

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

Department of Veterinary Epidemiology and Animal Health



«CONFIRM»

Dean of the Faculty of
Veterinary Medicine

_____ M. Tsviliovskiy

on _____» _____ 2024

«APPROVED»

at the meeting of Department of Veterinary

Epidemiology and Animal Health

The Protocol № 5 on «15» May 2024

Acting as Head of Department

_____ V. Melnyk

«REVIEWED»

Guarantor of EP "Veterinary Medicine"

_____ N. Grushanska

**WORKING PROGRAM OF EDUCATIONAL DISCIPLINE
"VETERINARY VIROLOGI"**

Field of knowledge 21 Veterinarian

Specialty 211 Veterinary Medicine

Educational program - Veterinary Medicine

Faculty of Veterinary Medicine

Developer - **L. Vygovska**, Professor at the Department of Veterinary Epidemiology
and Animal Health, Doctor of Veterinary Sciences, Senior Researcher

Kyiv – 2024

Description of the discipline "VETERINARY VIROLOGI "

Field of knowledge, specialty, educational program, educational degree		
Educational degree	Master	
Specialty	211 Veterinary Medicine	
Educational program	Veterinary Medicine	
Characteristics of the discipline		
Kind	Regulatory	
Total hours	120	
Number of ECTS credits	4	
Number of thematic modules	4	
Course project (work) (if it is in the working educational plan)	-	
Form of control	an examination	
Indicators discipline for full-time and extramural study		
	full-time study	extramural study
Year of training	2	
Semester	4	
Lectures	30 hours	
Practical classes, seminars		
Laboratory classes	45 hours	
Self-work	45 hours	
Self-work under supervising tutor		
Number of weekly hours for full-time study	5 hours	

1. Purpose, tasks and competencies of the discipline

The purpose 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.

Tasks of the course:

- ✓ study of morphology, taxonomy, structure, chemical structure, genetics, reproduction;
- ✓ study of pathogenesis viral disease with features of antiviral immunity;
- ✓ study of means and methods of diagnosis and prevention of viral diseases of animals;
- ✓ learn modern methods of virological studies of biological material from animals;
- ✓ learn methods of culturing viruses.

Acquisition of competencies:

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 competencies (GC):

- ✓ ability to abstract thinking, analysis and synthesis;
- ✓ ability to apply knowledge in practical situations;
- ✓ ability to conduct research at the appropriate level;
- ✓ knowledge and understanding of veterinary virology;
- ✓ ability to make informed decisions;

- ✓ desire to preserve the environment.

Professional (special) competencies (PC):

- ✓ ability to follow the rules of labor protection, asepsis and antiseptics during professional activities;
- ✓ ability to carry out procedures for selection, packaging, preservation and transfer of samples of biological material for virological research;
- ✓ ability to organize, conduct and analyze the results of virological research;
- ✓ ability to protect the environment from pollution during virological research.

Program learning outcomes (PL):

- ✓ Know and correctly use virological terminology..
- ✓ Use information from domestic and foreign sources to develop strategies in virological diagnostics.
- ✓ Develop measures aimed at protecting the population from viral diseases common to animals and humans.
- ✓ Understand the logical sequence of actions and be able to draw up appropriate documentation during virological research.
- ✓ Know the rules and requirements of biosafety, bioethics and animal welfare.
- ✓ To have specialized software tools for performing professional tasks.

2. Program and structure of the discipline for: full-time education.

Titles content modules	Hours					
	Full-time					
	total	including				
L		P	Lab	Ind	Self	
Content module 1. Determinate viruses at the pathological material						
Topic 1. Introduction at the veterinary virology	6	2		2		2
Topic 2. The chemical structure and ultra structure of viruses	6	2		2		2
Topic 3. Reproduction of viruses	6	2		2		2
Topic 4. CLASSIFICATION AND GENETICS OF VIRUSES.	6	2		2		2
Topic 5. Pathogenesis of viruses infection Diseases	8	2		2		4
Together for content module 1	32	10		10		12
Content module 2. Features viral multi-vector effect on the body						
Topic 1. Biological drugs in veterinary virology	6	2		2		2
Topic 2. Antiviral immunity	8	2		4		2
Topic 3. Laboratory Diagnosis of Virus Diseases	6	2		2		2
Topic 4. Oncolytic viruses	6	2		2		2
Topic 5. Characteristics of prions	6	2		2		2
Together for content module 2	32	10		12		10
Content module 3. DNA-content viruses.						
Topic 1. Viruses and biosecurity.	8	2		3		3

Topic 2. Family Herpesviridae, Family Poxviridae, Family Circoviridae, Family Adenoviridae	10	2		4		4
Topic 3. Family Parvoviridae, Family Asfarviridae, Family Iridoviridae, Family Papovaviridae	10	2		4		4
Together for content module 3	28	6		11		11
Content module 4. RNA-content viruses.						
Topic 1. Family Flaviviridae, Family Coronaviridae, Family Arenaviridae, Family Picornavirida	10	2		4		4
Topic 2. Family Orthomyxoviridae, Family Paramyxoviridae, Family Rhabdoviridae, Family Retroviridae	10	2		4		4
Topic 3. Family Reoviridae, Family Arenaviridae, Family Caliciviridae, Family Bunijaviridae	10	2		4		4
Together for content module 4	30	6		12		12
Total hours	120	30		45		45

3. Themes of laboratory studies (practical studies, seminar classes)

№	Name of theme	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	Module 1. Determinate viruses at the pathological material	1
5	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
6	Luminescent/fluorescent microscopy. Study of the structure of a fluorescent microscope. The use of fluorescent microscopy in the diagnosis of viral diseases.	2
7	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
8	Preparation of dishes, saline solutions and nutrient media for cultivating cell cultures.	2
9	Module 2. Features viral multi-vector effect on the body	1
10	Primary cell cultures. Learning methods for primary cell cultures by trypsinization.	2
11	Interweave cell culture. Study methods to maintain these cells in the laboratory.	2
12	Cultivation of viruses in cell cultures. Study methods of infection of cell cultures, revealing cito-pathogen of viruses into cells.	2

13	Study of the cytopathogenic effect of viruses on cell cultures. Collection, cleaning, preservation and storage of virus-containing materials.	2
14	Titration of viruses. Study of methods of titration of viruses according to the infectious effect, which is evaluated statistically.	2
15	Культивування вірусів в курячих ембріонах, що розвиваються. Засвоєння методів зараження КЕ.	1,5
16	Cultivation of viruses in chicken embryos developing countries. Assimilation techniques infection CE. Signs of viral replication in OM.	1,5
17	Module 3. DNA-content viruses.	1
18	Hemagglutinating viruses. Studying the methods of staging RGA.	1
19	Development of serological methods of diagnosis of viral diseases. Setting RDHA. RHAD and RDHA.	2
20	Reaction of diffusion precipitation in agar gel (RDP). Neutralization reaction. Methods of implementation.	2
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

4. Topics for self-study

№	Name of theme	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 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)	4
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

5. Means of diagnosing learning outcomes:

- ✓ exam;
- ✓ module tests.
- ✓ Protection of laboratory and practical classes

6. Teaching methods:

- ✓ verbal 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).

7. Evaluation methods:

- ✓ exam;
- ✓ oral or written survey;
- ✓ modular testing;
- ✓ protection of laboratory work.

8. Distribution of points that get students.

Assessment of student knowledge is on a 100-point scale and is translated into national assessments according to table. 1 "Regulations on examinations and tests in NULES of Ukraine".

Student rating, points	The assessment is national	
	examination	test
90-100	Perfectly	Passed
74-89	Good	
60-73	Satisfactory	
0-59	Unsatisfactorily	Non passed

To determine the student's rating for mastering the discipline R_{DIS} (up to 100 points), the rating obtained from the certification R_{SER} (up to 30 points) is added to the student's rating for the educational work R_{EW} (up to 70 points): $R_{DIS} = R_{EW} + R_{SER}$

9. Educational and methodological support

1. Electronic training course of the academic discipline <https://elearn.nubip.edu.ua/course/view.php?id=393>
2. Калініна О. С., Панікар І. І., Скибіцький В. Г. Ветеринарна вірусологія : підручник. Київ : Вища освіта, 2004. 432 с.
3. Лютка Г.І., Радзиховський М.Л., Дишкант О.В. Загальна вірусологія основи ветеринарної та зоонотичної вірусології Ч. 1. / за ред. М.Л. Радзиховського. Вінниця : ТОВ «Друк», 2020. 400 с.
4. Люта В. А., Кононов О. В. Мікробіологія з технікою мікробіологічних досліджень, вірусологія та імунологія : підручник. 2-ге вид. Київ : ВСВ «Медицина». 2018. 576 с.
5. Практикум з ветеринарної вірусології / В. Г. Скибіцький та ін. Київ : Вища школа, 2005. 208 с.
6. Скибіцький В. Г. Ташута С. Г. Посібник з ветеринарної вірусології. Київ. Електронний варіант на КД, 2003.
7. Радзиховський М.Л., Дишкант О.В. Основи ветеринарної вірусології : Київ: НУБіП України, 2022. 180 с.
8. Калініна О. С. Таксономічна характеристика ДНК–геномних вірусів хребетних тварин і людини . *Науковий вісник ЛНУВМ та БТ ім. С. З. Гжицького*. 2016. Т. 18, № 2 (66). С. 83–87. doi:10.15421/nvlvet6618
9. Калініна О. С. Таксономічна характеристика РНК-геномних вірусів хребетних тварин і людини . *Науковий вісник ЛНУВМ та БТ ім. С. З. Гжицького*. 2017. Т. 19, № 78. С. 30–35. doi:10.15421/nvlvet7807
10. Лісова В. В., Радзиховський М. Л. Коронавірусна інфекція собак : монографія. Київ: ЦП «Компринт», 2019. 126 с.
11. Медична мікробіологія, вірусологія та імунологія : підручник / за ред. В. П. Широкобокова. Вінниця : Нова книга, 2011. 952 с.
12. Поліщук В. П., Будзанівська І. Г., Шевченко Т. П. Посібник з практичних занять до курсу «Загальна вірусологія». Київ : Фітосоціоцентр, 2005. 204 с.
13. Netherton C. L., Wileman T. Virus factories, double membrane vesicles and viroplasm generated in animal cells. *Current opinion in virology*. 2011. № 1. P 381–387. Doi:10.1016/j.coviro.2011.09.008.
14. Радзиховський М.Л., Горальський Л.П., Костюк В.К. Особливості культивування вірусів собак родини Parvoviridae та Coronaviridae. Житомир: Рута, 2018. 20 с.

Information Resources

1. <http://veterinaryvirology.com/>
2. http://www.virology.net/big_virology/bvdiseaselist.html. The Big Picture Book of Viruses
3. <http://www.virology.net/>
1. <http://www.microbiologybook.org/book/virol-sta.htm>