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

APPROVED BY
Vice-Rector for Educational
Work and Youth Policy
Sukhinin A.A.
10.04.2026

Department of microbiology, virology and immunology

EDUCATIONAL WORK PROGRAM

for the discipline

IMMUNOLOGY

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
02.03.2026
Protocol No. 8
Head of the Department
of Microbiology, Virology and Immunology,
Doctor of biological sciences, Professor
Sukhinin A.A.

Saint Petersburg
2026

1. AIMS AND OBJECTIVES OF THE DISCIPLINE

The main goal of teaching the discipline "Immunology" is to give students modern knowledge of fundamental immunology.

The teacher is faced with the task of providing students with practical skills to use the achievements of clinical practice and research immunological work.

1. 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 Federal State Educational Standard of Higher Education 36.05.01 "Veterinary Medicine".

Area of professional activity:

13. Agriculture

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:

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

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

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

Discipline B1.V.07 "Immunology" is a discipline formed by public education relations of the federal state educational standard of higher education in the specialty 36.05.01 "Veterinary Medicine" (specialty level).

It is mastered in the 8th semester for full-time education, in the 8th semester for part-time and part-time and in the 5th year for part-time study.

When teaching the discipline "Immunology", the knowledge and skills acquired by students while mastering microbiology, virology, and biotechnology were used.

Disciplines in which the discipline "Immunology" is leading: veterinary and sanitary examination, epizootology and infectious diseases. parasitology and invasive diseases.

4. THE SCOPE OF DISCIPLINE AND TYPES OF ACADEMIC WORK

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

Type of educational work	Hours	Semester
		8
Classroom classes (total)	**32**	**32**
Including:	-	-
Lectures, including interactive forms	16	16
Practical lessons (PL), including interactive forms, among which are:	16	16
practical training (PT)	4	4
Self-study	40	40

Type of intermediate and final certification (test, exam)	Test	Test
Total labor intensity hours/credits	72/2	72/2

5. THE CONTENT OF THE DISCIPLINE AND TYPES OF CLASSES

5.1. The content of the discipline (full-time education)

№	The title	Achieved competences	Semester	Types of academic work, including students' self-study and labor intensity (in hours)			
				Lectures	Practical lessons	Practical training	Self-study
1	Traditional definition of immunity. The emergence of modern immunology. A new definition of immunity. Levels of study and manifestation of immunological reactivity. The biological meaning of immunity and the biological content of immunology. Innate and acquired immunity.	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms	8	2	2		4
2	Types of immunity. The system of innate (constitutional) and acquired immunity. Innate and acquired immunity	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological	8		2		4

		material of animals of different species and the reasons that cause deviations of indicators from the norms					
3	Determination of antigens. Factors that determine the properties of antigens. The main characteristics of antigens: foreignness, antigenicity, immunogenicity, specificity. Types of antigen specificity: species specificity, group specificity, heterospecificity and heteroantigens.	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms	8	2			4
4	Nature of the antibody. General structure of immunoglobulins. Functional features of different classes of immunoglobulins	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of	8	2	2		4

		biological material of animals of different species and the reasons that cause deviations of indicators from the norms						
5	Lymphoid (immune) system. Central lymphoid organs. Peripheral (secondary) lymphoid organs and formations. Functional differences of secondary lymphoid organs. Antigen recognition receptors, antigens, markers.	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms	8	2			4	
6	Immunogenetics. Major histocompatibility complex (MHC). Histocompatibility loci and the concept of haplotype-phenotype. Cellular immune reactions. humoral immune response	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of	8	2			4	

		the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms						
7	Immunopathological conditions. Autoimmune diseases. Primary and secondary immunodeficiencies	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms	8	2	2		6	
8	Humoral immune response. Immuno-nological tolerance. Transplan-tational immunity. Antigens histo-compatibility. Immunological reactions Protecting the body from infection.	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for	8	2	4	4	6	

		indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms					
9	Protecting the body from objects. Vaccination. Immunological tolerance. Theories of immunity.	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms	8	2			4
TOTAL FOR THE 8TH SEMESTER				16	12	4	40

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

6.1. Guidelines for independent work

Chkhenkeli V.A. Immunology: a textbook for students of higher education institutions studying in the specialty 36.05.01 Veterinary Science (qualification "veterinarian") and in the direction of training 36.03.02 Animal Science (qualification (degree) "bachelor") / Chkhenkeli Vera Aleksandrovna. - St. Petersburg: Prospect Nauki, 2015. - 144 p. - Text: electronic // Electronic books from the Prospect Nauki publishing house: [website]. - http://prospektnauki.ru/ebooks/index-spbgavm.phpfrom (Accessed 02.03.2026).

6.2. Literature for independent work

1.Royt A. Immunology: trans. from English / Royt A., Brostoff J., Mail D. - M.: Mir, 2000. – 592
2.Basic Veterinary Immunology / G. N. Callahan, R. M. Yates,. - b.m : University Press of Colorado, 2014. - 351 p. - Access mode: for authorized users of EB SPbGUVM. - Text : electronic. - ISBN 978-1-60732-218-4 (Date of access: 02.03.2026).
3. Tizard, Ian R. Veterinary Immunology / I. R. Tizard. - 11th Edition. - B.m. : Saunders, [2024]. - 517 p. - Access mode: for authorized users of EB SPbGUVM. - Text : electronic. - ISBN 978-0443109751 (Date of access: 02.03.2026).
4. Avian Immunology / editors Bernd Kaspers , Karel A. Schat, Thomas Göbel, Lonneke Vervelde. - 3rd Edition. - B.m. : Academic press, [2022]. - 603 p. - Access mode: for authorized users of EB SPbGUVM. - Text : electronic - ISBN 978-0128187081 (Date of access: 02.03.2026).

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

7.1. Basic literature

Gosmanov, R.G. Fundamentals of the doctrine of infection and antimicrobial immunity / R.G. Gosmanov, N.M. Kolychev, A.A. Novitsky. — 2nd ed., rev. - St. Petersburg: Lan, 2017. - 280 p. — ISBN 978-5-8114-2277-4

7.2. Additional literature

Kolychev, N. M. Veterinary Microbiology and Immunology / N. M. Kolychev, R. G. Gosmanov. - 3rd ed., revised and enlarged. - Moscow: Kolos, 2003. - 432 p. : ill. - (Textbooks and teaching aids for students of higher educational institutions). - Text (visual): direct (209 copies) https://search.spbguvm.informsystema.ru/. (Accessed 02.03.2026.)

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

1. https://meduniver.com – Medical information site.
2. Meduniver.com – medical information site.

Electronic library systems:

1. EBS "SPBGUVM"
2. EBS “Student Consultant”
3. Legal reference system “ConsultantPlus”
4. University information system “RUSSIA”
5. Full-text database POLPRED.COM
6. Scientific electronic library ELIBRARY.RU
7. Russian Scientific Network
8. Electronic library system IQlib

9. Database of international science citation indexes Web of Science

10. Full-text interdisciplinary database on agricultural and environmental sciences ProQuest AGRICULTURAL AND ENVIRONMENTAL SCIENCE DATABASE

11. Electronic books from the publishing house "ProspektNauki" http://prospektnauki.ru/ebooks/

12. Collection "Agriculture. Veterinary" publishing house "Kvadro" http://www.iprbookshop.ru/586.html

9. METHODOLOGICAL GUIDELINES FOR STUDENTS ON EDUCATION OF THE DISCIPLINE

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

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

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

The morning time is the most fruitful for educational work (from 8-14 o'clock), then the afternoon (from 16-19 o'clock) and the evening time (from 20-24 o'clock). The most difficult material is recommended to be studied at the beginning of each time interval after rest. After 1.5 hours of work, a break (10-15 minutes) is required; after 4 hours of work, the break should be 1 hour. Part of the scientific organization of labor is mastering the technique of mental work. Normally, a student should devote about 10 hours a day to studying (6 hours at the university, 4 hours at home).

• Recommendations for working on lecture material

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

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

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

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

4) prepare yourself psychologically for the lecture.

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

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

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

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

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

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

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

• Recommendations for preparing for practical classes

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

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

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

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

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

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

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

Practical (seminar) classes perform the following tasks:

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

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

• Recommendations for working with literature.

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

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

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

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

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

According to the guidelines presented in the list of guidelines.

10. EDUCATIONAL WORK

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

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

11.1 Information technologies

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

- lecturing using slide presentations;
- interactive technologies (conducting lectures and dialogues, collective discussion of various approaches to solving a particular educational and professional problem);
- interaction with students via email;

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

11.2 Software:
list of licensed and free- distributed software, including national programs

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

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

The title of the discipline (module), practice in accordance with the curriculum	The title of special rooms and rooms for self-work	Equipment of special rooms and rooms for self-work
Discipline B1.V.07 "IMMUNOLOGY"	412 (196084, St. Petersburg, Chernigovskaya str., 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification.	Specialized furniture: tables, chairs, boards, illustrative material in the form of computer presentations, posters, demonstration material on topics. Technical teaching aids: laptop, projector, screen, electrical connector for Internet access. Laboratory tables, medical laboratory metal cabinet, homogenizer, universal pH meter, comparator (Michaelis apparatus), magnetic stirrer, UV lamp, slides and cover glasses, alcohol burners , tank loops, tweezers, dye solutions, immersion oil rinsers with bridges, containers with disinfectant solutions, laboratory mixing device, biothermostat, Krotov apparatus, desiccator, microanaerostat, hot-air sterilizers of two different types, exhaust cabinet, water bath.
	413 (196084, St. Petersburg, Chernigovskaya st., 5) Classroom for conducting seminar-type classes, individual consultations, ongoing monitoring and intermediate certification.	AMD computer-system unit, P-911 computer, XEROXWC-PE 120i multifunctional device, XEROXPHASER printer, MiniTowerFoxconn system unit, LCDSamsung monitor, Samtran 56 E 15 monitor, Mikmed-6 medical microscope with M-5 digital video camera with video adapter and system unit LG, digital camera LevenhuC510, desks with laminar coating, bookcase, platinum cabinets - 2 pcs., board, stools, keyboard, mouse, extension cord, electrical connector for Internet access, microscope Mikmed -1.
	416 (thermostatic) room for equipment storage and preventive maintenance.	Serological bath, exhaust cabinet, VLKT-200 scales, dry-heat cabinet, laboratory table, TES-1 thermostat, wooden cabinet

		for storing consumables (tips), wooden desk.
	418 (washing room) room for preventive maintenance of equipment.	Household electric stove, electric water heater, laboratory tables, stands for drying test tubes, a stand for drying dishes, a cabinet for storing detergents and disinfectants, metal sterilizers, a trash can.
	419 autoclave	Steam sterilizers VK-75PT – 2 pcs., laboratory table for storing bins and stands.
	420 room for equipment storage and preventative maintenance.	Table for analytical balances, laboratory tables, iron laboratory cabinets – 5 pcs., combined laboratory refrigerator "Paracelsus", machine for making stoppers, microscopes – 10 pcs., medical water distiller, magnetic stirrer – 2 pcs,, laboratory glassware (flasks, test tubes, cylinders, funnels, pipettes, mortars, pestles, Petri dishes), microcentrifuge, VLKT quadrant scales, I-500 ion meter, bookcase.
	422 (196084, St. Petersburg, Chernigovskaya st., 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification.	Specialized furniture: tables, chairs, boards, illustrative material in the form of computer presentations, posters, demonstration material on topics: Technical teaching aids: laptop, projector, screen. Laboratory tables, medical laboratory metal cabinet, portable UVL lamp, slides and cover glasses, alcohol burners, loop tank, tweezers, dye solutions, immersion oil, rinsers with bridges, containers with disinfectant solutions, bottles for washing smears. Krotov apparatus, desiccator, microanaerostat, stands, test tubes with saline. solution. Device for filtration through ceramic candles, ceramic bacterial candles, microscopes, table lamps
	423 (196084, St. Petersburg, Chernigovskaya str., 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification.	Specialized furniture: tables, chairs, boards, illustrative material in the form of computer presentations, posters, demonstration material on topics. Technical teaching aids: laptop, projector. Laboratory tables, medical metal laboratory cabinet, dry air sterilizer, microscopes, Koch apparatus, water bath, thermostat, slides and cover glasses, alcohol burners, tank hinges, tweezers,

		dye solutions, immersion oil rinses with bridges, containers with disinfectant solutions, homogenizer, thermostat
	424 (196084, St. Petersburg, Chernigovskaya str., 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification.	Specialized furniture: tables, chairs, boards, illustrative material in the form of computer presentations, posters, demonstration material on topics. Technical teaching aids: laptop, projector. Laboratory tables, medical metal laboratory cabinet, dry air sterilizer, microscopes, Koch apparatus, water bath, thermostat, slides and cover glasses, alcohol burners, tank hinges, tweezers, dye solutions, immersion oil rinses with bridges, containers with disinfectant solutions, homogenizer, thermostat
	425 (196084, St. Petersburg, Chernigovskaya str., 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification.	Specialized furniture: tables, chairs, boards, illustrative material in the form of computer presentations, posters, demonstration material on topics. Technical teaching aids: laptop, projector. Laboratory tables, medical metal laboratory cabinet, dry air sterilizer, microscopes, Koch apparatus, water bath, thermostat, slides and cover glasses, alcohol burners, tank hinges, tweezers, dye solutions, immersion oil rinses with bridges, containers with disinfectant solutions, homogenizer, thermostat

Developer:

Associate professor of the Department of microbiology, virology and immunology, Doctor of Veterinary Medicine — Makavchik S.A.

Annex 1

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

Department of microbiology, virology and immunology

FUND OF ASSESMENT TOOLS
for the discipline

IMMUNOLOGY

Level of higher education
SPECIALIST COURSE

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

Education starts in 2026

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1. PASSPORT OF THE FUND OF ASSESMENT TOOLS

№	Acquired competence	Assessed modules of a discipline	Assesment tool
1	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms	Traditional definition of immunity. The emergence of modern immunology. A new definition of immunity. Levels of study and manifestation of immunological reactivity. The biological meaning of immunity and the biological content of immunology. Innate and acquired immunity.	Seminar, Test
2	PC-3 Diagnosis based on anamnesis data analysis, database, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations from the norms	Types of immunity. The system of innate (constitutional) and acquired immunity. Innate and acquired immunity	Seminar, Test
3	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms	Determination of antigens. Factors that determine the properties of antigens. The main characteristics of antigens: foreignness, antigenicity, immunogenicity, specificity. Types of antigen specificity: species specificity, group specificity, heterospecificity and heteroantigens.	Seminar, Test
4	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms	The nature of antibodies. General structure of immunoglobulins. Functional features of different classes of immunoglobulins	Seminar, Test
5	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators	Lymphoid (immune) system. Central lymphoid organs. Peripheral (secondary) lymphoid organs and formations. Functional differences of secondary lymphoid organs.	Seminar, Test

	from the norms	Antigen recognition receptors, antigens, markers.	
6	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms	Immunogenetics. Major histocompatibility complex (MHC). Histocompatibility loci and the concept of haplotype-phenotype. Cellular immune reactions. humoral immune response	Seminar, Test
7	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms	Immunopathological conditions. Autoimmune diseases. Primary and secondary immunodeficiencies	Seminar, Test
8	PC-3 Diagnosis based on analysis of anamnesis, general, special (instrumental) and laboratory research methods. PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms	Humoral immune response. Immunological tolerance. Transplan-tational immunity. Histocompatibility antigens. Immunological reactions Protecting the body from infection.	Seminar, Test
9	ПК-3 Постановка диагноза на основе анализа данных анамнеза, общих, специальных (инструментальных) и лабораторных методов исследования. ПК-3 ид5 Знать нормы показателей состояния биологического материала животных разных видов и причины, вызывающие отклонения показателей от норм	Protecting the body from infections. Vaccination. Immunological tolerance. Theories of immunity.	Seminar, Test

List of assessment tools

№	Name of the assessment tool	Brief description of the assesment tool	Presentation of the assessment tool in the fund
1.	Seminar	A means of control is organized as a conversation between the teacher and the student on topics related to the discipline, and designed to clarify the amount of knowledge that students have on a certain module, topic,	Questions on topics/modules of the discipline presented in relation to the competencies provided by the work program of the discipline

		problem, etc. May be conducted in written form.	
2.	Test	A system of standardized tasks, which allows to automate the assessment of students knowledge and skills	A fund of test assignments

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

Planned results of competency acquaired	The level of development				Assesment tool
	Unsatisfactory	Satisfactory	Good	Exellent	
PC-3. To set the diagnose based on the analysis of anamnesis, general, special (instrumental) and laboratory research methods					
PC-3 ID-5 To know the norms of indicators of the status of animals' biological material of different species and the reasons that cause deviations from the norms.	The level of knowledge is below the minimum requirements, gross errors have occurred	The minimum acceptable level of knowledge, many minor errors have been made	The level of knowledge corresponds to the training program, several minor errors have been made	The level of knowledge corresponds to the training program, no errors have been made	Seminar, Test,

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

3.1. Typical tasks for the current control of academic progress

3.1.1 Test-questions

PC-3 Able to use in professional activities methods for solving problems using modern equipment when developing new technologies and use modern professional methodology to conduct experimental studies and interpret their results.

PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms

1. List the components of the complement fixation test (reaction) .

2. What requirements must be met when setting the condition?
3. Explain the essence of complement fixation test (reaction) .
4. Draw a diagram of the main experiment of the complement fixation test (reaction)?
5. What is the essence of the phenomenon of immunofluorescence?
8. What types of forms of immunofluorescence exist? Tell us in detail about each of them.
9. Obtaining anti-species and anti-complementary serum.
10. What is the essence of radioimmunoassay (RIA)?
11. What is the essence of the enzyme immunoassay (ELISA) method?
12. What are the different types of enzyme immunoassay? Tell us in detail about each of them.
13. The essence of immune electron microscopy (IEM)
Developed competence: Able to determine the biological status and normative clinical indicators of organs and body systems of animals (GPC-1)
14. The essence of flow cytometry (FC)
15. The purpose of the statement, components and essence of the hemagglutination reaction
16. The purpose of the statement, components and essence of the hemagglutination delay reaction
17. The purpose of the statement, components and essence of the hemadsorption reaction
18. The purpose of the statement, components and essence of the hemadsorption delay reaction
19.Operating principle indirect hemagglutination reaction
20. Setting up and accounting indirect hemagglutination reaction
21.The purpose of the formulation, components and essence of the ring precipitation reaction.
22. The purpose of setting, components and essence of RIA according to Mancini
23. The purpose of the production, the essence and production of RIOEF
24. What is the essence of serological reactions?
25. What types of agglutination reactions are there?
26. Describe the essence and technique of immunochromatographic analysis.
27. Obtaining monoclonal antibodies. and their application
28. Cytokine system
29. Describe the essence and technique of staging neutralization reactions for bacterial infections
Describe the essence and technique of staging neutralization reactions for viral infections

3.1.2. Test – questions on the discipline "Immunology"

PC-3 Able to use in professional activities methods for solving problems using modern equipment when developing new technologies and use modern professional methodology to conduct experimental studies and interpret their results.
PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms

1. What characteristic applies to hemagglutination delay reaction
1. is not a serological reaction;
2. assessment of the reaction using a light microscope;
3. diagnosis of viral diseases;
4. Use as a cell culture test system.

2. Which characteristics do NOT apply to hemagglutination reaction (RGA)
1. the reaction is assessed in positive terms;
2. for viruses with hemagglutinating activity;
3. used to determine antibody titer;
4. determination of virus titer in GAU.

3. Options (types) of staging hemagglutination delay reaction.
1. using erythrocyte diagnosticum;

2. blood-droplet agglutination reaction;
3. using an immunological microplate with adsorbed specific Ab;
4. using an immunological microplate with adsorbed specific Ab.

4. What characteristics relate to hemadsorption reaction (RGAd)
1. diagnosis of all diseases;
2. volumetric (test tube) or droplet (on glass) method of production;
3. the reaction is assessed in positive terms;
4. Use as a cell culture test system.

5. Which of the following reactions are NOT serological:
1. Indirect hemagglutination reaction;
2.RGA;
3. hemagglutination delay reaction;
4. neutralization reaction (RN).

6..What reactions are called serological?
1. interaction of antigen and antibodies;
2. a set of test tube reactions,
based on the interaction of antigen and antibody;
3. interaction of toxin with antitoxin;
4. interaction of immune cells.

7. What is determined when setting up RGA:
1. AT titer;
2. AG titer;
3. identify the virus;
4. number of red blood cells.

8. How many GAE viruses are used to perform an RTGA
eleven;
2. 2;
3.3;
4. 4.

9. Enterprise Components Indirect hemagglutination reaction
1. AG, red blood cells;
2. AG, AT;
3. At, antigenic erythrocyte diagnosticum;
4. AG, AT, erythrocytes

10. Negative result Indirect hemagglutination reaction
1. sediment of erythrocytes in the form of an "umbrella";
2. sediment of erythrocytes in the form of a "button";
3. agglutinate flakes;
4. hemolysis.

11.What is the function of immunity in the body:
1. protecting the body exclusively from viral infections;
2. protecting the body from agents carrying foreign genetic information;
3. protecting the body exclusively from colds;
4. protecting the body exclusively from bacterial infections;

12. What is the name of an antigen that is unable to induce an immune response:
1. adjuvant;
2. hapten;
3. complete antigen;
4. opsonin.

13. What is used to enhance the immune response to the introduction of an antigen:
1.selectins;
2. adjuvants;
3. anaphylatoxins;
4. immunoglobulins.

14.Which immunoglobulin is capable of passing through the placenta?
1. IgM.
2. IgE.
3. IgG.
4. IgA.

15.Which immunoglobulin is responsible for immediate allergic reactions?
1. IgM.
2.IgE.
3.IgG 4.IgA.

16. Which part of the immunoglobulin molecule does the antigen bind to?
1. with Fc fragment.
2. with a 'hinged' part.
3. with a Fab fragment.
4. with C-domains.

17. Which immunoglobulin has a secretory component?
1. IgA;
2.IgM;
3. IgG;
4.IgD;

18. What are immunoglobulins:
1. nonspecific factor of the immune system;
2.specific factor of the immune system;
3. adjuvants;
4. epitopes.

19.What is the ability of an antigen to selectively react with specific antibodies or sensitized lymphocytes called:
1. variability;
2. specificity;
3. foreignness;
4. immunogenicity.

20. Which cells are capable of presenting antigen:
1. T-lymphocytes;
2.cardiomyocytes;

3. macrophages;
4. neutrophils.

21. What is the function of the spleen in the immune response:
1. is an organ of the central immune system;
2. is an organ of the peripheral immune system;
3. is not an organ of the immune system;
4. Serves as a site for maturation of T-lymphocytes

22. The state of immunity is determined by the functions:
1. central nervous system;
2. hormonal system;
3. lymphoid system;
4.all listed systems.

23. What refers to nonspecific factors of the body's defense:
1. complement system;
2. interferon and lymphokines;
3. phagocytosis system;
4. all of the above.

24.What is the number of classes of immunoglobulins:
12 ;
2.5;
3.7;
4.9.

27. Which immunoglobulin is synthesized first?
1. IgA;
2.IgE;
3. IgM;
4.IgG.

28.What is the lifespan of T-lymphocytes
1.several hours;
2. several days;
3. Several months;
4. up to a year.

29.What is the lifespan of B-lymphocytes
1. 7 hours;
2. 7 days;
3.7 months;
4. 7 years.

30. Serological reactions include
1. reactions of agglutination of erythrocytes by the influenza virus;
2. hemagglutination reactions for the corresponding blood groups;
3. reactions of blast transformation of leukocytes;
4. NST test.

31.Thė method for assessing humoral immunity includes:
1. determination of immunoglobulins using the RID method;

2. determination of the level of T-lymphocytes;
3. blast transformation reaction with lipopolysaccharide;
4. blast transformation reaction with phytohemagglutinin.
32.What cells carry out cellular immunity:
1. T-lymphocytes;
2. B lymphocytes;
3. plasma cells;
4. monocytes/macrophages.

33. What is the name of the immunity that arises after illness?
1.natural creative active;
2.natural production passive;
3. artificial consumer passive;
4.artificial consciously active;

34. What is the name of the immunity that arises after the introduction of a vaccine into the body?
1.natural creative active;
2.natural production passive;
3. artificial consumer passive;
4.artificial consciously active.

35. What is the name of the immunity that arises after the introduction of serum into the body?
1.natural creative active;
2.natural production passive;
3. artificial consumer passive;
4.artificial consciously active.

36.Which immunoglobulin has a serum component?
1. IgA;
2.IgM;
3. IgG;
4.IgD

37. Which immunoglobulin is responsible for filing an immediate application?
1. IgM.
2.IgE.
3.IgG 4.IgA.

4.2.Typical tasks for intermediate certification

4.2.1. List of questions for the test in "Immunology"

Competency being developed: PC-3 Diagnosis based on analysis of anamnesis data, general, special (instrumental) and laboratory research methods.

PC-3 ID5 Know the norms for indicators of the state of biological material of animals of different species and the reasons that cause deviations of indicators from the norms

1. Subject and objectives of immunology; its place and role in modern biology, medicine, and national economy.
2. Historical stages in the development of immunology. Works by E. Jenner, L. Pasteur1.

3. The emergence of non-infectious immunology. I.I. Mechnikov, F. Chistovich, P. Ehrlich, K. Landsteiner and others.
4. Traditional definition of immunity; formation and definition of modern immunology.
5. Immunity, the main task is immunity1.
6. The biological meaning of immunity and the biological content of immunology.
7. Immune system and immunological reactivity.
8. Nonspecific factors of protection of the body1.
9. The main forms of specific reactions during an immunological response.
10. Antigens, features that characterize a substance as an antigen.
11. Structural basis of antigen specificity; idea of antigenic determinants.
12. Types of antigen specificity.
13. Antibodies and immune serums.
14. Reactions of specific interaction of antibodies with antigens.
15. Specificity and heterogeneity of antibodies.
16. Structure of immunoglobulino3.
17. Immediate hypersensitivity (anaphylaxis and allergy).
18. The phenomenon of desensitization and its significance in medicine.
19. Mechanism and conditions of manifestation of anaphylaxis.
20. Delayed hypersensitivity type 1.
21. Central organs of the immune system (structure and main functions).
22. Secondary (peripheral) organs of the immune system; structure of the lymph node1.
23. Origin and interaction of T- and B-lymphocyto3.
24. Subpopulations of lymphocytes; antigens and receptors.
25. Cell interaction in the immune response.
26. Immunological memory.
27. Major histocompatibility complex.
28. Basic reactions of cellular immunity1.
29. Cytokines and mediators of the immune system (brief description).
30. Immunological tolerance (works by M. Hasek, P. Medawar).
31. Factors determining tolerance.
32. Transplantation immunity (the main phenomenon and its discovery).
33. Genetic laws of tissue compatibility.
34. Histocompatibility loci and the concepts of haplotype-phenotype.
35. Graft versus host reaction1.
36. Primary immunodeficiencies.
37. Secondary immunodeficiencies.
38. Autoimmune disorders1.
39. Immune mechanisms of tissue rejection.
40. Selection-clonal theory of immunity1.
41. The main distinctive features of immediate and delayed type 3 hypersensitivity reactions.
42. The main achievements of immunology that have found practical application.
43. The complement system and its activation.
44. Conditions and forms of manifestation of graft-versus-host reaction1.
45. Antitumor immunity.
46. Specificity of the immune response and phenotypic correction.
47. The importance of T- and B-lymphocytes in the development of tolerance.
49. Principles of gene therapy.
50. Genetics of immunoglobulins
51. Immunoglobulin3 gene systems.
52. Recombination of genes encoding light and heavy chains of immunoglobulin3.
53. Switching immunoglobulin isotypes3.
54. Genetic control of the immune response1.

55. Genetics of blood groups of the ABO system.
56. Genetics of the Rhesus system.
57. Clinical significance of group blood antigens.
58. The role of macrophages in the immune response.
59. Reasons for the ineffectiveness of antitumor immunity1.
60. Adaptive immunity.

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

4.1. Criteria for evaluating students' knowledge during 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.

4.2. 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

4.3. Criteria for evaluating students' knowledge in the preparation of reports

The mark "**excellent**" - the problem is identified and its relevance is justified; an analysis of various points of view on the problem under consideration is made and one's own position is logically stated; conclusions are formulated, the topic is fully disclosed, the volume is maintained; the requirements for external design are met, the basic requirements for the report are fulfilled.

The mark "**good**" - mistakes have been made. In particular, there are inaccuracies in the presentation of the material; there is no logical consistency in judgments; the volume of the report is not maintained; there are omissions in the design, there are significant deviations from the requirements for the presentation of materials.

The mark "**satisfactory**" - the topic is only partially covered; factual errors were made in the content of the report; there are no conclusions, the topic of the report is not disclosed.

The mark "**unsatisfactory**" - there is a significant misunderstanding of the problem or the report is not submitted.

4.4. Criteria for evaluating students' knowledge when checking control papers

The mark "**excellent**" - the problem is identified and its relevance is justified; an analysis of various points of view on the problem under consideration is made and one's own position is logically stated; conclusions are formulated, the topic is fully disclosed, the volume is maintained; the requirements for external design are met, the basic requirements for the abstract are fulfilled

The mark is "**good**" - mistakes have been made. In particular, there are inaccuracies in the presentation of the material; there is no logical consistency in judgments; the volume of the abstract is not maintained; there are omissions in the design, there are significant deviations from the requirements for abstracting.

The mark "**satisfactory**" - the topic is only partially covered; factual errors were made in the content of the abstract; there are no conclusions, the topic of the abstract is not disclosed

The mark "**unsatisfactory**" - there is a significant misunderstanding of the problem or the abstract is not presented at all.

4.5. Criteria of knowledge during the test

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

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

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

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

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

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

4.6. Criteria of knowledge during the examination

The mark "excellent" – all types of educational work provided for in the curriculum have been completed. The student demonstrates the compliance of knowledge, skills, and abilities with the indicators given in the tables, operates with acquired knowledge, skills, and applies them in various situations of increased complexity. At the same time, inaccuracies, difficulties in

analytical operations, transfer of knowledge and skills to new, non-standard situations may be allowed. –

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

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

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

5. ACCESSIBILITY AND QUALITY OF EDUCATION FOR DISABLED PEOPLE

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

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

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

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

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

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

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

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

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

Program abstract of the discipline
B1.V.07 "IMMUNOLOGY"
for specialty 36.05.01 Veterinary Medicine
Profile: «General clinical veterinary medicine»

Purpose of the discipline: The main goal of teaching the discipline "Immunology" is to give students modern knowledge about fundamental immunology.

The teacher is faced with the task of instilling practical skills in students to use the achievements of immunology in clinical practice and research work.

Place of the discipline in the curriculum: Discipline B1.V.07 "Immunology" is a discipline part 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). The discipline is mastered in the 7th semester of full-time study.

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

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

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

Brief content of the discipline:

To achieve this goal, it is necessary to solve the following tasks: Determination of antigens. Factors that determine the properties of antigens. The main characteristics of antigens: foreignness, antigenicity, immunogenicity, specificity. Types of antigen specificity: species specificity, group specificity, heterospecificity and heteroantigens.

The nature of antibodies. General structure of immunoglobulins. Functional features of different classes of immunoglobulins

Central lymphoid organs. Peripheral (secondary) lymphoid organs and formations. Functional differences of secondary lymphoid organs. Antigen recognition receptors, antigens, markers.

Immunopathological conditions. Autoimmune diseases. Primary and secondary immunodeficiencies.

As a result of mastering the discipline, the student must:

Know: the physical and chemical foundations of the life of the body, methods of mathematical and variation statistics in biological and veterinary science. It is necessary to understand the pathogenesis of immunopathological processes and the features of their manifestation in various animal species.

Be able to: evaluate immunological reactions; explain the processes occurring in the body from the point of view of general biological and environmental science; use knowledge of immunology when assessing the animal's condition; carry out immunological analysis; select material for immunological studies.

Posses: knowledge of basic physical, chemical and biological laws and their use in veterinary medicine; skills to operate laboratory equipment; methods for assessing the immune status of the body; skills in studying the functions of organs and immune systems, observation and experimental methods; knowledge of the mechanisms of development of immune disorders.

The overall significance of the discipline is: 2 credits (72 academic hours).

Final control in the discipline: test.