



MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
STATE BIOTECHNOLOGICAL UNIVERSITY
Faculty of Veterinary Medicine

APPROVED by
Head of the Epizootology and
Microbiology Department

(signature)

R.V. Severin

(surname and initials)

«20» June 2025 p

EPIZOOTOLOGY AND MICROBIOLOGY DEPARTMENT
(name of the department)

WORKING PROGRAM
OF EDUCATIONAL DISCIPLINE
VETERINARY IMMUNOLOGY
(code and name of academic discipline)

Level of higher
education

The second level of higher education (master's)

(name)

Branch of knowledge

21 Veterinary medicine

(code and name)

Specialty

211 Veterinary medicine

(code and name)

Educational program

educational and professional program "Veterinary
Medicine"

(name)

Kharkiv – 2025

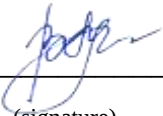
Compilers: associate professors Severyn R.V., Garagulya G.I.,
candidates of veterinary sciences Basko S.O.
(academic title, position, surname and initials)

The working program of the academic discipline was approved at an extended meeting of the department Department of epizootology and microbiology
Minutes dated the 26 » June 2025, No. 13.

The work program has been agreed.

Guarantor of the educational program "Veterinary Medicine"

(name of OPP)

June the 23^d 2025 () Naumenko S.V.
(signature) (surname and initials)

Translated and layout created by R.V.Severin, cand. of vet. sci., associate professor, Head of the Department of Epizootology and Microbiology of SBTU

The validity period has been extended to:
" ____ " ____ 20 ____ . Minutes № ____ from ____ " ____ 20 ____ p.
head of the department (_____) (signature) (_____)
(name of department)

" ____ " ____ 20 ____ . Minutes № ____ from ____ " ____ 20 ____ p.
head of the department (_____) (signature) (_____)
(name of department)

" ____ " ____ 20 ____ . Minutes № ____ from ____ " ____ 20 ____ p.
head of the department (_____) (signature) (_____)
(name of department)

1 Description of the academic discipline

Name of indicators	Characteristics of the academic discipline			
	full-time education			
Number of credits <u>3</u>	Discipline status:			
	mandatory			
Sections - 2	Year of training:			
	<u>2</u> -th	-th	-th	-th
	Semester			
The hours' amount of discipline <u>90</u> .	<u>4</u> -th	-th	-th	-th
	Lectures			
	<u>18</u> hours	hours	hours	hours
	Laboratory			
	38 hours	hours	hours	hours
	Self-study			
	34 hours	hours	hours	hours
	Clinical practice			
	- hours	- hours	- hours	- hours
	Term paper			
	- hours	- hours	- hours	<u>30</u> hours
Weekly hours for full-time education: classrooms – 56 independent work of the acquirer - 34	Type of control:			
	Final exam.	-	-	-

2 The purpose and tasks of the discipline

The purpose of the discipline "Veterinary Immunology" is to provide students with the necessary theoretical knowledge and practical skills and abilities on the technique of obtaining and preparing for research biological material obtained from animals for conducting immunological studies, establishing immunological indicators and their further interpretation in the course of diagnosing infectious diseases of animals and establishing their immune status.

The task of studying the discipline consists in forming in the future doctor of veterinary medicine an understanding of the role of the immune system in animal and human pathology, the possibility of using immunological methods in the diagnosis, treatment and prevention of animal diseases of various etiologies.

The subject of study of the academic discipline is the assimilation by students of the features of the functioning of the immune system, familiarization with immunological research methods and the possibilities of using these methods during the laboratory diagnosis of infectious and non-infectious diseases, as well as understanding the main laws of their specific prevention.

The basic disciplines for the successful assimilation of the program material of the discipline are the assimilation of the following courses: "Zoology", "Latin language (terminology)", "Anatomy of domestic animals", "Genetics", "Chemistry (organic and inorganic)", "Cytology, histology and embryology", "Animal physiology", "Veterinary microbiology", "Veterinary virology".

This educational discipline ensures the formation of the following learning outcomes:

PLO 1. Know and correctly use the terminology of veterinary medicine.

PLO 2. Use information from domestic and foreign sources to develop diagnostic, treatment and business strategies.

3 Program of the academic discipline

Chapter 1 General veterinary immunology

Topic 1. The concept of immunology.

History of immunology, its place and role among biological sciences. Basic concepts and terms; organs of the immune system and their functions; types of immunity; cellular and molecular bases of immunity and their interaction

Recommended reading (links)

<http://moodle.btu.kharkiv.ua/course/view.php?id=520>

Tizard Ian R. Veterinary Immunology, 10th Edition. – 2017. – 815p.

<https://www.youtube.com/watch?v=6fwu7AES9z8>

<https://www.youtube.com/watch?v=AomdQO0tskU>

Topic 2. Innate and adaptive immunity.

Brief content of the topic: types of non-specific and specific immunity factors, characteristics and classification of antigens and antibodies; immune mechanisms of the inflammatory process, features of the formation of an immune response to various antigens; primary and secondary immune response, immunological memory, mechanisms of immune response regulation.

Recommended reading (links)

<http://moodle.btu.kharkiv.ua/course/view.php?id=520>

Tizard Ian R. Veterinary Immunology, 10th Edition. – 2017. – 815p.

<https://www.youtube.com/watch?v=AomdQO0tskU>

<https://www.youtube.com/watch?v=vmlLj1aLZ7s>

Chapter 2 Clinical veterinary immunology

Topic 3. Immunological diagnosis and prevention.

Brief content of the topic: Applied value of immunological research methods, basics of immunological diagnostics; types of serological reactions and their use in laboratory diagnostics of animal diseases; types of immunological drugs and rules for the use of vaccines and serums.

Recommended reading (links)

<http://moodle.btu.kharkiv.ua/course/view.php?id=520>

Tizard Ian R. Veterinary Immunology, 10th Edition. – 2017. – 815p.

<https://www.youtube.com/watch?v=oYnXeAPieN0>

Topic 4. The concept of the immune status of the body.

Brief content of the topic: forms of immune response; transplantation and antitumor immunity; hypersensitivity reactions; immunodeficiency states; autoimmune diseases in animals.

Recommended reading (links)

<http://moodle.btu.kharkiv.ua/course/view.php?id=520>

Tizard Ian R. Veterinary Immunology, 10th Edition. – 2017. – 815p.

<https://www.youtube.com/watch?v=h9lxx6x3HAM>

<https://www.youtube.com/watch?v=nwYlk4eB7yA>

4 Structure of the academic discipline

Name sections and topics	Total hours full-time education				
	Total amount	Auditory hours			Independent work
		altogether	Lectures	Practical classes	
1	2	3	4	5	6
Chapter 1. General veterinary immunology					
Topic 1. The concept of immunology	18	8	4	4	10
Topic 2. Innate and adaptive immunity	24	14	4	10	10
Together for section 1	42	22	8	14	20
Chapter 2. Clinical veterinary immunology					
Topic 3. Immunological diagnosis and prevention.	24	14	4	10	10
Topic 4. The concept of the immune status of the body	24	14	4	10	10

Together for section 2	48	28	8	20	20
Hours in total	90	50	16	34	40

5 THEORETICAL LESSON (LECTURES)

N by order	The name of the topic of the lecture	Hours
		d/f
Chapter 1 Theoretical foundations of veterinary immunology		
1.	Introduction into immunology.	2
2.	The innate defense mechanisms	2
3.	Basic molecules of the immune system	2
4.	The inflammatory response.	2
Chapter 2 Clinical veterinary immunology		
5.	Adaptive immune response. Part 1.	2
6.	Adaptive immune response. Part 2.	2
7.	Regulation of adaptive immunity	2
8.	Immunity to Bacteria, Virus, Fungi, Helminths and Protozoa	2

6 LABORATORY CLASSES

	Name topics	Total hours
1	Rules of work in the immunological laboratory. Study of organs of the immune system	2
2	Study of immunocompetent cells of various organs	2
3	Study of non-specific immunity factors using the example of lysozyme.	2
4	Study of phagocytic activity of neutrophils	2
5	Obtaining bacterial antigens.	2
6	Blood serum as a source of immunoglobulins.	2
7	Obtaining hyperimmune sera. Isolation of individual classes of immunoglobulins.	2
8	Serological reactions. Precipitation reaction (RP) and its modifications (Ascoli reaction, RDP).	2
9	The phenomenon of agglutination. Qualitative agglutination reactions (RA).	2
10	Quantitative agglutination reactions (RA).	2
11	Hemagglutination reactions (RHA, RZHA, RNHA)	2

12	Complement binding reaction (CRF). Neutralization reaction (PH)	2
13	The phenomenon of labels. Immunofluorescence reaction (IF).	2
14	Enzyme immunoassay (ELISA)	2
15	Monoclonal antibodies.	2
16	Reaction of rosette formation. Determination of the number of T-lymphocytes. Determination of the number of B lymphocytes	2
17	Immune status of the body. Final lesson	2
	Total	34

7 SELF-STUDY WORK

	Control questions and tasks for self-study	Hours
1	Theories of the development of immunology. Evolution of the immune system. Scientists-immunologists, laureates of the Nobel Prize - independent biography of an individual scientist.	4
2	Types of phagocytes and their functions (neutrophils, monocytes, macrophages, SMF). Phagocytosis and complement as non-specific factors of immunity. Phagocytosis and complement - participation in specific immune reactions.	4
3	The role of T- and B-lymphocytes in immunity. Differentiation of T-lymphocytes in the thymus. The mechanism of lymphocyte circulation.	4
4	Groups of mediators and their functions (pro-inflammatory and anti-inflammatory). Interaction of cellular and humoral factors of immunity during the inflammatory reaction.	4
5	Superfamily of immunoglobulins (Ig). Formation and differentiation of Ig. Classes Ig. Switching classes Ig.	4
6	Features of the immune response to different types of antigens (AG).	4
7	Methods of obtaining monoclonal antibodies	4
8	Types of diagnostics (AG-no and AT-no), methods of their manufacture, application. Peculiarities of preparation of material for research. Comparison of the sensitivity of different serological reactions.	4
9	Immunohematology: blood groups, Rhesus factor system, hemolytic disease.	4
10	Hypersensitivity. Transplantation. Immunodeficiencies. Autoimmune diseases.	4

	Total	40
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8 Teaching methods

(According to the structure of the academic discipline)

1. Lecture classes: lecture, story, explanation, illustration, conversation.
2. Laboratory classes: conversation, explanation, demonstration, illustration, laboratory method, practical work, work with a book.
3. Self-study: work with a book.

**The content of the section is of a recommendatory nature and is adjusted according to the content of the academic disciplines.*

9 Control methods

- ❖ oral interview;
- ❖ test control;
- ❖ credit;
- ❖ exam.

During the current and final control, the means of assessing the results of learning in the discipline are standardized computer tests.

The final semester control (credit) is determined by the sum of the actually scored rating points from the current control and the individual educational and research task.

Current control is carried out during the semester by means of a survey (oral or test), as well as checking the quality of mastering the topics of independent work.

When choosing the criteria for assessing the assimilation of the discipline program by the applicant, the implementation of the program and the assimilation of the material in terms of lecture and laboratory classes, as well as the implementation of the independent work provided for by the program, were taken into account.

All types of control (oral interview, written interview, test interview) are closely related and organized in such a way as to stimulate the effective independent work of applicants and ensure an objective assessment of the level of their knowledge.

After completing the study of the discipline (part of the discipline), the final control is carried out in the form of an exam (test) and the applicant can score from 60 to 100 points inclusive during the semester at the control points.

**The content of the section is of a recommendatory nature and is adjusted in accordance with the content of the academic discipline.*

10 Distribution of points received by applicants (credit)

In the process of studying the course, the success of applicants is determined by conducting ongoing and final controls (credit and exam).

Current testing, answers in class and control of independent work				Total points
Chapter 1		Chapter 2		60-100
T <u>1</u>	T <u>2</u>	T <u>3</u>	T <u>4</u>	
0-100	0-100	0-100	0-100	
Overall rating score (ORS = R+E)				0-100

T __, T __... T __ – topics of chapters.

The grade that a higher education applicant receives for conducting an intermediate (current) control (CurC) consists of the points that the applicant receives during testing (T), which are 30%; the points that the applicant receives during activity in classes (Cl), which are 40%; and the points for mastering the independent work block (InW), which are 30%.

$$\text{CurC} = T \times 0,3 + Cl \times 0,4 + InW \times 0,3$$

In each section of the educational component, current control is carried out (**current control** - CurC).

For applicants in the fall (spring) semester, when the final knowledge test is completed with an undifferentiated credit (UDC), the final sum of points (UDC points) is the arithmetic average of the points of the four current tests of the fall (spring) semester:

$$\text{UDC points} = (\text{CurC } 1 + \text{CurC } 2 + \text{CurC } 3 + \text{CurC } 4) / 4$$

Based on the results of the semester control, the applicant's transcript is assigned a "pass/fail" grade on the national scale.

11 Distribution of points received by applicants (exam)

Current testing, answers in class and control of independent work				Total points	
Chapter 1		Chapter 2		According to the results of the chapters (R)	Exam (E)
T <u>1</u>	T <u>2</u>	T <u>3</u>	T <u>4</u>	((T <u>1</u> +T <u>2</u> +... T <u>4</u>)/n)x60%	Ex40%
0-100	0-100	0-100	0-100		
Overall rating score (ORS = R+E)				0-100	

T1, T2... T4 – topics of chapters, n – number of topics.

The final control of the academic performance of applicants is carried out in the form of an exam based on the results of computer testing. The exam grade for the educational component (discipline) is determined on a 100-point scale.

The exam grade (EG) is 40% of the total final grade (FG).

$$\mathbf{EG = ETS \times 0,4}$$

where: ES – exam score; ETS– exam testing scores, which account for 40% of the points scored during exam testing.

The final grade for the discipline is given on a 100-point scale. It is calculated as the average arithmetic value (AAV) of all the grades received by the student from the current control (CurC) of the assimilation of the material of the sections, with their subsequent conversion into points according to the following formula:

$$\mathbf{AAV = (CurC\ chapter1 + CurC\ chapter.2 + CurC\ chapter.3 + CurC\ chapter.4) / 4}$$
$$\mathbf{CurCS = AAV \times 0,6}$$

where: CurCS – current control scores, which make up 60% of the total final score; AAV is the arithmetic average value of all grades received by the student from the current control

The applicant can score up to 60 points inclusive at the control points of the mastery of the sections within 2 semesters.

Thus, the final grade (FG) is calculated using the formula:

$$\mathbf{FG = EG + CurCS}$$

The results of the tests are displayed in the DBTU Moodle system. All forms of control are included in the 100-point assessment scale.

12 Scale: national and ECTS and assessment criteria for determining the level of knowledge and skills

The control of students' knowledge and skills in the discipline is carried out in accordance with the use of the European system of transfer and accumulation of ECTS credits.

Basic provisions:

The total number of current control measures that a student must pass in the discipline is determined taking into account the number of credits in the discipline.

Based on the results of the current control measure, the student's level of assimilation of the educational material is assessed according to the national scale and the ECTS scale.

The number of points received by the student in the assessment of the final control is correlated with the marks on the national scale and the ECTS scale in accordance with Table 1.

1. Rating scale

<i>100-point scale</i>	National scale	interpretation	ECTS scale
90 – 100	excellent	Excellent - excellent answer, the work is fulfilled with only a small number of errors	A
82 – 89	good	Very well - above average with a few errors	B
74 – 81		Well - in general the correct answer, the work with a certain number of serious errors	C
64 – 73	satisfactory	Satisfactorily – not bad, but with big number of errors	D
60 – 63		Quite satisfactorily – the work meets the minimum criteria	E
35– 59	unsatisfactory	Unsatisfactorily – with the possibility to pass again	FX
0-34		Unsatisfactorily – with compulsory passing of the work once again	F

Passing current tests is mandatory. A section is considered passed if the student has scored the minimum required number of points or more.

The results of the rating for the section are brought to the attention of students no later than the third working day after the control event and, in the absence of claims from the students, are considered final.

If the student does not agree with the decision to assign him rating points for the section, then he must immediately after their announcement file a written appeal to the head of the department and, within the specified period, take an oral attestation for the section before the commission. The composition of the appeal commission in each specific case is determined by the head of the department. The decision of the commission is final.

A student who did not appear for the current test has the right to take the missed current test during the assessment week.

The final rating of current performance in the discipline is calculated by averaging the ratings from all sections. The semester grade is given to the student taking into account the results of the final and current tests. The maximum number of points that a student can receive when studying a discipline is 100.

The exam involves a final test. If permission is granted for automatic exam enrollment, a student who has passed all current tests on time and has been certified with an "excellent" grade based on their results can receive a credit automatically. The semester grade in this case is the average grade for the sections.

The teacher is required to submit the completed credit and examination report to the academic department within the following deadline: for the exam - no later than the next business day after its completion.

The mastery of the independent work block is assessed on a scale according to the following regulations (Table 2)

Table 2.

Assessment criteria (100-point system, oral interview).

The level of formation of a student's knowledge and skills in the academic discipline, both during the final and current control, is assessed on a 100-point scale with subsequent conversion of grades into the national scale and the ECTS grading scale.

№	Criteria	Maximum number of points	Description
1	Completeness of the answer	30 points	The answer covers all the main aspects of the question, reveals its content in accordance with the curriculum.
2	Correctness and accuracy of presentation	20 points	The answer does not contain factual, logical or terminological errors.
3	Consistency and logic	10 points	The answer is logically structured, without inconsistent or chaotic fragments.
4	Language and style of presentation	10 points	The expression is competent, clear, using professional terminology.
5	Independent thinking	10 points	The student demonstrates the ability to draw his own conclusions, analyze, compare, give examples.
6	Additional knowledge (outside the main program)	10 points	The answer contains references to modern sources, interdisciplinary connections, and the latest data.

7	Ability to answer additional questions	10 points	The student confidently responds to the teacher's clarifying or in-depth questions, provides additional arguments or examples.
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The conversion of grades on a 100-point scale to the national scale and ECTS scale is carried out according to the table:

Total points for all types of learning activities	Mark according to ECTS scale	Mark according to national scale
90 – 100	A	excellent
82 – 89	B	good
74 – 81	C	
64 – 73	D	satisfactory
60 – 63	E	
35 – 59	FX	unsatisfactory
0 – 34	F	

Activity in classes is assessed on a scale with a maximum of 100 points in accordance with the following regulations (Table 3)

Table 3.

ACTIVITY ASSESSMENT SCALE IN CLASSES

ECTS scale	National scale	Points	Score interpretation
A	Excellent	90-100	the student works actively during classes, provides complete answers to the teacher's questions and shows a deep mastery of the material, is able to express his own opinion when discussing situational tasks, demonstrates the ability to independently and reasonably present the material, analyze phenomena and facts, make independent generalizations and conclusions, correctly completes educational tasks, has a full synopsis of theoretical material, regularly visits the Moodle system
B	Very well	82-89	the student works actively during the lessons, the questions are covered in full, the presentation of the material is logical, substantiated by facts,

			with references to literary sources, the coverage of the questions is completed with conclusions, the student has shown the ability to analyze facts and events, as well as to complete educational tasks. However, there are inaccuracies in the answers, some minor errors, the presence of a full summary of the theoretical material, regular visits to the Moodle system
C	Well	74-81	the student works actively during the lessons, the questions are covered in full, the presentation of the material is logical, substantiated by facts, with references to literary sources, the coverage of the questions is completed with conclusions, the student has shown the ability to analyze facts and events, as well as to complete educational tasks. However, there are inaccuracies in the answers, some minor errors, there is insufficient reasoning when presenting the material, there is an incomplete synopsis of the theoretical material, partial access to the Moodle system
D	Satisfactorily	64-73	The student has generally mastered the essence of the issues on the topic, demonstrates knowledge of the lecture material and educational literature, tries to analyze facts and events, draw conclusions and solve situational problems. However, in class he behaves passively, responds only to the teacher's call, gives incomplete answers to questions, makes gross mistakes when covering theoretical material, incomplete notes on theoretical material, partial access to the Moodle system
E	Quite satisfactorily	60-63	the student lacks understanding of the main essence of the questions, conclusions, generalizations, demonstrated inability to solve situational problems, incomplete note-taking of theoretical material, partial access to the Moodle system
FX, F	Unsatisfactorily	0-59	lack of desire to participate in the discussion of issues, lack of notes, irregular visit to the Moodle system

Example: a student wrote the test tasks of the current control for 85 points. Multiply by 0.3. The result for the tests is 25.5 points. For independent work, the student received 88 points. Multiply by 0.3. The result for it is 26.4 points. For activity in classes - the student received 74 points. Multiply by 0.4. We get 29.6. In total, the number of points for the current control is 81.5 points. We average towards a larger number and get 82 points, which is equal to good B.

Regarding the final certification of the student, the result obtained for the student's current work (average value for 4 sections, multiplied by 0.6) and the final test work (multiplied by 0.4) is taken into account.

Example: Section I – 83 points, Section II – 95 points, Section III – 73 points, Section IV – 88 points. The sum of the points for the sections is $339 / 4 = 84.75$ (85) points – this is the average value. Next, $85 \times 0.6 = 51$ points. The student wrote the final exam with 91 points. $91 \times 0.4 = 36.4$ points. Therefore, the total number of points for the discipline is $51.0 + 36.4 = 87.4$. We average towards a smaller number and get 87 points, which is equal to a good or B grade.

13 Methodological supports

<http://moodle.btu.kharkiv.ua/course/view.php?id=520>

14 RECOMMENDED BOOK

Tizard Ian R. Veterinary Immunology, 10th Edition. – 2017. – 815p.

15 Electronic information resources

(Link)

<https://www.youtube.com/watch?v=6fwu7AES9z8>

<https://www.youtube.com/watch?v=AomdQO0tskU>

<https://www.youtube.com/watch?v=vmlLj1aLZ7s>

<https://www.youtube.com/watch?v=oYnXeAPieN0>

<https://www.youtube.com/watch?v=h9lxx6x3HAM>

<https://www.youtube.com/watch?v=nwYlk4eB7yA>

16 Changes and additions

(to methodological support and recommended literature)

What is being removed from the work program	What is being added to the work program	Date of consideration by the department