3,5

AN OPEN TYPE TASK

PC-2 ID-11 To possess skills of the technique of setting functional tests for animals.

Task 16.

Read the text of the assignment and write down a detailed, reasoned answer.

Give a general definition of the concept – leukemia. Write down a detailed, reasoned answer.

Answer: Clonal malignant disease of the hematopoietic system.

Task 17.

Read the text of the assignment and write down a detailed, reasoned answer.

Explain the term neutrophilia with a shift to the right. Write down a detailed, reasoned answer.

Answer: This is a condition in which there is a decrease in the relative number of rod-shaped neutrophils and an increase in the percentage of segmented neutrophils with hypersegmented nuclei.

PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material.

Task 18.

Read the text of the assignment and write down a detailed, reasoned answer.

In which cases there is a decrease in hematocrit in animals. Write down a detailed, reasoned answer.

Answer: A decrease in hematocrit is observed with: a decrease in the number of red blood cells, a decrease in the volume of red blood cells, hemolysis, excessive fluid infusion.

Task 19.

Read the text of the assignment and write down a detailed, reasoned answer.

What are the main reasons for the increase in the relative content of lymphocytes in the leukogram? Write down a detailed, reasoned answer.

Answer: The majority of acute viral infections, chronic bacterial infections (tuberculosis, brucellosis), toxoplasmosis, and lymphoproliferative diseases lead to an increase in the percentage of lymphocytes in the leukogram.

Task 20.

Read the text of the assignment and write down a detailed, reasoned answer.

What types of leukocytes are taken into account when removing a leukogram. Write down a detailed, reasoned answer.

Answer: Basophils, eosinophils, myelocytes, metamyelocytes, rod-shaped neutrophils, segmented neutrophils, lymphocytes, monocytes.

PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods.

CLOSED-TYPE TASKS

Tasks of a combined type with the choice of one correct answer from the suggested options

PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases

Task 1.

Read the text and choose the correct answer

What is the range of leukocyte content in the blood of clinically healthy cattle 10^9/L.

1. 1.6 – 10;
2. 4,5 – 12;
3. 8,5 – 10,5;
4. 7 – 12.

correct answer: 2

Task 2.

Read the text and choose the correct answer

A viscometer is used to determine.

1.Hematocrit;
2.Electrical resistance of blood;
3. Blood viscosity;
4. Blood clotting rate.

correct answer: 3

Task 3.

Read the text and choose the correct answer

The range of the relative content of lymphocytes in the blood of clinically healthy horses is %.

1.40 – 65;
2.20 – 40;
3.30 – 45;
4.25 – 44.

correct answer: 4

Tasks of a combined type with the choice of several correct answers from the suggested options

Task 4.

Read the text and choose the correct answers.

What hematological parameters are directly proportional?

1. Red blood cells and white blood cells;
2. Red blood cells and hemoglobin;
3. Leukocytes and leukogram;
4. Red blood cells and hematocrit.

correct answers: 2,4

Task 5.

Read the text and choose the correct answers

What equipment can be used to count the number of white blood cells in the blood?

1.Hematology analyzer;
2.Sali Hemometer;
3.Blood element counter;
4.Refractometer.

correct answers: 1, 3

Closed-type tasks with compliance assignments

PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies.

Task 6.

Read the text and make a match.

Establish a correspondence between the method of leukogram extraction and the scope of its application: for each position of the first column, select the corresponding position from the second column.

Equipment		**Scope of application**	
A	The clock glass	1	Determination of hemoglobin
B	Hemoglobinometer	2	Leukogram removal
C	11-key counter	3	Staining of blood smears
D	Romanovsky's-Gimza Dye	4	Definition of ESR

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer: A4, B1, C2, D3.

Task 7.

Read the text and make a match.

Establish a correspondence between the method of leukogram extraction and the scope of its application: for each position of the first column, select the corresponding position from the second column.

Term		**Meaning**	
A	Leukemia	1	Decrease in the relative content of lymphocytes
B	Poikilocytosis	2	Blood cancer
C	Lymphocytopenia	3	Red blood cell shape change
D	Haemotransfusion	4	Blood transfusion

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer: A2, B3, C1, G4.

Task 8.

Read the text and make a match.

Establish a correspondence between the method of leukogram extraction and the scope of its application: for each position of the first column, select the corresponding position from the second column.

The reagent		**Scope of application**	
A	Methyl alcohol	1	Staining of blood smears
B	Nikiforov's liquid	2	Fixation of blood smears
C	Distilled water	3	Preparation of glasses for blood smears
D	3.8% sodium citrate solution	4	Blood stabilization

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer: A2, B3, C1, G4.

Task 9.

Read the text and make a match.

Establish a correspondence between the method of leukogram extraction and the scope of its application: for each position of the first column, select the corresponding position from the second column.

Method name		**Method assignment**	
A	The Pappenheim method	1	Staining of blood smears
B	The Derviz-Vorobyov method	2	Definition of ESR
C	The Westergren method	3	Leukogram removal
D	The Shilling method	4	Determination of hemoglobin

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer: A1, B4, C2, D3.

Task 10.

Read the text and make a match.

Establish a correspondence between the method of leukogram extraction and the scope of its application: for each position of the first column, select the corresponding position from the second column.

The standard range is 10^{12}/l		**Species of animal**	
A	5 – 7,5	1	Horse
B	6 – 9	2	Dog
C	5,2 – 8,4	3	Sheep
D	7 – 12	4	Cattle

Write down the selected numbers under the corresponding letters in the table.

A	B	C	D

correct answer: A4, B1, C2, D3.

Closed-type tasks for establishing the sequence

PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination.

Task 11.

Read the text and set the sequence.

Arrange the steps of the platelet counting process in the Goryaev chamber in the correct sequence. Write down the numbers in the correct sequence.

1. Collect 20 ml of test blood with a dispenser;
2.Move;
3.Add 0.4 ml of 1% ammonium oxalate solution to the test tube;
4.Count platelets in 5 large squares divided by 16 small ones using a blue light filter;
5.Charge the Goryaev chamber with the solution.

correct answer: 3,1,2,5,4.

Task 12.

Read the text and set the sequence.

Arrange the Philipson brush stroke coloring method in the correct order. Write down the numbers in the correct sequence.

1.Rinse the smear with running water;
2. Apply 20 drops of alcohol solution of Romanovsky-Giems paint to the smear;
3.Exposure time is 20 minutes;
4. Apply 20 drops of distilled water to the smear;

5. Exposure time is 5 min.

correct answer: 2,5,4,3,1.

Task 13.

Read the text and set the sequence.

Arrange the stages of nuclear transformation in neutrophils in the correct sequence as they age. Write down the numbers in the correct sequence.

1.Rounded;

2.Elongated with many constrictions;

3. Horseshoe-shaped;

4. Bean-shaped.

correct answer: 1,4,3,2.

Task 14.

Read the text and set the sequence.

Arrange the names of red blood cells in sequence from smaller to larger, depending on their size. Write down the numbers in the correct sequence.

1. Normocyte;

2. Macrocyte;

3. Microcyte;

4. Megalocyte.

correct answer: 3,1,2,4.

Task 15.

Read the text and set the sequence.

Arrange the cells in the hematopoiesis system in the correct order according to their increasing differentiation. Write down the numbers in the correct sequence.

1. The polypotent cell;

2. The unipotent cell;

3. The stem cell;

4. Blast cell;

5. Mature cell;

6. The maturing cell.

correct answer: 3,1,2,4,6,5.

AN OPEN TYPE TASK

PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.

Task 16.

Read the text of the assignment and write down a detailed, reasoned answer.

What are the pathologies of basophilia in animals in the leukogram? Write down a detailed, reasoned answer.

Answer. Basophilia in the leukogram is observed in ulcerative colitis; myxedema; erythroderma; myeloid leukemia, long-term therapy with estrogens or antithyroid drugs.

Task 17.

Read the text of the assignment and write down a detailed, reasoned answer.

What changes in the general clinical blood test are observed in acute infectious disease of bacterial etiology? Write down a detailed, reasoned answer.

Answer. Moderate anemia, Hyperleukocytosis, Left-shifted neutrophilia, Lymphocytopenia.

Task 18.

Read the text of the assignment and write down a detailed, reasoned answer.

Describe the main morphological features of a monocyte. Write down a detailed, reasoned answer.

Answer. A large cell with a nucleus occupying more than half of its volume, the nucleus is dark blue, may have a rounded, bean-shaped, horseshoe shape, the cytoplasm is basophilic, contains multiple pinocytic vesicles, and there is no perinuclear clearance zone.

Task 19.

Read the text of the assignment and write down a detailed, reasoned answer.

Name the main veins from which blood is obtained for clinical analysis in different species of animals and birds. Write down a detailed, reasoned answer.

Answer. In cattle and horses, blood is usually taken from the jugular vein, in pigs from the ear veins or cranial vena cava, in carnivores from the subcutaneous vein of the forearm or the vein of the neck, in fur–bearing animals from the plantar vein, in rodents from the caudal vein or from the heart, in chickens from the axillary vein.

Task 20.

Read the text of the assignment and write down a detailed, reasoned answer.

Describe the parameters of a properly prepared blood smear. Write down a detailed, reasoned answer.

Answer. A properly prepared blood smear should meet the following criteria: occupy 70-85% of the length of the slide, the blood should be evenly distributed over its entire area, the thickness should decrease smoothly from the beginning to the end of the smear, blood cells should be located mainly in one layer.

3.2. Standard tasks for intermediate certification

3.2.1. Questions for accepting test

The competence achieved:

PC-1. Anamnesis of animal life and disease to identify the cause of disease, conduct a general clinical study of animals in order to establish a preliminary diagnosis and determine the ongoing research program

PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.

PC-1 ID-8 To know the forms and rules for filling out the journal for the registration of sick animals and the animal's medical history, including in electronic form in accordance with the requirements of veterinary rules.

PC-1 ID-10 To know the technique of conducting an animal clinical study, using general methods, in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals.

1. What is blood? What are its main functions?
2. Briefly outline the history of the development of domestic veterinary hematology.
3. Which of the domestic scientists made the greatest contribution to the development of veterinary hematology. What are the specific merits of each of them?
4. What are the prospects for further development of veterinary hematology?
5. Give a blood test diagram and what does each section include?
6. Briefly describe the methods for determining ESR in animals.
7. What factors of the external and internal environment have the greatest impact on ESR?
8. Indicate the ESR indicators in healthy horses and cattle (in the latter case, with a vertical and inclined position of the tripod).
9. What are the changes in ESR in pathology?
10. What is ESR, what does it indicate and in what diseases is it observed?
11. Physiological functions of hemoglobin and the clinical significance of its determination in the blood?

12. What are oxyhemoglobin, carboxyhemoglobin and methemoglobin? How does the latter differ from the former?

13. Name the methods for determining the amount of hemoglobin. What principles are these methods based on and what is the advantage of one over the other?

14. What changes in the amount of hemoglobin occur in pathology? What are these changes called?

15. Name the diseases. Which are accompanied by a change in the amount of hemoglobin.

16. What are the formed elements of blood? What are the physiological functions of each?

17. What methods can be used to determine the number of red blood cells in the blood of animals? What principles are these methods based on?

PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis

PC-2 ID-4 To be able to take samples of animal biological material for laboratory research.

PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory

PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis.

PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals

PC-2 ID-8 To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal studies, including X-ray examinations.

PC-2 ID-11 To possess skills of the technique of setting functional tests for animals.

PC-2 ID-12 To know the methodology of sampling and analytical fullfilment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material

18. Give a complete description of Goryaev's counting chamber: structure, area, dimensions, volume of the entire chamber.

19. How does erythrocyte melangeur differ from leukocyte melangeur, how and how many times is the blood diluted accordingly before counting them?

20. Briefly describe the method of counting erythrocytes and leukocytes in the Goryaev chamber.

21. Indicate and explain the formulas by which the number of erythrocytes and leukocytes is calculated.

22. What is the number of erythrocytes and leukocytes in healthy horses, cattle, small cattle and pigs and what are their changes in pathology?

23. Name at least three diseases that are accompanied by each change in the number of erythrocytes and leukocytes.

24. Why are blood smears made? What does a good blood smear mean?

25. Which blood smears are considered bad? What are the reasons for such smears?

26. What reaction should distilled water have when staining blood smears, how is it determined, and what needs to be done to be able to use it?

27. Indicate the composition of Romanovsky-Giemsa paint and describe the technique for staining blood smears using this method.

28. Why is supravital staining of blood smears performed, what paints are used?

29. Give a classification of leukocytes and explain why each type is called that.

30. Briefly give the morphological and chemical characteristics of granulocytes.

31. Briefly describe the morphology and chemical composition of agranulocytes.

32. What is a leukogram and by what methods can it be obtained?

33. Write leukograms of healthy horses, cattle, pigs and dogs. What are their similarities and differences?

PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods

PC-3 ID-2 To possess skills to use specialized information databases for the diagnosis of animal diseases

PC-3 ID-3 To possess skills to document the results of clinical animal studies, using digital technologies.

PC-3 ID-4 To know the methods of interpretation and data analysis of special (instrumental) methods of animal examination.

PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.

34. What changes in leukograms occur in pathology and what are these changes called?

35. Name the changes in leukograms during acute septic processes and characterize these changes.

36. Give the classification of leukocytosis.

37. How to distinguish homogeneous leukocytosis from heterogeneous?

38. What types of neutrophilic leukocytosis occur in pathology, how are they characterized and what do they indicate?

39. Name at least three diseases that are accompanied by neutrophilic, lymphocytic, monocytic and eosinophilic leukocytosis.

40. What do they pay attention to when assessing the morphology of leukocytes, what changes occur and what do they indicate?

41. What do you pay attention to when assessing the morphology of erythrocytes.

42. Give a brief description of red blood cells in healthy animals and birds.

43. What are the changes in the morphology of red blood cells and what do these changes indicate?

44. Give the classification of granulocytes. What is the amount of them in the blood of healthy horses, cattle, and pigs?

45. What does an increase in the number of granulocytes in the blood indicate?

46. Why, where and how is bone marrow punctate taken?

47. What is determined in the bone marrow of animals) How do the results of bone marrow studies differ from those of blood in healthy animals?

48. What is the clinical significance of blood testing?

49. Describe anemic syndrome.

50. Hemorrhagic diathesis syndrome.

51. DIC syndrome.

4. METHODOLOGICAL MATERIALS DEFINING THE PROCEDURES FOR ASSESSING KNOWLEDGE, SKILLS AND ABILITIES AND WORK EXPERIENCE CHARACTERIZING THE STAGES OF COMPETENCE FORMATION

4.1. Criteria for evaluating students' knowledge during testing

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

The mark "**excellent**" is 25-22 correct answers.
The mark "**good**" is 21-18 correct answers.
The mark "**satisfactory**" is 17-13 correct answers.
The mark "**unsatisfactory**" is less than 13 correct answers

4.2. Criteria of knowledge during the test

The mark "**accepted** " must correspond to the parameters of any of the positive ratings ("excellent", "good", "satisfactory").

The mark "**not accepted** " rating should correspond to the parameters of the "unsatisfactory" rating.

The mark "excellent" – all types of educational work provided for in the curriculum have been completed. The student demonstrates the compliance of knowledge, skills, and abilities with the indicators given in the tables, operates with acquired knowledge, skills, and applies them in situations of increased complexity. At the same time, inaccuracies, difficulties in analytical operations, transfer of knowledge and skills to new, non-standard situations may be allowed.

The mark "good" – all types of educational work provided for in the curriculum have been completed. The student demonstrates the compliance of knowledge, skills, and abilities with the indicators given in the tables, operates with acquired knowledge, skills, and applies them in standard situations. At the same time, minor errors, inaccuracies, difficulties in analytical operations, transfer of knowledge and skills to new, non-standard situations may be made.

Mark "satisfactory" – one or more types of educational work provided for in the curriculum have not been completed. The student demonstrates incomplete compliance of knowledge, skills, and abilities with the indicators given in the tables, significant errors are made, a partial lack of knowledge, skills, and skills is manifested in a number of indicators, the student experiences significant difficulties in operating with knowledge and skills when transferring them to new situations. –

The mark «unsatisfactory" – the types of educational work provided for in the curriculum have not been completed. demonstrates incomplete compliance of knowledge, skills, and abilities given in the tables of indicators, significant errors are made, a lack of knowledge, skills, and skills is manifested for a large number of indicators, the student experiences significant difficulties in operating knowledge and skills when transferring them to new situations

5. ACCESSIBILITY AND QUALITY OF EDUCATION FOR DISABLED PEOPLE

If necessary, persons with disabilities and persons with disabilities are given additional, time to prepare an answer for the test.
When conducting the procedure for evaluating the learning outcomes of disabled people and persons with disabilities, their own technical means can be used.

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

For people with visual impairments:	– in printed form in enlarged font; – in the form of an electronic document.
For people with hearing impairments:	– in printed form;

	– in the form of an electronic document.
For people with disorders of the musculoskeletal system:	– in printed form, the device; – in the form of an electronic document.

When conducting the procedure for evaluating the learning outcomes of disabled people and persons with disabilities in the discipline, it ensures that the following additional requirements are met, depending on the individual characteristics of the students:

a) instructions on the procedure for conducting the assessment procedure are provided in an accessible form (orally, in writing);

b) an accessible form of assignment of assessment tools (in printed form, in printed form in enlarged font, in the form of an electronic document, assignments are read out by the teacher);

c) an accessible form of providing answers to tasks (written on paper, a set of answers on a computer, orally).

If necessary, for students with disabilities and the disabled, the procedure for evaluating the results of training in the discipline can be carried out in several stages.

The procedure for evaluating the learning outcomes of disabled people and persons with disabilities is allowed using distant learning technologies.