

**NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES  
OF UKRAINE**

**Department of Veterinary Epidemiology and Animal Health**

**APPROVED**  
**Faculty of Veterinary Medicine**  
**« 4 » June 2025**

**CURRICULUM OF ACADEMIC DISCIPLINE**  
**VETERINARY VIROLOGI**

Area of knowledge 21 Veterinarian

Specialty 211 «Veterinary Medicine»

Academic programme «Veterinary Medicine»

Faculty of Veterinary Medicine

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**Description of the discipline** Virology is a part of microbiology that studies viruses, their morphology, physiology, genetics, as well as the evolution of viruses and issues of ecology. Medical and veterinary virology primarily examines viruses affecting humans and animals, studies their role in the development of infectious and oncological diseases, and determines methods of diagnosis, therapy, and prevention of viral diseases. The Veterinary Virology study of the nature, taxonomy; structure, chemical structure, genetic, reproduction and methods of viruses cultivation; familiarity with the pathogenesis of viral diseases, with special antiviral immunity, means and methods of diagnosis and prevention of infectious diseases in animals.

Area of knowledge, specialty, academic programme, academic degree		
Academic degree	Master	
Specialty	211 Veterinary Medicine	
Academic programme	Veterinary Medicine	
Characteristics of the discipline		
Type	обов'язкова	
Total number of hours	120	
Number of ECTS credits	4	
Number of modules	4	
Course project (work) (if any)	-	
Form of assessment	exam	
Indicators of the discipline for full-time and part-time forms of university study		
	University study	
	Full-time	Part-time
Year of study	2	-
Term	4	-
Lectures	30 hours	-
Practical classes and seminars	-	-
Laboratory classes	45 hours	-
Self-study	45 hours	-
Number of hours per week for full-time students	5 hours	-

### 1. Aim, competences and expected learning outcomes of the discipline

**Aim.** The aim. of the discipline "Veterinary Virology" is to form a future specialist in veterinary medicine knowledge and skills related to microorganisms, including biology viruses, viral pathogens of animal diseases, principles and methods of laboratory diagnosis of infectious animal diseases.

#### **Competences acquired:**

**Integral competence (IC):** the ability to solve complex tasks and problems in veterinary virology, which involves conducting research and/or innovation and is characterized by the uncertainty of conditions and requirements.

#### **General competence (GC):**

1. Ability to abstract thinking, analysis and synthesis.
2. Ability to apply knowledge in practical situations.
3. Ability to conduct research at the appropriate level.
4. The ability to communicate in the state language both orally and in writing.
5. Ability to communicate in a foreign (English) language.
6. Skills in using information and communication technologies.
7. Ability to conduct research at an appropriate level.
8. Ability to learn and master modern knowledge.
9. Ability to make informed decisions.

10. Ability to communicate with representatives of other professional groups at different levels (with experts in other fields of knowledge/types of economic activity).

### ***Special (professional) competence (SC):***

1. The ability to establish the features of the structure and functioning of cells, tissues, organs, their systems and apparatuses of the body of animals of different classes and species - mammals, birds, insects (bees), fish and other vertebrates.
2. Ability to use tools, special devices, instruments, laboratory equipment and other technical means to perform the necessary manipulations during professional activities.
3. Ability to follow the rules of labor protection, asepsis and antiseptics during professional activities.
4. Ability to conduct clinical studies to draw conclusions about the condition of animals or to establish a diagnosis.
5. Ability to organize and conduct laboratory and special diagnostic tests and analyze their results.
6. Ability to apply knowledge of biosafety, bioethics and animal welfare in professional activities.
7. Ability to carry out educational activities among industry workers and the public.

### ***Expected learning outcomes (ELO):***

1. Know and correctly use the terminology of veterinary medicine.
2. Establish a connection between the clinical manifestations of the disease and the results of laboratory tests. Monitor the causes of the spread of diseases of various etiologies and biological pollution of the environment with livestock waste, as well as materials and veterinary products.
3. Understand the essence of the processes of manufacturing, storing and processing biological raw materials.
4. Know the rules for storing various pharmaceuticals and biological products, the routes of their enteral or parenteral administration, understand the mechanism of their action, interaction and complex effect on the animal body.
5. Know the rules and requirements of biosafety, bioethics and animal welfare.

### ***First day competencies (FDC):***

1. To understand the methods of scientific research, the contribution of fundamental and applied research to science and the implementation of the principle of 3Rs (Replacement, Reduction, Refinement - Replacement, Reduction, Improvement);
2. Understand and apply the principles of the One Health concept to ensure good clinical practice in veterinary medicine, as well as science-based and evidence-based veterinary medicine;
3. Promote and monitor the preservation of health and safety of oneself, patients, animal owners, colleagues and the environment during the performance of professional activities; demonstrate knowledge of the principles of quality assurance; apply the principles of risk management in practice;
4. Conduct autopsies of animal corpses of all common species, including sampling, sending them for research and reporting;
5. Collect, store and transport specimens, select appropriate diagnostic tests, perform interpretation and have an understanding of the limitations of test results;
6. Apply biosecurity principles and evaluate biosecurity protocols correctly.

## **2. Programme and structure of the discipline**

Modules and topics	Number of hours												
	full-time							part-time					
	weeks	total	including					total	including				
			l	p	lab	ind	s.st.		l	p	lab	ind	s.st.
Module 1. <b>Determinate viruses at the pathological material</b>													
Topic 1. Introduction at the veterinary virology	1	6	2	-	2	-	2	-	-	-	-	-	-
Topic 2. The chemical structure and ultra structure of viruses	2	6	2	-	2	-	2	-	-	-	-	-	-

Topic 3. Reproduction of viruses	3	6	2	-	2	-	2	-	-	-	-	-	-
Topic 4. CLASSIFICATION AND GENETICS OF VIRUSES.	4	6	2	-	2	-	2	-	-	-	-	-	-
Topic 5. Pathogenesis of viruses infection Diseases	5	8	2	-	2	-	4	-	-	-	-	-	-
Total for module 1		32	10	-	10	-	12	-	-	-	-	-	-
<b>Module 2. Features viral multi-vector effect on the body</b>													
Topic 1. Biological drugs in veterinary virology	6	6	2	-	2	-	2	-	-	-	-	-	-
Topic 2. Antiviral immunity	7	8	2	-	4	-	2	-	-	-	-	-	-
Topic 3. Laboratory Diagnosis of Virus Diseases	8	6	2	-	2	-	2	-	-	-	-	-	-
Topic 4. Oncolytic viruses. Characteristics of prions.	9	6	2	-	2	-	2	-	-	-	-	-	-
Topic 5. Characteristics of prions.	10	6	2	-	2	-	2	-	-	-	-	-	-
Total for module		32	10	-	12	-	10	-	-	-	-	-	-
<b>Module 3. 3. DNA-content viruses.</b>													
Topic 1. Viruses and biosecurity.	11	7	1	-	3	-	3	-	-	-	-	-	-
Topic 2. Family Herpesviridae, Family Poxviridae, Family Circoviridae, Family Adenoviridae	11-12	10	2	-	4	-	4	-	-	-	-	-	-
Topic 3. Family Parvoviridae, Family Asfarviridae, Family Iridoviridae, Family Papovaviridae	12-13	10	2	-	4	-	4	-	-	-	-	-	-
Total for module		27	5	-	11	-	11	-	-	-	-	-	-
<b>Module 4. RNA-content viruses.</b>													
Topic 1. Family Flaviviridae, Family Coronaviridae, Family Arenaviridae, Family Picornavirida	13-14	10	2	-	4	-	4	-	-	-	-	-	-
Topic 2. Family Orthomyxoviridae, Family Paramyxoviridae, Family Rhabdoviridae, Family Retroviridae	14-15	10	2	-	4	-	4	-	-	-	-	-	-
Topic 3. Family Reoviridae, Family Arenaviridae, Family Caliciviridae, Family Bunijaviridae	15	9	1	-	4	-	4	-	-	-	-	-	-
□ Total for module		29	5	-	12	-	12	-	-	-	-	-	-

Total hours	120	30	-	45	-	45	-	-	-	-	-	-
Course project (work)	-	-	-	-	-	-	-	-	-	-	-	-
(if included in the curriculum)												
Total hours	-	-	-	-	-	-	-	-	-	-	-	-

### 3. Topics of lectures

No.	Topic	Hours
1	Introduction at the veterinary virology	2
2	The chemical structure and ultra structure of viruses	2
3	Reproduction of viruses	2
4	Classification and genetics of viruses	2
5	Pathogenesis of viruses infection Diseases Classification and genetics of viruses	2
6	Biological drugs in veterinary virology	2
7	Antiviral immunity	2
8	Laboratory Diagnosis of Virus Diseases	2
9	Oncolytic viruses.	2
10	Characteristics of prions	2
11	Viruses and biosecurity.	1
12	Family Herpesviridae, Family Poxviridae, Family Circoviridae, Family Adenoviridae	2
13	Family Parvoviridae, Family Asfarviridae, Family Iridoviridae, Family Papovaviridae	2
14	Family Flaviviridae, Family Coronaviridae, Family Arenaviridae, Family Picornavirida	2
15	Family Orthomyxoviridae, Family Paramyxoviridae, Family Rhabdoviridae, Family Retroviridae	2
16	Family Reoviridae, Family Arenaviridae, Family Caliciviridae, Family Bunijaviridae	1
Total hours		30

### 4. Topic of laboratory (practical, seminars) classes

No.	Topic	Hours
1.	Organization and equipment of virological laboratories. Rules for working with viruses. Safety equipment. Bacterial filters and filtering technology.	2
2.	Selection, conservation, and transportation of pathological material to the laboratory. Methods of primary processing of material and its preparation for virological studies.	2
3.	The use of laboratory animals for the diagnosis of diseases of viral etiology (learning the methods of infection, the rules of dissection of corpses).	2
4.	Preparation of virus-containing material for research. Inclusion bodies in viral diseases. Methods of their detection. Methods of coloring and microscopy of elementary bodies.	2
5.	Luminescent/fluorescent microscopy. Study of the structure of a fluorescent microscope. The use of fluorescent microscopy in the diagnosis of viral diseases.	2
6.	Electron microscopy and immunoelectron microscopy. The structure of EM and the principle of its operation. Preparation of preparations for EM and IEM studies. Mastering the technique of preparing ultra-thin sections for EM studies.	2
7.	Preparation of dishes, saline solutions and nutrient media for cultivating cell cultures.	2

8.	Module 1. Determinate viruses at the pathological material	1
9.	Primary cell cultures. Learning methods for primary cell cultures by trypsinization.	2
10	Interweave cell culture. Study methods to maintain these cells in the laboratory.	2
11	Cultivation of viruses in cell cultures. Study methods of infection of cell cultures, revealing cito-pathogen of viruses into cells.	2
12	Study of the cytopathogenic effect of viruses on cell cultures. Collection, cleaning, preservation and storage of virus-containing materials.	2
13	Titration of viruses. Study of methods of titration of viruses according to the infectious effect, which is evaluated statistically.	2
14	Module 2. Features viral multi-vector effect on the body	1
15	Cultivation of viruses in developing chicken embryos. Mastering methods of infection of chicken embryos.	1,5
16	Cultivation of viruses in chicken embryos developing countries. Assimilation techniques infection CE. Signs of viral replication in OM.	1,5
17	Hemagglutinating viruses. Studying the methods of staging RGA.	1
18	Development of serological methods of diagnosis of viral diseases. Setting RDHA. RHAD and RDHA.	2
19	Reaction of diffusion precipitation in agar gel (RDP). Neutralization reaction. Methods of implementation.	2
20	Module 3. DNA-content viruses.	1
21	Identification of the virus and determination of the antibody titer using the neutralization reaction.	2
22	The complement fixation reaction (CRF).	2
23	Determination of types and variants of foot-and-mouth disease virus using CRF.	1
24	Immunosorbent assay (ELISA). Application of ELISA in laboratory practice. Study of standard diagnostics are used in veterinary medicine.	2
25	Molecular genetic methods in virology (PCR).	2
26	Module 4. RNA-content viruses.	1
Total hours		45

## 5. Topics of self-study

No.	Topic	Hours
1	Evolution of viruses	2
2	Characterization of diseases with different types of tropism of pathogens. Comparative characteristics of clinical and pathological materials.	3
3	Microbial composition of virus-containing materials. Minimizing the ingress of foreign microbes into samples (sampling of blood, postmortem and intravital pathological materials). Use of vacuum tubes in blood research	4
4	Structure of viruses (terminology). Simple and complex virions. The functions of the virion structures. The formation of new antigenic variants of viruses. The symmetry of viral capsids. The relationship between the type of symmetry and the number of virulent particles in the samples. Types of defective virions.	4
5	Documentation to accompany virus-containing samples	2
6	Chemical composition of virions (terminology). Substances in the structures of simple and complex viruses. Characteristics of viral proteins. Peplomers and lipids of complex virions.	4
7	Dimensions and structure of the genome of viruses	2
8	Phases of virus reproduction and their characteristics (features of attachment of viruses to tropic cells, fusion of host membranes and virus envelopes, "undressing" of the virion, replication of genetic material, biosynthesis of viral	4

	proteins, self-organization of components into mature virions, release of vibrios. Reproduction of viruses with different genome structures ( single- and double-stranded DNA; single spiral + RNAs,; single-spiral – RNA; retrovirus)	
9	Resistance of virions of different families to environmental factors	2
10	Classification of virions. Principles of virus classification. Characteristics of viral genomes. Summarizing the classification properties of simple and complex viruses. Vertebrate pathogens (size of viral particles and disinfection; activity of RNA viruses with spiral symmetry of the capsid; disease prevention and formation of reassortants in viruses with a fragmented genome).	4
11	Preparations suitable for disinfection of livestock premises, clinics and laboratories. Advantages and disadvantages of modern disinfectants. Disinfection of premises in the presence of animals. Destruction of animal corpses, disinfection of manure.	4
12	Vertebrate pathogens (size of viral particles and disinfection; activity of RNA viruses with spiral symmetry of the capsid; disease prevention and formation of reassortants in viruses with a fragmented genome).	4
13	The use of light, luminescence and electron microscopy in the identification of pathogens of viral etiology	2
14	Techniques of serological reactions (reaction of delay of hemagglutination, reaction of indirect hemagglutination, reaction of diffuse precipitation)	2
15	Modern express methods of research (immunoenzyme analysis, polymerase chain reaction). Advantages and disadvantages of methods	2
Total hours		45

## 6. Methods of assessing expected learning outcomes:

(select necessary or add)

- oral or written survey;
- interview;
- test;
- defending laboratory works;
- exam.

## 7. Teaching methods (select necessary or add):

Format of the discipline "Veterinary Virology": full-timeverbal method (lecture, discussion, interview, etc.);

- practical method (laboratory, practical classes);
- visual method (illustration method, demonstration method);
- work with educational and methodical literature (summarizing, summarizing, annotating, reviewing, writing an essay);
- video method (remote, multimedia, web-oriented, etc.);
- independent work (task performance).

Under quarantine conditions - blended (combination of traditional forms of learning with elements of e-learning through the Elearn system), distance learning.

## 8. Results assessment.

The student's knowledge is assessed by means of a 100-point scale converted into the national grades according to the "Exam and Credit Regulations at NULES of Ukraine" in force

### 8.1. Distribution of points by types of educational activities

Educational activity	Results	Assessment
Module 1. Determinate viruses at the pathological material		
<b>Lecture 1 (if assessed)</b> Introduction at the veterinary virology	Knowledge of the main stages of development of virology as a science	-
<b>Laboratory work 1.</b> Organization and equipment of virological laboratories.	Knowledge of the organization and equipment of virology laboratories; rules for working with	<b>10</b>

Rules for working with viruses. Safety equipment. Bacterial filters and filtering technology.	viruses; safety precautions. Skills in working with bacterial filters and studying filtration technology.	
<i>Self-study (distance learning) 1. Evolution of viruses</i>	Knowledge of the stages of virus evolution	
<b>Lecture 2 (if assessed)</b> The chemical structure and ultra structure of viruses	Knowledge of the chemical structure and ultrastructure of viruses	-
<b>Laboratory work 2.</b> Selection, conservation, and transportation of pathological material to the laboratory. Methods of primary processing of material and its preparation for virological studies.	Knowledge of the rules for the selection, preservation and transportation of pathological material to the laboratory. Knowledge of the methods of primary processing of the material and its preparation for virological research.	10
<b>Laboratory work 3.</b> The use of laboratory animals for the diagnosis of diseases of viral etiology (learning the methods of infection, the rules of dissection of corpses).	Knowledge and practical skills in using laboratory animals for the diagnosis of diseases of viral etiology (study of methods of infection, rules for autopsy).	10
<i>Self-study (distance learning) 2. Characterization of diseases with different types of tropism of pathogens. Comparative characteristics of clinical and pathological materials.</i>	Knowledge of the characteristics of diseases with different types of tropism of pathogens. Study of the comparative characteristics of clinical and pathological materials.	
<b>Lecture 3 (if assessed)</b> Reproduction of viruses	Know the types of virus reproduction	
<b>Laboratory work 4.</b> Preparation of virus-containing material for research. Inclusion bodies in viral diseases. Methods of their detection. Methods of coloring and microscopy of elementary bodies.	Mastering the methods of preparing virus-containing material for research. Studying the types of inclusion bodies in viral diseases, methods of their detection. Mastering the methods of staining and microscopy of elementary bodies.	10
<i>Self-study (distance learning) 3. Microbial composition of virus-containing materials. Minimizing the ingress of foreign microbes into samples (sampling of blood, postmortem and intravital pathological materials). Use of vacuum tubes in blood research</i>	Study of the microbial composition of materials containing viruses. Study of methods for minimizing the ingress of foreign microbes into samples (blood sampling, postmortem and intravital pathological materials). Mastering the rules for using vacuum tubes in blood tests.	-
<b>Lecture 4 (if assessed)</b> Classification and genetics of viruses	Knowledge of the classification and genetics of viruses	-
<b>Laboratory work 5.</b> Luminescent/fluorescent microscopy. Study of the structure of a fluorescent microscope. The use of fluorescent microscopy in the diagnosis of viral diseases.	Learning the methods of Luminescent/fluorescent microscopy. Studying the structure of a fluorescent microscope. Learning the skills of using fluorescent microscopy in the diagnosis of viral diseases.	10
<b>Laboratory work 6.</b> Electron microscopy and immunoelectron microscopy. The structure of EM and the principle of its operation. Preparation of preparations for EM and IEM studies. Mastering the technique of preparing ultra-thin sections for EM studies.	Study of methods of electron microscopy and immunoelectron microscopy. Study of the structure of EM and the principle of its operation. Mastering the methods of preparation of preparations for EM and IEM studies. Mastering the technique of preparing ultrathin sections for EM studies.	10



<i>Self-study (distance learning)</i> 4. Structure of viruses (terminology). Simple and complex virions. The functions of the virion structures. The formation of new antigenic variants of viruses. The symmetry of viral capsids. The relationship between the type of symmetry and the number of virulent particles in the samples. Types of defective virions.	Study of the structure of viruses (terminology), the structure of simple and complex virions. Study of the function of virion structures. Knowledge about the formation of new antigenic variants of viruses, Symmetry of viral capsids. Study of the relationship between the type of symmetry and the number of virulent particles in samples. Study of the types of defective virions.	-
<b>Lecture 5 (if assessed)</b> Pathogenesis of viruses infection Diseases Classification and genetics of viruses	Gaining knowledge about the Pathogenesis of viral infections and Diseases. Gaining knowledge about the Classification and genetics of viruses.	-
<b>Laboratory work 7.</b> Preparation of dishes, saline solutions and nutrient media for cultivating cell cultures.	Mastering the methods of preparing dishes, salt solutions, and nutrient media for cultivating cell cultures.	10
<i>Self-study (distance learning)</i> 5. Documentation to accompany virus-containing samples	Study and assimilation of Documentation accompanying samples containing the virus	-
<b>Module control work 1.</b>		30
<b>Total for module 1</b>		100
<b>Module 2. Features viral multi-vector effect on the body</b>		
<b>Lecture 6 (if assessed)</b> Biological drugs in veterinary virology	Knowledge of types of biological drugs in veterinary virology and their manufacturing technology	-
<b>Laboratory work 9.</b> Primary cell cultures. Learning methods for primary cell cultures by trypsinization.	Knowledge of methods for obtaining primary cell cultures. Learning methods for primary cell cultures by trypsinization.	10
<b>Laboratory work 10.</b> Interweave cell culture. Study methods to maintain these cells in the laboratory.	Knowledge of methods for obtaining interweave cell culture. Study methods to maintain these cells in the laboratory.	10
<i>Self-study (distance learning)</i> 6. Chemical composition of virions (terminology). Substances in the structures of simple and complex viruses. Characteristics of viral proteins. Peplomers and lipids of complex virions.	Study of the Chemical composition of virions (terminology). Knowledge of Substances in the structures of simple and complex viruses. Knowledge of the characteristics of viral proteins. Study of Peplomers and lipids of complex virions.	
<b>Lecture 7 (if assessed)</b> Antiviral immunity	Knowledge of Antiviral Immunity	
<b>Laboratory work 11.</b> Cultivation of viruses in cell cultures. Study methods of infection of cell cultures, revealing cytopathogen of viruses into cells.	Knowledge of methods of Cultivation of viruses in cell cultures. Study methods of infection of cell cultures, revealing cytopathogen of viruses into cells.	10
<i>Self-study (distance learning)</i> 7. Dimensions and structure of the genome of viruses	Розміри та структура геному вірусів	-
<b>Lecture 8 (if assessed)</b> Laboratory Diagnosis of Virus Diseases	Knowledge of methods Laboratory diagnostics of viral diseases	-
<b>Laboratory work 12.</b> Study of the cytopathogenic effect of viruses on cell cultures. Collection, cleaning, preservation and storage of virus-containing materials.	Study of the cytopathogenic effect of viruses on cell cultures. Mastering methods of collection, purification, preservation and storage of virus-containing materials.	10

<b>Laboratory work 13.</b> Titration of viruses. Study of methods of titration of viruses according to the infectious effect, which is evaluated statistically.	Mastering the methods of virus titration. Study of methods of titration of viruses according to the infectious effect, which is evaluated statistically.	<b>10</b>
<i>Self-study (distance learning)</i> 8. Phases of virus reproduction and their characteristics (features of attachment of viruses to tropic cells, fusion of host membranes and virus envelopes, "undressing" of the virion, replication of genetic material, biosynthesis of viral proteins, self-organization of components into mature virions, release of virions. Reproduction of viruses with different genome structures ( single- and double-stranded DNA; single spiral + RNAs; single-spiral – RNA; retrovirus)	Study of the phases of virus reproduction and their characteristics Study of the features of reproduction of viruses with different genome structures (single- and double-stranded DNA; single-stranded + RNA; single-stranded – RNA; retrovirus)	-
<b>Lecture 9 (if assessed)</b> Oncolytic viruses.	To acquire knowledge about Oncolytic viruses, the features of their biological properties and pathogenesis	-
<b>Laboratory work 14.</b> Cultivation of viruses in developing chicken embryos. Mastering methods of infection of chicken embryos.	Study of the features of virus cultivation in developing chicken embryos. Mastering the methods of infection of chicken embryos	<b>10</b>
<i>Self-study (distance learning)</i> 9. Resistance of virions of different families to environmental factors	Assimilation of knowledge about the resistance of virions of different families to environmental factors	-
<b>Lecture 10 (if assessed)</b> Characteristics of prions	Learning about the characteristics of prions	-
<b>Laboratory work 15.</b> Cultivation of viruses in chicken embryos developing countries. Assimilation techniques infection CE. Signs of viral replication in OM.	Mastering methods of culturing viruses in chicken embryos of developing countries. Study of assimilation methods in CE infection. Studying signs of virus replication in chicken embryos.	<b>10</b>
<i>Self-study (distance learning)</i> 10. Classification of virions. Principles of virus classification. Characteristics of viral genomes. Summarizing the classification properties of simple and complex viruses. Vertebrate pathogens (size of viral particles and disinfection; activity of RNA viruses with spiral symmetry of the capsid; disease prevention and formation of reassortants in viruses with a fragmented genome).	Mastering the classification of virions. Knowledge of the Principles of virus classification. Knowledge of the characteristics of viral genomes. Summary of the classification properties of simple and complex viruses. Vertebrate disease agents (size of virus particles and disinfection; activity of RNA viruses with helical capsid symmetry; prevention of diseases and formation of reassortants in viruses with fragmented genome).	-
Module control work 2.		<b>30</b>
<b>Total for module 2</b>		<b>100</b>
<b>Module 3. DNA-content viruses.</b>		
<b>Lecture 11 (if assessed)</b> Viruses and biosecurity.	Acquisition of knowledge about Viruses and biodefense	-
<b>Laboratory work 17.</b> Hemagglutinating viruses. Studying the methods of staging RGA.	Acquiring knowledge about Hemagglutinating viruses. Studying the methods of staging RGA.	<b>15</b>

<i>Self-study (distance learning)</i> 11. Preparations suitable for disinfection of livestock premises, clinics and laboratories. Advantages and disadvantages of modern disinfectants. Disinfection of premises in the presence of animals. Destruction of animal corpses, disinfection of manure.	Acquiring knowledge about Preparations suitable for disinfection of livestock premises, clinics and laboratories, Advantages and disadvantages of modern disinfectants. Acquiring knowledge about Disinfection of premises in the presence of animals. Acquisition of knowledge about methods of destruction of animal corpses, disinfection of manure	-
<b>Lecture 12</b> ( <i>if assessed</i> ) Family Herpesviridae, Family Poxviridae, Family Circoviridae, Family Adenoviridae	Learning about the Family Herpesviridae, Family Poxviridae, Family Circoviridae, Family Adenoviridae	-
<b>Laboratory work 18.</b> Development of serological methods of diagnosis of viral diseases. Setting RDHA. RHAD and RDHA.	Learning about the development of serological methods of diagnosis of viral diseases. Setting RDHA. RHAD and RDHA.	15
<b>Laboratory work 19.</b> Reaction of diffusion precipitation in agar gel (RDP). Neutralization reaction. Methods of implementation.	Learning about the reaction of diffusion precipitation in agar gel (RDP). Neutralization reaction. Methods of implementation.	20
<i>Self-study (distance learning)</i> 12. Vertebrate pathogens (size of viral particles and disinfection; activity of RNA viruses with spiral symmetry of the capsid; disease prevention and formation of reassortants in viruses with a fragmented genome).	Learning about the vertebrate pathogens (size of viral particles and disinfection; activity of RNA viruses with spiral symmetry of the capsid; disease prevention and formation of reassortants in viruses with a fragmented genome).	-
<b>Lecture 13</b> ( <i>if assessed</i> ) Family Parvoviridae, Family Asfarviridae, Family Iridoviridae, Family Papovaviridae	Learning about the Family Parvoviridae, Family Asfarviridae, Family Iridoviridae, Family Papovaviridae	-
<b>Laboratory work 20.</b> Identification of the virus and determination of the antibody titer using the neutralization reaction.	Learning about the Identification of the virus and determination of the antibody titer using the neutralization reaction.	20
<i>Self-study (distance learning)</i> 13. The use of light, luminescence and electron microscopy in the identification of pathogens of viral etiology	Learning about the the use of light, luminescence and electron microscopy in the identification of pathogens of viral etiology	-
Module control work 3.		30
<b>Total for module 3</b>		100
<b>Module 4. RNA-content viruses.</b>		
<b>Lecture 14</b> ( <i>if assessed</i> ) Family Flaviviridae, Family Coronaviridae, Family Arenaviridae, Family Picornavirida	Learning about the Family Flaviviridae, Family Coronaviridae, Family Arenaviridae, Family Picornavirida	-
<b>Laboratory work 22.</b> The complement fixation reaction (CRF).	learning the complement fixation reaction (CFR) method.	15
<b>Laboratory work 23.</b> Determination of types and variants of foot-and-mouth disease virus using CRF.	Determination of types and variants of foot-and-mouth disease virus using CRF.	15
<i>Self-study (distance learning)</i> 14. Techniques of serological reactions (reaction of delay of hemagglutination,	Learning about the techniques of serological reactions (reaction of delay of hemagglutination, reaction of indirect	-

reaction of indirect hemagglutination, reaction of diffuse precipitation)	hemagglutination, reaction of diffuse precipitation)	
<b>Lecture 15</b> (if assessed) Family Orthomyxoviridae, Family Paramyxoviridae, Family Rhabdoviridae, Family Retroviridae	Learning about the Family Orthomyxoviridae, Family Paramyxoviridae, Family Rhabdoviridae, Family Retroviridae	-
<b>Laboratory work 24.</b> Immunosorbent assay (ELISA). Application of ELISA in laboratory practice. Study of standard diagnostics are used in veterinary medicine.	Learning about the immunosorbent assay (ELISA). Application of ELISA in laboratory practice. Study of standard diagnostics are used in veterinary medicine.	<b>20</b>
<i>Self-study (distance learning)</i> 15. Modern express methods of research (immunoenzyme analysis, polymerase chain reaction). Advantages and disadvantages of methods	Learning about the modern express methods of research (immunoenzyme analysis, polymerase chain reaction). Advantages and disadvantages of methods	-
<b>Lecture 16</b> (if assessed) Family Reoviridae, Family Arenaviridae, Family Caliciviridae, Family Bunjaviridae	Learning about the Family Reoviridae, Family Arenaviridae, Family Caliciviridae, Family Bunjaviridae	-
<b>Laboratory work 25.</b> Molecular genetic methods in virology (PCR).	Learning about the molecular genetic methods in virology (PCR).	<b>20</b>
<b>Module control work 4.</b>		<b>30</b>
<b>Total for module 4</b>		<b>100</b>
<b>Class work</b>	<b>(M1 + M2+M3+M4)/4*0,7 ≤ 70</b>	
<b>Exam/credit</b>	<b>30</b>	
<b>Total for year</b>	<b>(Class work + exam) ≤ 100</b>	
Course project/work (if any)	-	<b>100</b>

## 8.2. Scale for assessing student's knowledge

Student's rating, points	National grading (exam/credits)
90-100	excellent
74-89	good
60-73	satisfactory
0-59	unsatisfactory

## 8.3. Assessment policy

<b>Deadlines and exam retaking rules</b>	<i>EXAMPLE:</i> works that are submitted late without valid reasons will be assessed with a lower grade. Module tests may be retaken with the permission of the lecturer if there are valid reasons (e.g. a sick leave).
<b>Academic integrity rules</b>	<i>EXAMPLE:</i> cheating during tests and exams is prohibited (including using mobile devices). Term papers and essays must have correct references to the literature used
<b>Attendance rules</b>	<i>EXAMPLE:</i> Attendance is compulsory. For good reasons (e.g. illness, international internship), training can take place individually (online by the faculty dean's consent)

## 9. Teaching and learning aids:

- e-learning course of the discipline  
(<https://elearn.nubip.edu.ua><https://elearn.nubip.edu.ua/course/view.php?id=393>) **MANDATORY**;

- references to digital educational resources;
- textbooks, manuals, tutorials;
- guidelines for studying a discipline by full-time and part-time students;
- internship programmes of the discipline (if included in the curriculum).

## 10. Recommended sources of information

1. General veterinary virology: textbook / M Radzykhovskiy., O. Dyshkant, L. Vygovska, V. Ukhovskiy, V. Melnyk, H. Kozlovskaya – Kyev: NULES of Ukraine, 2024. – 166 c.
2. Goralskii L., Radzykhovskiy N., Dyshkant O., Dunaievskaya O., & Sokulskiy I. Experimental study of tropism in cultivated canine coronavirus in the small intestine of puppies. *Regulatory Mechanisms in Biosystems*. 2019. Vol. 10 (4). P. 489–496. Doi: 10.15421/021972
3. Kovalenko V.L., Radzykhovskiy M.L., Rudyi O.V., Drozhzhe J.M., Gerilovych A.P., Ponomaryova S.A., Stupak O.M., Androshchuk O.O., & Grebinichenko A.D. Evaluation of virulicidal effect of biocidal agent on the resistance of parvovirus strain test culture. *One Health Journal*. 2025. Vol. 3 (2). P. 25–33. Doi: 10.31073/onehealthjournal2025-II-02
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9. Radzykhovskiy M.L., Kuryata N.V., Pishchanskyi O.V., Dyshkant O.V., Androshchuk O.A., Sokulskiy I.M., Ukhovskiy V.V., & Rudoi O.V. Features of in vitro cultivation of the field strain canine parvovirus. *The Animal Biology*, 2024, Vol. 26 (2). P. 42–46. doi.org/10.15407/animbiol26.01.000
10. Radzykhovskiy M., Dyshkant O., Vygovska L., Ukhovskiy V., & Kornienko L. Determination of morphological criteria for identification of coronavirus infection in companion animals *Scientific reports of NULES of Ukraine*, 2023. Vol. 14 (3) P. 128–142. Doi: 10.31548/veterinary3.2023.128
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