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



APPROVED BY
Vice-Rector for Educational
Work and Youth Policy
Sukhinin A.A.
April 10, 2026

Department of Clinical Diagnostics

EDUCATIONAL WORK PROGRAM

for the discipline

“Laboratory diagnostics”
The level of higher education
SPECIALIST COURSE

Specialty 36.05.01 Veterinary Medicine
Profile: «General clinical veterinary medicine»

Full-time education
Education starts in 2026

Reviewed and adopted
at the meeting of the department
on April 09, 2026
Protocol No. 10

Head of the Department
of Clinical Diagnostics,
Doctor of Veterinary Medicine, Professor
Kovalev S.P.

Saint Petersburg
2026

1. AIMS AND OBJECTIVES OF THE DISCIPLINE

The purpose of the discipline: to learn to correctly recognize and examine a sick animal, summarize the results obtained, evaluate the anatomical and physiological characteristics of the animal's body depending on environmental, technological and other conditions.

The objective of the discipline is to determine the state of health and, as early as possible, to comprehensively study the disorders that occur in the body, making it possible to diagnose the disease, determine its etiology and pathogenesis. Using general clinical research methods and laboratory diagnostics within the framework of propaedeutics, work out optimal methods for studying the biochemical, biophysical and cytological composition of biological fluids of the body, indicators of the health of animals in normal and pathological conditions, establish the diagnostic role of individual tests and their combinations; identify the features of individual indicators. To master the methodology for conducting clinical examination of productive animals as a set of planned measures aimed at the timely detection of animal diseases, disease prevention, with the aim of timely treatment of sick people and the creation of healthy, highly productive herds.

Laboratory diagnostics as a subject is an integral part of clinical diagnostics, which requires students to master medical diagnostic techniques, semiotics and medical logic, as well as diagnostic techniques. Students' mastery of laboratory methods for researching farm animals, gaining experience in identifying symptoms and syndromes, and the ability to analyze a situation in order to make a diagnosis are of great importance.

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 36.05.01 "Veterinary Medicine".

The field of professional activity:

13 Agriculture

Types of professional activity tasks:

- Medical;
- Expert control;
- Scientific and educational.

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

The education of the discipline should form the following competencies:

a) professional competencies (PC):

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-12

To know the methodology of sampling and analytical fulfillment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material

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

The discipline B1.V.01 " Laboratory diagnostics " is a discipline formed by participants in educational relations of the federal state educational standard of higher education in the specialty 36.05.01 "Veterinary Medicine" (specialty level).

Mastered: full-time - in the 6th semester.

Laboratory diagnostics as a subject is one of the main sections closely related to general diagnostics, helping to master semiotics and medical logic, and diagnostic techniques. The course is aimed at developing the skills of drawing up an algorithm for laboratory diagnostics and tactics of therapeutic and diagnostic measures based on the clinical interpretation of laboratory data results while ensuring the continuity of laboratory examination at different stages of veterinary care for animals. Familiarity with laboratory research methods not performed in laboratories. Of great importance are students' mastery of clinical laboratory methods for researching farm animals, gaining experience in identifying symptoms and syndromes, and the ability to analyze a situation in order to make a diagnosis.

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	Total hours	6 semester
Class work (total)	32	32
Including:		
Lectures	16	16
Practical lessons (PL), including interactive forms	16	16
Practical training (PT)	4	4
Independent work (total)	40	40
Type of intermediate certification (test, exam)	test	test
Total labor intensity hours / credit points	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
1.	Subject and components of clinical laboratory diagnostics. The main goals and objectives of laboratory diagnostics. Organization of laboratory work.	<p>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</p> <p>PC-1 ID-5. To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.</p> <p>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.</p> <p>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.</p> <p>PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis</p> <p>PC-2 ID-4. To be able to take samples of animal biological material for laboratory research.</p> <p>PC-2 ID-5. To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory</p> <p>PC-2 ID-6. To be able to interpret and analyze data from laboratory animal research methods for diagnosis.</p> <p>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</p> <p>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.</p> <p>PC-2 ID-12. To know the methodology of sampling and analytical fulfillment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material</p>	6	1		2
2.	Laboratory diagnosis of protein metabolism disorders, clinical significance.	<p>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</p> <p>PC-1 ID-8. To know the forms and rules for filling out the journal for the registration of sick animals</p>	8	2		4

3.	Laboratory diagnosis of carbohydrate metabolism disorders, clinical significance.	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.	6	2			4
4.	Laboratory diagnosis of lipid metabolism disorders, clinical significance.	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.	6	2			4
5.	Clinical significance of determining liver pigment metabolism. Differentiation of jaundices.	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	6	2			4
6.	Clinical significance of determining enzymes in the blood (ALT, AST, alkaline phosphatase, amylase, lipase, urea, urea nitrogen, creatinine, lipids, cholesterol).	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 fulfillment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material	6	2			4
7.	Laboratory diagnosis of mineral metabolism disorders, clinical significance.		6	2			4
8.	Laboratory diagnosis of vitamin metabolism disorders, clinical significance		6	2			2
9.	Laboratory diagnosis of water-electrolyte metabolism disorders. The importance of studying the biochemical composition of blood for diagnosing animal diseases.		6	1			2

10	Study of skin scrapings, washings from mucous membranes, nasal discharge, sputum. Obtaining and examining punctures from the chest and abdominal cavities.	<p>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</p> <p>PC-1 ID-5. To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.</p> <p>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.</p> <p>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.</p> <p>PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis</p> <p>PC-2 ID-4. To be able to take samples of animal biological material for laboratory research.</p> <p>PC-2 ID-5. To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory</p> <p>PC-2 ID-6. To be able to interpret and analyze data from laboratory animal research methods for diagnosis.</p> <p>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</p> <p>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.</p> <p>PC-2 ID-12. To know the methodology of sampling and analytical fulfillment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material</p>	6	2	1
11	Study of the contents of rumen and abomasum in ruminants.	<p>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</p> <p>PC-1 ID-5. To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.</p> <p>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.</p> <p>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.</p> <p>PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis</p> <p>PC-2 ID-4. To be able to take samples of animal biological material for laboratory research.</p> <p>PC-2 ID-5. To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory</p> <p>PC-2 ID-6. To be able to interpret and analyze data from laboratory animal research methods for diagnosis.</p> <p>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</p> <p>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.</p> <p>PC-2 ID-12. To know the methodology of sampling and analytical fulfillment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material</p>	6	2	1
12	Obtaining and studying gastric juice in horses and carnivores.	<p>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</p> <p>PC-1 ID-5. To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.</p> <p>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.</p> <p>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.</p> <p>PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis</p> <p>PC-2 ID-4. To be able to take samples of animal biological material for laboratory research.</p> <p>PC-2 ID-5. To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory</p> <p>PC-2 ID-6. To be able to interpret and analyze data from laboratory animal research methods for diagnosis.</p> <p>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</p> <p>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.</p> <p>PC-2 ID-12. To know the methodology of sampling and analytical fulfillment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material</p>	6	2	1
13	Fecal examination. Clinical significance of indicators of physical and chemical properties of feces. Microscopic examination of stool. Scatological syndromes. Laboratory examination of urine - determination of physical and chemical parameters of urine.	<p>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</p> <p>PC-1 ID-5. To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.</p> <p>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.</p> <p>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.</p> <p>PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis</p> <p>PC-2 ID-4. To be able to take samples of animal biological material for laboratory research.</p> <p>PC-2 ID-5. To be able to perform analytical preparation, storage of the studied biological material,</p>	6	2	1
14	Microscopy of urine sediment.	<p>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</p> <p>PC-1 ID-5. To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.</p> <p>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.</p> <p>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.</p> <p>PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis</p> <p>PC-2 ID-4. To be able to take samples of animal biological material for laboratory research.</p> <p>PC-2 ID-5. To be able to perform analytical preparation, storage of the studied biological material,</p>	6	2	1
15	Microscopy of urine sediment.	<p>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</p> <p>PC-1 ID-5. To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.</p> <p>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.</p> <p>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.</p> <p>PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis</p> <p>PC-2 ID-4. To be able to take samples of animal biological material for laboratory research.</p> <p>PC-2 ID-5. To be able to perform analytical preparation, storage of the studied biological material,</p>	6	2	1

16	Diagnostic value of determining inorganic phosphorus and total calcium in blood serum, reserve alkalinity of blood plasma and acid capacity of blood serum.	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.	6		2			2
17	Determination of carotene in blood serum, vitamin A and C in blood.	PC-2 ID-12. To know the methodology of sampling and analytical fulfillment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material	6		2			2
18	Total for 6th semester			16	12		4	40

6. THE LIST OF EDUCATIONAL AND METHODOLOGICAL SUPPORT FOR THE DISCIPLINE "LABORATORY DIAGNOSTICS"

6.1. Guidelines for independent work

1. 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://search.spbguvminformsistema.ru/viewer.jsp?aWQ9NDU4JnBzPTI4> (date of access: 04/09/2026). - Access mode: for authorization. users of the SPbSUVM EB.

6.1. 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.

3. Basic syndromes of internal diseases of animals: textbook / Kovalev Sergey Pavlovich, A.P. Kurdeko, Yu.K. Kovalenok [etc.]; Ministry of Agriculture of the Russian Federation; SPbGAVM. - St. Petersburg: Publishing house SPbGAVM, 2013. - 48 p.

4. 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: 04/09/2026). - Access mode: for authorization. users of the SPbSUVM EB.

5. 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 04/09/2026). - Access mode: for authorization. users of the SPbSUVM EB.

6. 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; edited by N.V. Zelenevsky. - St. Petersburg: Logos, 2005. - 132 p. – URL: <https://clck.ru/ebnFX> (date of access: 04/09/2026). - 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.]; edited by 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. 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]; edited by S. P. Kovalev; Ministry of Agriculture of

the Russian Federation, SPbGAVM. - St. Petersburg: SPbGAVM, 2013. - 132 p. - URL: <https://clck.ru/ekrWA> (access date 04/09/2026). - 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 practical classes and perform independent work, students can use the following Internet resources:

1. <https://meduniver.com> – Medical information site.
2. <http://vanat.cvm.umn.edu> – Animal Anatomy University of Minnesota

Electronic library systems:

1. EBS "SPBGUVM" <https://ebs.spbgavm.ru/MarcWeb2>
2. EBS "Student Consultant" <http://www.studentlibrary.ru/>
3. Legal reference system "ConsultantPlus" https://www.ascon-spb.ru/konsultant_plus/
4. Scientific electronic library ELIBRARY.RU <http://elibrary.ru/defaultx.asp>
5. Russian Scientific Network <http://www.nature.web.ru/>
6. ELECTRONIC BOOKS BY THE PUBLISHING HOUSE "PROSPEKT NAUKI" <HTTP://PROSPEKTNAUKI.RU/EBOOKS/http://prospektnauki.ru/ebooks/>

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 taking 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 code, 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 activity are 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://spbguvvm.ru/academy/eios/>

11.2. Software

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

№	Technical and computer programs	License
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п/п	recommended by sections and topics of the program	
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/KJI
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
Laboratory diagnostics	101 (196084, St. Petersburg, Chernigovskaya str., 5, «J») Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification	Specialized furniture: desks, chairs, stools, blackboard, aluminum trays. Visual aids and educational materials: posters for sections of the discipline.
	102 (196084, St. Petersburg, Chernigovskaya str., 5, «J») Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification	Specialized furniture: desks, chairs, stools, blackboard, aluminum trays. Visual aids and educational materials: posters for sections of the discipline.
	111 (196084, St. Petersburg, Chernigovskaya str., 5, «J») Educational laboratory of the department	Specialized furniture: stainless steel sink tables, containers. Technical teaching aids: table scales, drying cabinet, tripods, KFK, microscopes. Visual aids and educational materials: posters on sections of clinical diagnostics.
	196084, St. Petersburg, Chernigovskaya str., 5, «J» Workshop of the department	Technical training aids: stalls for animals, means for restraining animals. Visual aids and educational materials: cow, small livestock - sheep, goats).
	206, Large reading room 196084, St. Petersburg, Chernigovskaya str., 5, «J» Workshop of the department Room for independent work	Specialized furniture: tables, chairs Technical teaching aids: computers with an Internet connection and access to the electronic information and educational environment
	214, Small reading room 196084, St. Petersburg, Chernigovskaya str., 5, «J» Workshop of the department Room for independent work	Specialized furniture: tables, chairs, special equipment, materials and spare parts for preventive maintenance of educational equipment.
	324 Information Technology Department 196084, St. Petersburg, Chernigovskaya str., 5, Room for storage and preventive	Specialized furniture: tables, chairs, special equipment, materials and spare parts for preventive maintenance of educational equipment.

	maintenance of educational equipment.	
	Box No. 3 Carpentry workshop, 196084, St. Petersburg, Chernigovskaya str., 5, Room for storage and preventive maintenance of educational equipment	Specialized furniture: tables, chairs, special equipment, materials for preventive maintenance of specialized furniture

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.



Nikitina A.A.

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
"LABORATORY DIAGNOSTICS"**

Level of higher education
SPECIALIST COURSE

Specialty 36.05.01 Veterinary medicine
Profile: «General clinical veterinary medicine»
Full-time education.

Education starts in 2026

Saint Petersburg
2026

1. PASSPORT OF THE FUND OF ASSESSMENT TOOLS

№	Acquired competence	Assessed modules of a discipline	Assessment tool
1	<p>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</p> <p>PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.</p> <p>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.</p> <p>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.</p>	<p>Section 1. Subject and composite part of the clinical laboratory diagnostics. Basic goals and objectives laboratory diagnostics. Organization of laboratory work.</p>	Test
2	<p>PC-2 ID-6 To be able to interpret and analyze data from laboratory animal research methods for diagnosis.</p>	<p>Section 2. Diagnosis of carbohydrate, protein and lipid metabolism disorders</p>	Test
3	<p>PC-2 ID-7 To know the indication for the use of digital equipment, special (instrumental) and</p>	<p>Section 3. Diagnosis of disorders of mineral metabolism and vitamins.</p>	test
4	<p>PC-2 ID-4 To be able to take samples of animal biological material for laboratory research.</p>	<p>Section 4. Importance of laboratory urine testing</p>	Test
5	<p>PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis</p>	<p>Section 5. The importance of examining gastric contents, rumen contents, and feces.</p>	Test
6	<p>PC-2 ID-5 To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory</p>	<p>Section 6. Study of skin scrapings, exudates, transudates.</p>	Test
7	<p>PC-2 ID-8 To know the indication for the use of digital equipment, special (instrumental) and</p>	<p>Section 7. Study of liver enzyme metabolism.</p>	Test
8	<p>PC-2 ID-9 To know the indication for the use of digital equipment, special (instrumental) and</p>	<p>Assessment of knowledge in all sections of the discipline</p>	Credit

	<p>laboratory methods of animal research in accordance with the guidelines, instructions, rules for the diagnosis, prevention and treatment of animals PC-2 ID-8</p> <p>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</p> <p>To know the methodology of sampling and analytical fulfillment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material</p>		
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2. List of assessment tools

№	Name of the assessment tool	Brief description of the assesment tool	Presentation of the assessment tool in the fund
2.	Test	A system of standardized tasks, which allows to automate the assessment of students knowledge and skills	A fund of test assignments
3.	Credit	A means of monitoring the assimilation of educational material of discipline sections.	Questions for credit

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

Planned results of competency acquired	The level of development			Assesment tool	
	Unsatisfactory	Satisfactory	Good Excellent		
<p>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</p>					
<p>PC-1 ID-5 To be able to establish a preliminary diagnosis based on anamnesis analysis and clinical research, using general methods.</p>	<p>When deciding standard tasks basic skills not demonstrated there were rough errors</p>	<p>When deciding standard tasks basic skills have not been demonstrated, there were rough errors</p>	<p>Basic skills demonstrated when deciding standard tasks with some shortcomings</p>	<p>The level of knowledge corresponds to the training program, no errors have been made</p>	<p>Test</p>
<p>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.</p>	<p>When deciding standard tasks basic skills not demonstrated there were rough errors</p>	<p>When deciding standard tasks basic skills have not been demonstrated, there were rough errors</p>	<p>Basic skills demonstrated when deciding standard tasks with some shortcomings</p>	<p>The level of knowledge corresponds to the training program, no errors have been made</p>	<p>Test</p>

<p>PC-1 ID-10</p> <p>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.</p>	<p>When deciding standard tasks basic skills not demonstrated there were rough errors</p>	<p>When deciding standard tasks basic skills have not been demonstrated, there were rough errors</p>	<p>Basic skills demonstrated when deciding standard tasks with some shortcomings</p>	<p>The level of knowledge corresponds to the training program, no errors have been made</p>	<p>Test</p>
<p>PC-2. Development of an animal research program and conduction of clinical study, using special (instrumental) and laboratory methods to clarify the diagnosis</p>					
<p>PC-2 ID-4</p> <p>To be able to take samples of animal biological material for laboratory research.</p>	<p>Knowledge level below minimum requirements, had the place is rude errors</p>	<p>Minimum acceptable knowledge level, a lot was allowed minor mistakes</p>	<p>Level of knowledge in volume, appropriate program preparation, admitted a few rough ones errors</p>	<p>Level of knowledge in volume, appropriate program preparation, without errors.</p>	<p>Test</p>
<p>PC-2 ID-5</p> <p>To be able to perform analytical preparation, storage of the studied biological material, transportation to the laboratory</p>	<p>When deciding standard tasks do not demonstrate basic skills, there were rough errors</p>	<p>Minimum acceptable knowledge level, a lot was allowed minor mistakes</p>	<p>All basic skills have been demonstrated, all basic problems with non-rough errors, all tasks were completed in full volume, but some with shortcomings</p>	<p>All basic skills have been demonstrated, all basic problems have been solved some non-essential shortcomings, all completed assignments in full</p>	<p>Test</p>

<p>PC-2 ID-6</p> <p>To be able to interpret and analyze data from laboratory animal research methods for diagnosis.</p>	<p>When solving standard problems basic skills were not demonstrated, gross errors occurred</p>	<p>There is a minimum set of skills to solve standard tasks with some shortcomings</p>	<p>When solving standard problems basic skills were not demonstrated with some flaws</p>	<p>Skills were demonstrated in solving non-standard tasks without errors and flaws</p>	<p>Test</p>
<p>PC-2 ID-7</p> <p>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</p>	<p>When solving standard problems basic skills were not demonstrated, gross errors occurred</p>	<p>There is a minimum set of skills to solve standard tasks with some shortcomings</p>	<p>When solving standard problems basic skills were not demonstrated with some flaws</p>	<p>All basic skills have been demonstrated, all basic problems have been solved some non-essential shortcomings, all assignments in full completed</p>	<p>Test</p>
<p>PC-2 ID-8</p> <p>To know the safe rules of operation with digital equipment, tools and equipment, used in special (instrumental) animal studies, including X-ray examinations.</p>	<p>When solving standard problems basic skills were not demonstrated, gross errors occurred</p>	<p>There is a minimum set of skills to solve standard tasks with some shortcomings</p>	<p>When solving standard problems basic skills were not demonstrated with some flaws</p>	<p>All basic skills have been demonstrated, all basic problems have been solved some non-essential shortcomings, all assignments in full completed</p>	<p>Test</p>
<p>PC-2 ID-12</p> <p>To know the methodology of sampling and analytical fulfillment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material</p>	<p>When solving standard problems basic skills were not demonstrated, gross errors occurred</p>	<p>There is a minimum set of skills to solve standard tasks with some shortcomings</p>	<p>When solving standard problems basic skills were not demonstrated with some flaws</p>	<p>All basic skills have been demonstrated, all basic problems have been solved some non-essential shortcomings, all assignments in full completed</p>	<p>Test</p>

4. LIST OF CHECK TASKS AND OTHER MATERIALS REQUIRED FOR THE ASSESSMENT OF KNOWLEDGE, ABILITIES, SKILLS AND ACTIVITY EXPERIENCE

Formed competence:

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-12

To know the methodology of sampling and analytical fulfillment of biological material samples for execution of laboratory analyses in accordance with the instructions and methodological documents, regulating the sampling of biological material

4.1. List of questions for credit

1. Taking the contents of the rumen. Basic studies of rumen contents.
2. Obtaining and examining the contents of the rennet.
3. Laboratory examination of gastric juice. List the main indicators and describe in detail the study of the digestive ability of pepsin.
4. Determination of gastric leukopedesis (the number of leukocytes in gastric juice).
5. Study of gastric juice for total acidity, free and bound HCl.
6. Laboratory examination of stool. List the main studies. Describe the physical properties of feces and their changes in various pathologies.
7. Describe the shape and consistency of feces in different animals and their changes during pathology.
8. Examination of feces for occult blood. Clinical significance.
9. Determination of protein and bile pigments in feces. Clinical significance.
10. Microscopic examination of stool. Clinical significance.
11. Laboratory examination of urine. List the main studies. Study of the physical properties of urine (list).
12. Determination of the physical properties of urine. Clinical significance.

13. Determination of protein, blood pigments, ketone bodies in urine. Clinical significance.
14. Chemical examination of urine. List the main indicators.
15. Determination of pH and sugar in urine. Clinical significance.
16. What substances belong to bile pigments? On what principle are qualitative tests for these pigments based? Name the tests that determine the presence of bile pigments in the urine.
17. What is considered a positive test for bile pigments? If it is in the urine of healthy animals? What is bilirubinuria? Name at least three diseases that are accompanied by bilirubinuria.
18. What is the clinical significance of urine testing in animals?
19. Microscopic examination of organized urine sediment. Clinical significance.
20. Microscopic examination of unorganized urine sediment. Clinical significance.
21. Determination of color, odor, transparency of urine and their changes in pathology.
22. Study of transudates and exudates. Clinical significance.
23. Determination of total calcium and inorganic phosphorus in blood serum. Clinical significance.
24. Determination of reserve alkalinity and acid capacity in blood serum. Clinical significance.
25. Determination of total protein and protein fractions in blood serum. Clinical significance.
26. Determination of carotene (vitamin A) in blood serum. Clinical significance.
27. Diagnosis of mineral metabolism disorders. Clinical significance.
28. Diagnosis of protein metabolism disorders. Clinical significance.
29. Diagnosis of carbohydrate metabolism disorders. Clinical significance.
30. Diagnosis of fat metabolism disorders. Clinical significance.
31. Diagnosis of water-electrolyte metabolism disorders. Clinical significance.
32. Diagnosis of vitamin metabolism disorders. Clinical significance.

4.2. Laboratory diagnostic tests:

Formed competence:

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. 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.

Combined type tasks with a choice of one correct answer from the proposed options

Task 1

A general clinical examination of animals is a comprehensive diagnostic procedure aimed at a comprehensive assessment of the animal's condition to establish a preliminary diagnosis and develop a further testing program. During the examination, key physiological parameters are analyzed, including body temperature, respiratory rate, pulse rate, skin, mucous membranes, and lymph nodes, as well as the animal's behavioral responses. Additionally, palpation, percussion, and auscultation may be used to detect pathological changes in internal organs. Based on the data obtained, a hypothesis about possible diseases is formed, which determines the need for specialized laboratory and instrumental testing to clarify the diagnosis and select the optimal treatment regimen. Specialized laboratory tests help accurately identify the causative agent of the

disease and identify disorders in the functioning of the animal's organs and systems. It is important to note that clinical laboratory diagnostics include blood, urine, and fecal analysis, as well as cytological and biochemical studies, which help identify diseases and assess the animal's overall condition. The main components of this diagnostics are hematological, biochemical, microbiological, immunological and molecular studies.

Based on the above, select the correct answer to the question: Which of the following areas are part of clinical laboratory diagnostics in veterinary medicine and are crucial for identifying pathologies and assessing the physiological state of animals?

1. Hematological, biochemical, microbiological, immunological, and molecular studies
2. Radiological, ultrasound, cytogenetic, oncological, and parasitological studies
3. Radionuclide tissue imaging, blood biochemistry, hematology, microbiology
4. Epizootological analysis, biostatistics, toxicological monitoring, herpetology, and nutritional science

Answer 1

Task 2

Specialized laboratory testing in veterinary medicine is a set of diagnostic methods aimed at a detailed study of physiological and pathological processes in animals. These tests include hematological and biochemical blood tests, microbiological examinations to detect bacterial and viral infections, serological tests to diagnose immune responses, cytological and histological tissue analysis, and molecular genetic methods such as polymerase chain reaction (PCR) and sequencing. Laboratory tests help identify abnormalities in internal organ function, determine the presence of infectious agents, establish the extent of inflammatory and degenerative changes, and monitor the effectiveness of treatment. A comprehensive approach to specialized testing ensures diagnostic accuracy and improves the effectiveness of veterinary interventions. Based on the above, select the correct answer to the question: What is the main purpose of laboratory testing in veterinary medicine?

1. Diagnosis of infectious diseases in animals to prevent epidemics.
2. Assessment of animal health and detection of hidden pathologies for timely treatment.
3. Detection of hidden pathologies, disease diagnosis, and monitoring of treatment effectiveness.
4. Laboratory monitoring of animal physiological parameters to select the optimal diet.
5. Analysis of biological materials to monitor animal health and prevent disease.

Answer 3

Task 3

Carbohydrate metabolism in animals includes all processes associated with the intake, digestion, absorption, and utilization of carbohydrates to provide energy and sustain life. The primary source of carbohydrates is dietary glucose, which enters the bloodstream after carbohydrate digestion. Glucose is used by cells for energy through glycolysis and oxidative phosphorylation. Excess glucose can be stored as glycogen in the liver and muscles or converted into fat. Carbohydrate metabolism is regulated by hormones such as insulin, which promotes glucose utilization, and glucagon, which stimulates glycogen breakdown to maintain blood glucose levels. Disturbances in carbohydrate metabolism can lead to various diseases, including diabetes. Based on the above, select the correct answer to the question: What may indicate a disorder of carbohydrate metabolism in animals?

1. Elevated blood glucose
2. Decreased blood calcium
3. Increased urea in urine
4. Increased bilirubin in the blood

Answer 1

Task 4

In animals, gastric juice is a secretion produced by cells lining the stomach and plays a key role in digestion. It contains hydrochloric acid (HCl), pepsinogen, which is converted into active pepsin, as well as mucus and other enzymes that facilitate protein breakdown. Hydrochloric acid creates an acidic environment necessary for pepsin activation and efficient protein digestion, and also serves as a barrier to microorganisms ingested with food. Gastric juice also facilitates the absorption of certain nutrients and activates enzymes for further digestion in the small intestine. Gastric juice production is regulated by hormones such as gastrin and nerve signals that respond to the presence of food in the stomach. Disturbances in the composition or quantity of gastric juice can lead to various gastrointestinal diseases, such as gastritis or peptic ulcers. Based on the above, select the correct answer to the question: Which test method is used to analyze gastric juice in animals to assess acidity and diagnose gastrointestinal diseases?

1. pH-metry
2. Serological analysis
3. Coagulogram
4. Agglutination test

Answer 1

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.

Combined type tasks with a choice of several correct answers from the proposed options

Task 5

The animal sickness log records the results of various laboratory tests aimed at diagnosing and monitoring the patient's condition. Key tests include hematological (complete blood count, differential, hematocrit), biochemical (glucose, protein, liver enzymes, and electrolyte levels), microbiological (bacterial cultures, antibiotic susceptibility tests), serological (detection of antibodies and antigens to infectious diseases), and molecular genetic testing (PCR diagnostics). Results of cytological and histological examinations, urine and fecal tests, and, if necessary, toxicology tests are also recorded. Maintaining such records allows for monitoring the animal's condition, adjusting treatment, and developing a further examination program. Based on the above, select the correct answers to the question: Which enzyme activity is most often elevated in the blood during pancreatic disease?

1. Amylase
2. Lipase
3. ALT
4. Creatinine

Answer 1,2

Task 6

Based on the above, select the correct answers to the question: Which parameters can be determined using a biochemical blood test?

1. Enzyme activity (ALT, AST, ALP, GGT, CPK, LDH)
2. Protein and fraction concentrations (total protein, albumin, globulins)
3. Glucose levels and carbohydrate metabolism parameters (glycosylated hemoglobin, fructosamine)
4. Electrolyte concentrations (sodium, potassium, chloride, calcium, phosphorus, magnesium)
5. Blood morphology (erythrocytes, leukocytes, platelets, reticulocytes)
6. Detection of antigens and antibodies to infectious agents (e.g., feline leukemia virus, rabies, brucellosis)

Answer 1, 2, 3, 4

Task 7

Multiple-choice questions with one correct answer from the given options Choose the correct answer to the question: Which blood biochemistry test indicator is used to assess kidney function in animals?

1. ALT
2. Creatinine
3. Cholesterol
4. Glucose

Answer 2

Task 8

Based on the above, select the correct answer to the question: Which biochemical parameters help assess liver health?

1. AST and ALT
2. Triiodothyronine
3. Oxytocin
4. Sodium and potassium

Answer 1

Combined-choice questions with multiple-choice answers from the given options

Task 9

A complete urinalysis in animals evaluates several key parameters that help diagnose urinary tract diseases and other pathologies. These include physical parameters such as color, clarity, and odor of urine. Urine specific gravity is also measured, which helps assess kidney function and its ability to concentrate urine. Important parameters include pH, protein, glucose, ketone bodies, and bilirubin. Additionally, microscopy of the sediment is performed to detect cells, bacteria, crystals, salts, and other abnormal elements, which may indicate inflammation, infection, or stones in the urinary tract. Based on the above, select the correct answers to the question: What parameters are evaluated in a complete urinalysis in animals?

1. Specific gravity
2. pH
3. Bilirubin
4. Hematocrit

Answer: 1, 2, 3

Task 10

Based on the above, select the correct answers to the question: What methods are used for laboratory testing of urine in animals?

1. Macroscopic analysis
2. Biochemical analysis
3. Sediment microscopy
4. PCR diagnostics

Answer 1, 2, 3

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

ID-10PC-1 Know the technique of conducting clinical animal research using general methods in accordance with the guidelines, instructions, rules of diagnosis, prevention and treatment of animals

A combined type of task with the choice of one correct answer from the suggested options

Task 11

The technique of conducting clinical animal research using general methods includes a sequence of actions aimed at assessing the overall health of the animal and diagnosing diseases. This process begins with a detailed medical history, during which the owner's complaints, conditions of detention, nutrition and the history of the animal's diseases are clarified. This is followed by an examination of the animal, including an assessment of the appearance, condition of the skin and coat, mucous membranes, as well as checking the lymph nodes and other visible signs of the disease. There are also several special laboratory research methods aimed at accurately diagnosing diseases and assessing the condition of animals. These include hematological methods for analyzing blood composition, biochemical methods for assessing metabolic processes, microbiological studies for detecting pathogenic microorganisms, serological methods for detecting antibodies and antigens, molecular genetic methods (PCR) for diagnosing infections and hereditary diseases, cytological and histological studies for analyzing cells and tissues, toxicological methods for detecting poisons and toxins, as well as coprological and urological examinations for the diagnosis of parasites and diseases of the urinary tract.

Based on the above, choose the correct answer to the question which of the following indicators is evaluated in the general analysis of urine in animals for the diagnosis of urinary tract diseases?

1. The ratio of glucose and creatinine in urine
2. The level of lactate dehydrogenase in urine
3. Urine density and relative concentration
4. Concentration of uric acid and electrolytes in blood serum

Answer 3

Task 12

Hematological methods in veterinary medicine include a number of analyzes aimed at assessing the composition of blood and the general condition of the animal. The main method is a general blood test, which includes measuring the level of hemoglobin, erythrocytes, leukocytes, platelets and hematocrit. An important aspect is the determination of the leukocyte formula for the detection of inflammatory processes and infections, as well as the study of the erythrocyte sedimentation rate (ESR), which may indicate inflammation. Additionally, reticulocyte tests are performed to assess hematopoiesis and anemia, as well as coagulation testing to diagnose blood clotting disorders. These studies help identify diseases such as infections, anemia, blood clotting disorders, and liver or kidney diseases, and are an important tool in the comprehensive diagnosis of animals.

Based on the above, choose the correct answer to the question, which factor most significantly affects the level of hemoglobin in the blood of animals?

1. Oxygen content in the environment and respiratory efficiency
2. The concentration of iron and vitamins in the body
3. The intestinal microbiome and its effect on vitamin synthesis

4. Body temperature and activity of enzymes involved in metabolism
Answer 2

Task 13

Based on the above, choose the correct answer to the question what helps determine a leukogram in a hematological analysis?

1. A leukogram allows you to estimate the percentage of different types of white blood cells (neutrophils, lymphocytes, monocytes, eosinophils and basophils), which helps diagnose the type of inflammation, infectious diseases, allergic reactions, as well as identify possible diseases of the immune system, such as like leukemias or lymphomas.
2. A leukogram is used exclusively to assess the cellular composition of blood under normal conditions and has no diagnostic value in inflammatory or infectious processes.
3. A leukogram only allows you to determine the total number of white blood cells in the blood and does not help in differentiating cell types, which limits its use for diagnosing diseases.
4. A leukogram: helps only in detecting anemia and is not used to diagnose inflammatory or infectious processes.

Answer 1

Task 14

Based on the above, choose the correct answer to the question what research method is used to determine the reserve alkalinity of blood in animals?

1. The Kondrakhin method
2. Glucose oxidant test
3. The nephelometry method
4. Determination of hematocrit

Answer 1

Task 15

Based on the above, choose the correct answer to the question what method allows you to assess the acid capacity of blood in animals?

1. Titrimetric analysis
2. Fluorescence microscopy
3. Radioimmune analysis
4. The Kalk-Kalker method

Answer 1

Task 16

Based on the above, choose the correct answer to the question: what is the normal level of carotene in the blood considered optimal for most animals?

1. 0.05–0.2 mcg/ml
2. 0.2–0.6 mcg/ml
3. 0.7–1.0 mcg/ml
4. 1.0–2.0 mcg/ml

Answer 2

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

Task 17

Sputum examination in animals is an important diagnostic method for detecting diseases of the respiratory system, such as infections, inflammations, allergies, and neoplastic processes. The main method of sputum production is bronchoalveolar lavage (BAL), which effectively isolates cellular and microbial material from the lower respiratory tract. The obtained lavage material is subjected to a comprehensive analysis, including macroscopic, cytological and microbiological studies. Cytological analysis allows you to determine the predominance of inflammatory cells, identify atypical cells or signs of an infectious process. Microbiological examination includes seeding the material on various media in order to identify bacteria, fungi or parasites, as well as performing an antibioticogram to select the optimal therapy. This method is especially important in the diagnosis of bronchopneumonia, tracheobronchitis, mycoplasmosis and other respiratory diseases in animals.

Choose the correct answers to the question what methods of obtaining sputum are used in animals to diagnose diseases of the respiratory system?

1. Spontaneous expectoration
2. Aerosol inhalation
3. Bronchoalveolar lavage (BALL)
4. Tracheal aspiration

The answer is 3, 4

Task 18

Examination of nasal discharge in animals is an important diagnostic method for detecting diseases of the upper respiratory tract, including rhinosinusitis, infectious respiratory diseases, allergic inflammations and neoplasms. The material is obtained by flushing or scraping from the nasal passages, after which a comprehensive analysis is performed, including microscopic, bacteriological and cytological examination. Microscopy can reveal the cellular composition, including inflammatory elements, microorganisms, fungal spores or atypical cells, which is important for differentiating infectious, inflammatory and tumor processes. Bacteriological examination and seeding on special nutrient media are necessary to identify pathogenic bacteria and assess their sensitivity to antibiotics. This method is an integral part of the diagnosis of diseases such as rhinotracheitis, parainfluenza, as well as allergic rhinosinusitis and tumor processes of the upper respiratory tract in animals.

Based on the above, choose the correct answers to the question what information does the study of nasal discharge in animals reveal?

1. Signs of bacterial, viral, and fungal infections and their sensitivity to antibiotics.
2. The predominance of inflammatory cells such as neutrophils and macrophages, as well as the presence of atypical cells or tumor markers.
3. The level of specific antibodies in the body, indicating the presence of an allergic reaction
4. Deficiency of vitamins and minerals that affect the function of the immune system

The answer is 1, 2.

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

Task 19

Vitamins A and C perform important physiological functions in the animal body, participating in the processes of antioxidant protection, immune regulation and metabolism. The optimal concentration of retinol (vitamin A) in the blood serum of most mammals is in the range of 0.3–0.5 micrograms/ml, ensuring normal growth, epithelial cell differentiation, and photoreception. Ascorbic acid (vitamin C) plays a key role in collagen synthesis, protection from oxidative stress and maintenance of vascular tone, while its physiological concentration is usually 5-10 mg/l. Deficiency of these vitamins can lead to impaired immune response, deterioration of reparative processes and oxidative damage to tissues.

Based on the above, choose the correct answer to the question: what is the range of concentrations of vitamins A and C in animal blood serum that is most characteristic of a healthy body?

1. Vitamin A: 0.3–0.5 mcg/ml, Vitamin C: 5-10 mg/l
2. Vitamin A: 0.1–0.2 mcg/ml, Vitamin C: 2-4 mg/l
3. Vitamin A: 0.6–0.9 mcg/ml, Vitamin C: 10-15 mg/l
4. Vitamin A: 0.05–0.1 mcg/ml, Vitamin C: 1-2 mg/l

Answer 1

Task 20

The study of skin scrapings in animals is an important diagnostic method that allows to identify parasitic, bacterial and fungal infections, as well as to identify inflammatory or allergic processes. The procedure consists of taking the surface or deep layer of the epidermis using a scalpel, blade or special scraper, after which the resulting material is examined under a microscope. The method is particularly effective for the diagnosis of demodicosis, sarcoptosis, dermatophytosis, and malasseziosis infections. The depth of the scraping depends on the suspected pathogen: for example, to detect ticks of the genus *Demodex*, a deeper scraping with capillary bleeding is required, whereas surface sampling of cellular material is sufficient to detect surface parasites and fungi. The study is complemented by cultural methods and cytological analysis, which increases the accuracy of diagnosis and allows choosing the optimal treatment.

Based on the above, choose the correct answer to the question, which diagnostic method is the most informative for detecting ectoparasitic and fungal skin infections in animals, given the need for a differentiated depth of sampling?

1. Histological examination of skin biopsies
2. Dermatoscopy with a polarizing filter
3. Microscopy of native and stained skin scraping preparations
4. Polymerase chain reaction (PCR) for pathogen identification

Answer 3

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

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

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

Task 1

Sampling biological material from animals for laboratory research is an important step in the diagnosis of diseases and assessment of the overall health of the animal. In order for the research results to be reliable and accurate, it is necessary to strictly follow the recommendations for sampling, transportation and storage of samples. First of all, it is important to take into account the type of material, the nature of the disease, as well as the specific requirements for samples depending on the suspected pathology.

The sampling process begins with the selection of the appropriate biological material, depending on the purpose of the study. The following types of biomaterials are most often used for laboratory research: blood (for clinical and biochemical analysis), urine, feces, saliva, secreted from the respiratory tract, smears from the skin and mucous membranes, as well as tissue biopsies (for example, if tumors or infectious diseases are suspected). A blood sample can be taken from both venous and capillary vessels, depending on the amount of material needed and the type of analysis. At the same time, the technical features of the sampling method and the need for the addition of anticoagulants or a stabilizer should be taken into account.

Based on the above, choose the correct answer to the question what is the most important factor in the selection of biological material for laboratory research?

1. Timeliness and correctness of sampling depending on the stage of the disease
2. The concentration of the pathogen in the sample and its correspondence to the analyzed disease
3. Conditions of storage and transportation of biomaterial before the study
4. The presence of specific markers in the biological material corresponding to the analysis

Answer 1

Task 2

Based on the above, choose the correct answer to the question, which biological material is most often used for clinical and biochemical analysis in laboratories?

1. Blood
2. Feces
3. Saliva
4. Fabrics

Answer: 1

Task 3

Based on the above, choose the correct answer to the question of what needs to be considered when taking blood samples for biochemical analysis in animals

1. Type of tableware for storage
2. The need for the addition of anticoagulants or stabilizers
3. A clean and dry test tube
4. The specifics of the research method

Answer: 3

Task 4

Based on the above, choose the correct answer to the question: what process is necessary to prevent contamination of faeces during its selection?

1. The use of antiseptics and sterile instruments
2. Selection of material in the fresh air
3. Collecting material without prior preparation
4. Taking feces directly from the rectum and packing the material into containers

Answer 4

Task 5

Based on the above, choose the correct answer to the question what conditions may be required for the transportation and storage of biological samples, such as blood or urine.

1. Storage at room temperature
2. Storage at a low positive temperature in containers
3. The absence of any temperature restrictions
4. Transportation in containers

Answer 2

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

Task 6

Possible contamination by external microorganisms during sampling may lead to distortion of the results. The sampling procedure should be carried out using sterile instruments and utensils, as well as observing asepsis and antisepsis. In the case of fecal or urine sampling, it is important that the material be taken in a sterile container, and if necessary, the rules for isolation and

transportation of samples should be followed in tests for infectious diseases to prevent contamination.

The rules of transportation and storage of biological material play a key role in ensuring the reliability of the results. Certain temperature conditions may be required for blood, urine, and other liquids, ranging from room temperature to low—temperature storage (for freezing), depending on the nature of the intended analysis. Tissue samples or smears should be placed in special containers that protect against damage and preserve the structure of the material.

The biomaterial sampling process should be rigorous and systematic, taking into account all recommendations for a specific type of study, in order to ensure the accuracy of diagnosis and the successful implementation of therapeutic measures.

Based on the above, choose the correct answer to the question what is the main requirement when transporting biological material for laboratory research?

1. Protection from external contamination and compliance with temperature conditions
2. Packing of samples in vacuum capsules with complete exclusion of oxygen access to prevent oxidative processes.
3. The use of special containers that protect the material from the effects of electromagnetic waves.

Answer: 1

Task 7

Obtaining and examining punctures from the thoracic cavity in animals is carried out to diagnose pathologies of the pleural cavity, lungs and mediastinum. The procedure includes thoracocentesis, the insertion of a needle or catheter into the chest cavity to aspirate fluid, air, or abnormal exudate. The obtained material is evaluated by physical, biochemical and cytological parameters, revealing inflammatory, infectious, neoplastic processes or traumatic injuries. The study helps to determine the nature of the effusion (transudate, exudate, chyletic or hemorrhagic), which is crucial for diagnosis and treatment selection.

Based on the above, choose the correct answer to the question what is the main purpose of obtaining and examining punctures from the thoracic cavity in animals?

1. Determine the nature of the pathological process in the pleural cavity, lungs and mediastinum, as well as the differentiation of inflammatory, infectious and neoplastic changes.
2. Improvement of gas exchange in the lungs by removing fluid and dilating the alveoli.
3. Carrying out therapeutic manipulations aimed at restoring normal intrathoracic pressure and increasing blood circulation.
4. Preparation for surgical intervention through anesthesia and stabilization of respiratory function.

Answer: 1

Task 8

Receiving and examining punctures from the abdominal cavity (abdominocentesis) is performed to diagnose pathologies of the abdominal organs, identify inflammatory, infectious, traumatic and oncological processes. The procedure involves inserting a sterile needle or catheter into the abdominal cavity to aspirate fluid, which is then analyzed for physico-chemical, biochemical and cytological parameters. The study helps to determine the nature of the effusion (transudate, exudate, hemorrhagic, chyletic or urohemetic), identify infectious agents and neoplasm cells, which plays a key role in making a diagnosis and choosing treatment tactics.

Based on the above, choose the correct answer to the question which of the listed methods is used to obtain a punctate from the abdominal cavity?

1. Thoracocentesis
2. Abdominocentesis

3. Pleural biopsy

4. Bronchoscopy

Answer: 2

Task 9

When examining punctures from the thoracic and abdominal cavities, which of the following biochemical parameters is most informative for differentiating exudate from transudate?

1. The ratio of protein levels in punctate and blood serum (protein ratio)

2. Albumin concentration in punctate

3. The glucose level in the punctate

4. Sodium concentration in punctate

Answer 1

ID-5PC-2 Should be able to perform analytical preparation, storage of the biological material under study, and transportation to the laboratory

Closed-type compliance assignments

Task 10

Analytical preparation, storage and transportation of the biological material under study are integral stages in the process of laboratory animal research. Analytical preparation includes proper sampling, collection and initial processing of samples, which avoids errors and distortions of the results. The storage of biological material requires compliance with certain temperature conditions and conditions that correspond to the characteristics of the material in order to preserve its integrity and prevent degradation. Transportation of samples to the veterinary laboratory should be carried out taking into account the need to comply with conditions that minimize the effects of factors such as temperature, humidity and mechanical damage, which ensures the accuracy and reliability of laboratory tests.

Make a match, match each position in the first column to the corresponding position in the second column.

1.	Analytical training	a	Compliance with the temperature conditions and storage conditions of the material to preserve its integrity.
2.	Storage of biological material	б	Collection, sampling and primary processing of samples to prevent distortion of the results.
3.	Transportation of the material to the laboratory	B	Transportation with consideration of minimizing the impact of external factors (temperature, humidity, mechanical damage).

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

1	2	3

Answer 1б, 2a, 3B

Task 11

Laboratory examination of urine in animals is important for the diagnosis of various diseases, including urinary tract infections, kidney diseases, diabetes and other endocrine disorders. Urinalysis can reveal changes in the chemical composition, density, presence of proteins, glucose, ketone bodies, leukocytes and erythrocytes, which can serve as an indicator of inflammatory processes, kidney failure or other pathologies. In addition, urine testing helps in monitoring the animal's condition during treatment, as well as during preventive examinations for early detection of possible abnormalities.

Match the corresponding readings from the second column for each position of the first column.

1	General urinalysis	a	The method makes it possible to detect the presence of infectious agents, such as bacteria, in the urine, as well as to determine their sensitivity to antibiotics.
2	Sowing urine on nutrient media	б	It allows you to assess the overall health of the urinary tract by detecting impurities, such as bacteria or protein, which may indicate inflammation.
3	Determination of protein/creatinine ratio	B	This ratio is used to assess the degree of protein loss in urine, which may indicate kidney diseases such as glomerulonephritis or nephrotic syndrome.

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

1	2	3

Answer 1б, 2a, 3B

ID-6PC-2 Should be able to interpret and analyze data from laboratory animal research methods to establish a diagnosis

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

Task 12

When examining scar tissue in animals, special attention is paid to determining its physical and chemical characteristics, such as odor, consistency, color, presence of food particles and microflora. The acid-base balance, the presence of gases and possible impurities (for example, blood or mucus) are also assessed. It is important to conduct a microbiological analysis to identify the bacterial flora, which may indicate infectious processes or disorders in the digestion of food. These data help in the diagnosis of diseases related to digestive disorders, scar infections, or other gastrointestinal pathologies.

Based on the above, choose the correct Answer to the question: What characteristics of scar tissue are evaluated in animals?

1. Only smell and color
2. Smell, consistency, color, presence of microflora
3. Only the presence of microflora and gas
4. Acid-base balance

Answer 2

Closed-type compliance assignments

Task 13

Total calcium in the blood plays a key role in maintaining normal cell function, bone system, nervous and muscular activity. It is involved in the process of blood clotting, transmission of nerve impulses and muscle contraction. Blood calcium levels are determined by biochemical analysis. Abnormalities may indicate various diseases: hypercalcemia may be associated with diseases of the parathyroid glands, tumors, or kidney failure, and hypocalcemia may be associated with metabolic disorders, vitamin D deficiency, or hypofunction of the parathyroid glands. Monitoring of calcium levels is an important aspect of diagnosis to assess an animal's condition.

1	The role of total calcium in the body	a	An increase in calcium levels may indicate parathyroid gland diseases, tumors, or kidney failure.
2	Causes of hypocalcemia	б	Calcium is involved in the process of blood clotting, transmission of nerve impulses and muscle contraction.
3	Abnormalities in calcium levels	B	Hypocalcemia may be associated with metabolic disorders, vitamin D deficiency, or hypofunction of the parathyroid glands.

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

1	2	3	4

Answer 1б, 2B,3a

Task 14

Microscopy of animal feces can reveal the presence of various microorganisms, such as parasite eggs, protozoan cysts, bacteria and fungi, as well as abnormal inclusions, such as fats or blood. The method is used to diagnose parasitic infections, inflammations, as well as to assess the state of the animal's digestive system. Microscopic analysis makes it possible to detect pathologies in the early stages, as well as evaluate the effectiveness of treatment and identify possible deviations from the norm, such as diarrhea, bloating or deterioration of the general condition of the animal.

Make a match: match the corresponding readings from the second column to each position of the first column.

1	Microscopy of feces in animals makes it possible to identify	a	It is used to diagnose intestinal infections such as salmonellosis or escherichiosis in animals.
2	Sowing feces on nutrient media	б	Eggs of parasites, cysts of protozoa, bacteria, fungi, as well as abnormal inclusions, such as fats or blood.
3	Hidden blood test	B	It helps to identify hidden inflammatory processes in the gastrointestinal tract of animals.

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

1	2	3

Answer 1б, 2a,3B

Task 15

The pH of urine in animals is an important indicator that reflects the acid-base balance of the body. The normal pH of urine varies from acidic to slightly alkaline, depending on the animal's diet and the state of its body. Abnormalities may indicate various diseases, such as urinary tract infections, kidney disease, or metabolic disorders. Protein in urine is also a significant indicator, as its presence indicates damage to the kidney filters or inflammation. Increased protein levels in the urine (proteinuria) may be associated with infections, kidney failure, or diabetes, which requires further examination and treatment.

Make a match: match the corresponding readings from the second column to each position of the first column.

1	Using indicator test strips	a	A fast but less accurate method that is widely used in clinical practice and allows you to determine the pH on a color scale.
2	pH measurement using a pH meter	б	It allows you to measure the pH level most accurately, especially when accurate laboratory data is needed, but requires calibration of the device and strict adherence to the methodology.
3	Determination of pH using litmus paper	B	The simplest method that gives a general idea of the acidity of urine, but is not suitable for accurate diagnosis.
4	Determination of pH by titration	г	A laboratory method used to assess the buffering capacity of urine, but used less frequently due to the complexity of its implementation.

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

1	2	3	4

Answer 1a, 2б, 3B, 4г

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

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

Task 16

A specialist working with animals should know the indications for the use of digital equipment, as well as special instrumental and laboratory research methods. This is necessary for accurate diagnosis, prevention and treatment of various diseases in animals. The application of such methods is carried out in strict accordance with the guidelines, instructions and established rules.

Based on the above, choose the right Answer to the question what is the main purpose of using digital equipment and laboratory methods in veterinary medicine?

1. Ensuring full automation of veterinary diagnostics with minimal involvement of specialists, which eliminates the human factor and makes the diagnostic process completely autonomous.
2. Improving the accuracy and reproducibility of laboratory research by standardizing processes, automated data processing, and minimizing subjective errors.
3. Maximize the acceleration of tests in order to obtain instant results without the need for further interpretation, which allows veterinarians to instantly prescribe treatment.
4. Creation of a universal digital database in which all analyses and medical parameters of animals are stored, which eliminates the need for repeated studies.

Answer: 2

Task 17

Based on the above, choose the correct Answer to the question What type of analyzer is used for automatic counting of blood cell elements in animals?

1. Blood gas analyzer
2. Biochemical analyzer
3. Hematology analyzer
4. Coagulometer

Answer: 3

Task 18

Based on the above, choose the correct Answer to the question what is the advantage of biochemical analyzers in veterinary diagnostics?

1. They allow for a comprehensive assessment of the electrolyte composition of blood without the need for serum sampling.
2. Use only capillary blood to minimize the cost of research.
3. They provide automated measurement of the concentration of enzymes, proteins and metabolites, which increases the accuracy of diagnosis.
4. They work exclusively with urine to detect infectious agents.

Answer: 3

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

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

Task 19

Knowledge of the rules of safe operation with digital equipment, tools and specialized equipment used in instrumental animal research is a key aspect of veterinary activities. This includes strict precautions when operating X-ray machines, ultrasound scanners, endoscopes, and other diagnostic tools in order to minimize risks to the operator, the animal, and the environment.

Based on the above, choose the right Answer to the question of what personal protective equipment should be used when working in the laboratory?

1. A lab coat or a disposable protective jumpsuit prevents skin and clothing from coming into contact with biological materials and chemicals.
2. Gloves (nitrile, latex or vinyl) – protect hands from contamination by infectious agents and chemicals.
3. Safety glasses or face shield – used when working with biological fluids, chemical reagents or centrifugation of samples.
4. Medical mask or respirator – reduces the risk of inhalation of aerosols, dust and infectious particles when working with pathogens.

Answer: 1,2,3,4

ID-12PC-2 Know the methodology of sampling and analytical preparation of samples of biological material for performing laboratory analyses in accordance with the instructional and methodological documents governing the sampling of biological material

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

Task 20

The study of gastric juice in animals is carried out to diagnose diseases of the gastrointestinal tract, such as gastritis, peptic ulcer, dyspepsia and other disorders. For this purpose, gastric sounding methods are used, in which a special probe is inserted through the nose or mouth to extract gastric juice. Various parameters are analyzed, such as acidity (pH), the content of hydrochloric acid, pepsin and other enzymes, as well as the presence of pathological inclusions. A biochemical study makes it possible to identify a violation of the secretory activity of the stomach, assess its function and juice composition, which plays an important role in the diagnosis of diseases and the selection of appropriate treatment.

Based on the above, choose the correct Answer to the question when examining gastric juice in animals, which of the following indicators is the most informative for assessing the secretory function of the stomach?

1. The level of lactate dehydrogenase in gastric juice
2. The ratio of hydrochloric acid and pepsin in gastric juice
3. Concentration of amino acids in gastric juice
4. The level of total protein in the blood serum

Answer: 2

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

5.1. Criteria for evaluating students' knowledge during the knowledge survey (written survey)

Mark "**excellent**" - the student clearly expresses his point of view on the issues under consideration, giving appropriate examples.

Mark "**good**" - the student admits some errors in the answer

The mark «**satisfactory**» - the student discovers gaps in knowledge of the basic educational and normative material.

The mark "**unsatisfactory**" - the student discovers significant gaps in knowledge of the basic provisions of the discipline, the inability to obtain the correct solution to a specific practical problem with the help of a teacher.

5.2. 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

Knowledge criteria for the test:

- The “credit” grade must correspond to the parameters of any of the positive grades (“excellent”, “good”, “satisfactory”).
- A “no credit” grade must meet the parameters of an “unsatisfactory” grade.
- Mark “excellent” – all types of academic work provided for by the curriculum have been completed. The student demonstrates the correspondence of knowledge, skills and abilities to the indicators given in the tables, operates with acquired knowledge, skills and abilities, and applies them in situations of increased complexity. In this case, inaccuracies and difficulties may occur during analytical operations and the transfer of knowledge and skills to new, non-standard situations.
- Mark “good” – all types of educational work provided for by the curriculum have been completed. The student demonstrates the correspondence of knowledge, skills and abilities to the indicators given in the tables, operates with acquired knowledge, skills and abilities, and applies them in standard situations. In this case, minor errors, inaccuracies, and difficulties during analytical operations and the transfer of knowledge and skills to new, non-standard situations may be made.
- Mark “satisfactory” – one or more types of academic work provided for by the curriculum have not been completed. The student demonstrates incomplete compliance of knowledge, abilities, skills with the indicators given in the tables, significant mistakes are made, a partial lack of knowledge, abilities, and skills is manifested in a number of indicators, the student experiences significant difficulties in operating knowledge and skills when transferring them to new situations. –
- Mark “unsatisfactory” – the types of educational work provided for by the curriculum have not been completed. demonstrates incomplete compliance of knowledge, abilities, and skills with those given in the tables of indicators, significant errors are made, a lack of knowledge, abilities, and skills is manifested in a larger number of indicators; the student experiences significant difficulties in operating knowledge and skills when transferring them to new situations

6. 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;
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	– 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.

**Program abstract of the discipline
B1.V.01 Laboratory diagnostics
specialty 36.05.01 Veterinary Medicine
Profile: «General clinical veterinary medicine»**

The purpose of mastering the discipline: to learn to recognize and examine a sick animal using modern methods of laboratory diagnostics and improving the quality of research based on the introduction of new laboratory equipment and diagnostic systems.

Position of the discipline in the curriculum: Discipline B1.V.01. "Laboratory diagnostics" is a discipline formed by participants in educational relations of the federal state educational standard of higher education in the specialty 36.05.01 "Veterinary Medicine" (specialty level).

Mastered: full-time - in the 6th semester.

Requirements for the results of mastering the discipline:

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

Summary of the discipline: Masters safety precautions when working with animals, rules of personal hygiene when researching animals and when working in the laboratory; rules for collecting biological material, its storage and preservation, and shipment; rational and effective use of laboratory research methods; correct use of medical, technical, veterinary equipment, instruments and equipment in laboratories; ability to use regulatory documents when working in laboratories.

The total labor intensity of the discipline is: 72 hours (2 credit units).

Final control in the discipline: test.