

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

DEPARTMENT OF EPIZOOTOLOGY, MICROBIOLOGY AND VIROLOGY

**" CONFIRM "**

Dean of the Faculty of Veterinary Medicine

\_\_\_\_\_ Tsviliovskiy M.I

« \_\_\_\_\_ » \_\_\_\_\_ 2021

**REVIEWED AND APPROVED**

at the meeting of Department of Epizootology,  
Microbiology and Virology

The Protocol, №6 from "25" 05 2021

Acting Head of Department

\_\_\_\_\_ Melnyk V.V.

**WORKING PROGRAM OF EDUCATIONAL DISCIPLINE**

**VETERINARY VIROLOGY**

Training direction 211 — «Veterinary Medicine»

Faculty of Veterinary Medicine

Developers — **O. V. YABLONSKA**, Doctor of Vet Sciences, Prof.

**Kyiv - 2021**

## «VETERINARY VIROLOGY»

<b>Industry knowledge, training direction, specialty, education level</b>		
Educational qualification	211 «Veterinary Medicine»	
Training direction	211 «Veterinary Medicine»	
Specialty	Veterinary Medicine	
Education level	Master	
<b>Description of the course</b>		
Description	Normative	
Total hours	150	
Quantity of credits ECTS	5	
Quantity of content modules	3	
Course project (work) (if in your educational plan)	—	
Form of control	Test	
<b>Descriptions of the course for full-time and external form of education</b>		
	full-time education	external form of education
Semester	4	
Lectures	30 h.	
Practical, seminars	30 h.	
Laboratory classes	15 h.	
Independent work	75 h.	
Individual tasks		
Quantity of weekly hours for full-time students:	5 h.	
Independent work:	5 h.	



## 1. Objectives of the course

**The aim** of the course “Veterinary virology” is a branch of science that studies the morphology, physiology, genetics of viruses, their role in the circulation of substances in human, animal and plant pathology. Veterinary virology provides the foundation for a veterinarian as an infectious disease specialist.

### **Target. A study of the course the student should:**

#### **know:**

- main properties of vertebrate viruses, their taxonomy, modern classification;
- pathogens of viral diseases of animals;
- stages and methods of laboratory diagnosis of viral diseases of animals

#### **be able to :**

- take samples for virological tests;
- to produce the necessary reagents and nutrient media;
- to conduct research of environmental objects and products, the manufacture of which is controlled by the veterinary service;
- on the basis of the obtained results to determine their quality and safety;
- have the basic methods of indication and identification of viruses that cause animal diseases;
- analyze the results of virological research.

#### **Acquisition of competencies:**

- study of the discipline " Veterinary virology " provides mastery of such general competencies as knowledge and understanding of the subject area, the ability to search, process and analyze information from various sources, the ability to apply knowledge in practical situations, and apply creativity, adaptability, sociability and tolerance , persistence in achieving the goal and the ability to assess the quality of work performed;

- study of the discipline " Veterinary virology " provides the mastery of such professional competencies as the ability to use modern knowledge and methods of virological examination about the environmental objects and products, the manufacture of which is controlled by the veterinary service and on the basis of the obtained results to determine their quality and safety; study of nature, taxonomy; structure, chemical structure, genetics, reproduction and methods of culturing viruses; acquaintance with the pathogenesis of viral diseases, with the features of antiviral immunity, means and methods of diagnosis and prevention of infectious diseases of animals; study of the immune system, means of specific diagnosis and prevention of infectious diseases of viral nature.

### **3. The program and structure of study discipline:**

#### **Content module 1. Determinate viruses at the pathological material**

##### **Lecture 1. Introduction at the veterinary virology.**

Introduction to virology. The opening and history of the study of viruses. The formation of virology as a fundamental biological science. The spread of viruses in nature. The nature and origin of the viruses. Indigenous differences in viruses from other pathogens. The role of viruses in the infectious pathology of animals, plants and humans.

##### **Lecture 2. The chemical structure and ultra structure of viruses.**

Virion. Shape and size of virions. Ultrastructure of viruses (genom, capsid, nucleocapsid, nucleoid, supercapsid). Types of simmetria of viruses. Nucleid acids of viruses. Structural property of viruses nucleic acid: one- and two-chain, lined, fragmented, disconnected, bring, plus - filamentous, minus-filamentous. Function of viruses nucleic acid. Viruses proteins.

##### **Lecture 3. Taxonomy of viruses.**

The principles of taxonomy viruses, criteria of modern taxonomy viruses. Short characteristic of modern taxonomy viruses of vertebrales, non-vertebrales, plant, fungy, bacteria. The nomenclature of viruses

##### **Lecture 4. Genetic of viruses. Reproduction and cultivate of viruses.**

Genetic of viruses. Structura of viruses genome. Characteristic of structure genome and mechanism of realize genetic information at the viruses and eucariotes. Genotype and fenotyp of viruses. Viruses population and its genofond. Genetic Heterogeneity of viruses populations. "Stam", "type", ("serotype"), "variant", "klon". Methods of viruses selection. Mutation and its mechanism at the viruses. Spontaneous and inducted mutation. Relations of viruses on the genetic and non-genetic levels. Reproduction viruses at the sensitive cells. The characteristic of process adsorbtion, penetrated and declosed ov viruses. Transcription of different type viruses genome. Translation of viruses iRNA. Synthesis and modification of viruses proteines. Replication of viruses nucleic acids. Formation of viriones. Mechanism of close of viruses out cell. Defected viruses.

##### **Lecture 5. Pathogenesis of viruses infection. Antivirus immunity. Specific biological drugs, tests. Antivirus drugs.**

The way of penetrated viruses at the organism. Mechanism of spread viruses at the organism. Tropism of viruses. Characteristic of viruses infection at the cell's level: autonome, integrated, producted, abortion, acute, chronic, lytic, non-lytic. Characteristic of viruses infection at the organism's level: generalisated, fire, acute, chronic, abortion, lanetce. Mechanism of cytopathogenic action of viruses. Antiviruses immunity. Antigenic structure of viruses. Characteristic of viruses antigens. Mechanism of humoral and cell antiviral immunity. Interferon, inhibitor, theres property & mechanism synthesis of their antiviral action. The role of inflammation, hypertermia at the antiviral imunnity. Immunity as united process of relation between cell & humoral factors, total physiological reaction of organism. Immunopathology of viruses infection. Immunostimulation and immunocorrection of viruses infection. Specific biological drug. Classification and types of antivirus vaccine (inactivated, live, heterological, unitevirion, subunit, synthesis). The principles of construction, production and controle of the antiviral vaccines. hyperimmune serum, specific immunoglobulines at the prophylaxy of animal viral infection.

## **Content module 2. DNA-content viruses. Viruses cultivation at the lab**

### **Lecture 6. Family Herpesviridae & Family Poxviridae.**

Taxonomy and characteristic of the family. Pathogens of Aujeszky disease, infection rinotracheit of cattle, rinopneumonia of horse, malignum catarrhally fever of cattle, Marek disease, infection larynx and tracheitis of birds. Family Poxviridae. Taxonomy and characteristic of the family. Pathogens of the pox of sheep, birds, pigs, cows; mixomathoses and fibromatoses of rabbit, paravaxcine of cattle and contagiose pustule dermatitis.

### **Lecture 7. Family Adenoviridae. Family Parvoviridae.**

Adenovirus at the cattle, horse, pathogen of infection dog's hepatits and fox encephalites, adenoviruses of sheep and goat, pigs, birds. Family Parvoviridae. Taxonomy and characteristic of the family. Pathogens of the parvoviral infection of dogs, cats panleucopenia, parvoviral infection of pigs parvoviral infection of cattle, mink enteritis, enteritis of geese and Aleutian mink.

### **Lecture 8. Families Asfarviridae & Iridoviridae.**

Taxonomy and characteristic of the family. Pathogens of the African plaque of pig.

## **Content module 3. RNA-content viruses. Methods of viruses determination**

### **Lecture 9. Family Flaviviridae & Family Reoviridae.**

Taxonomy and characteristic of the family. Pathogens of the classic plaque of pig, viruses diarrhea of cattle. Family Reoviridae. Taxonomy and characteristic of the family. Rotaviruses infection of cattle, pigs, African plaque of horse.

### **Lecture 10. Family Coronaviridae.**

Taxonomy and characteristic of the family. Pathogens of the transmissive gastroenteritis of pigs, neonatal diarrhea of calves, infection bronchitis of birds.

### **Lecture 11. Family Orthomyxoviridae & Family Paramyxoviridae.**

Taxonomy and characteristic of the family. Pathogens of the influence, Newcastle disease of birds and plaque of the carnivores.

### **Lecture 12. Family Rhabdoviridae.**

Taxonomy and characteristic of the family. Pathogens of the rabies.

### **Lecture 13. Family Picornaviridae & Family Retroviridae.**

Taxonomy and characteristic of the family. Pathogens of the murrain, vesicles disease of pigs, Teschen disease. Viruses hepatitis of ducklings. Pathogens of the infection anemia of horse, leucosis of cattle.

### **Lecture 14. Family Bunjaviridae & Family Arenaviridae.**

Taxonomy and characteristic of the family.

### **Lecture 15. Priones.**

Taxonomy and characteristic of the family.

## The structure of educational discipline

Titles content modules	Hours					
	full-time					
	weeks	total	including			
			L	P	Lab	Ind
1	2	3	4	5	6	7
Content module 1. Determinate viruses at the pathological material						
Topic 1. <i>Introduction at the veterinary virology</i>	1	13	2	2	2	7
Topic 2. The chemical structure and ultra structure of viruses	2	10	2	2		6
Topic 3. Taxonomy of viruses	3	12	2	2	2	6
Topic 4. Genetic of viruses. Reproduction and cultivate of viruses	4	10	2	2		6
Topic 5. Pathogenesis of viruses infection. Antivirus immunity. Specific biological drugs, tests. Antivirus drugs.	5	13	2	2	2	7
Together for content module 1	*	58	10	10	6	32
Content module 2. DNA-content viruses. Viruses cultivation at the lab						
Topic 6. Family Herpesviridae & Family Poxviridae	6	10	2	2		6
Topic 7. Family Adenoviridae. Family Parvoviridae	7	13	2	2	2	7
Topic 8. Families Asfarviridae & Iridoviridae	8	10	2	2		6
Together for content module 2	*	33	6	6	2	19
Content module 3. RNA-content viruses. Methods of viruses determination						
Topic 9. Family Flaviviridae & Family Reoviridae.	9	12	2	2		6
Topic 10. Family Coronaviridae	10	12	2	2	3	6
Topic 11. Family Orthomyxoviridae & Family Paramyxoviridae	11	13	2	2		6
Topic 12. Family Rhabdoviridae	12	10	2	2	2	6
Topic 13. Family Picornaviridae	13	6	2	2		
Topic 14. Family Retroviridae	14	6	2	2	2	
Topic 15. Family Bunjaviridae & Family Arenaviridae. Priones	15	4	2	2		
Together for content module 3	*	59	14	14	7	24
Total hours	*	150	30	30	15	75

### 4. Topics for practical lessons

№	Topic name	hours
1	Safety rules and work with virus content materials. Equipment virology laboratory. Bacterial filters, filtration equipment	2
2	Sampling, transportation and primary processing of pathological material for virological study	2
3	Fluorescent microscopy in virology. Types of construction schematic diagram fluorescent microscope technique of flyuorohromation drugs	2
4	Use of laboratory animals in virology. Development of methods for infection of laboratory animals by the virus content material	2
5	Electron microscopic study of viruses. The design of EM, making preparations for EM, method of staining	2

6	Module 1. Indication of viruses in pathological material.	2
7	Cooking utensils, salt and nutrient media for culturing cell culture	2
8	Titration of virus	2
11	Module 2. DNA-content viruses. Cultivation of viruses in vitro	2
9	Hemagglutination viruses. Study methods staging RHA. The development of serological methods for diagnosis of viral diseases. Setting RDHA. RHAD and RDHA.	2
10	Complement fixation test (CFT). Definitions and types of FMD virus variants using RPR	2
12	Immunosorbent assay (ELISA). Application of ELISA in laboratory practice. Study of standard diagnostics are used in veterinary medicine	2
13	Molecular genetic methods in virology (PCR)	2
14	Neutralization reaction. Methods of Production. Identification and determination of virus titer antibodies by RN	2
15	Module 3. RNA-content viruses. Methods of virus identification	2
Total		30

### 5. Topics for laboratory lessons

№	Topic name	hours
1	Detection of viruses using a light microscope. Detection of elementary cells, viral inclusions-cells	2
2	Primary cell cultures. Learning methods for primary cell cultures by trypsinization	2
3	Interweave cell culture. Study methods to maintain these cells in the laboratory	2
4	Cultivation of viruses in cell cultures. Study methods of infection of cell cultures, revealing cito-pathogen of viruses into cells.	2
5	Cultivation of viruses in chicken embryos developing countries. Assimilation techniques infection CE. Signs of viral replication in OM.	2
6	Autopsy CE, selection of virus content material. Neutralization CE	3
7	Reaction diffusion precipitation in agar gel (PRD).	2
Total		15

### 6. Topics for independent lessons

№	Topic name	hours
1	Major periods of Virology	7
2	The contribution of domestic scientists in veterinary virology	6
3	Structural organization of virions	7
4	Biophysical properties of viruses	6
5	Resistant viruses in the environment	7
6	Genetic and non-genetic forms of interaction in virus	6
7	Ecology of viruses	7
8	Classification of viral infection on the level of the organism, cells	6
9	Evolution of viruses	6
10	Interferons	5
11	DNA - vaccines. Immunomodulators	6



12	Means chemoprophylaxis of viral diseases	6
Total		75

## 7. Test questions, test kits to determine the level of learning students

### Test questions

1. Laboratory diagnosis of Newcastle disease. Characteristics of methods.
2. Neutralization reaction. Control and accounting of the result.
3. Laboratory diagnosis of infectious rhinotracheitis of cattle. Characteristics of methods.
4. Precipitation reaction. The principle of production and components.
5. Laboratory diagnosis of Aujeszky's disease. Characteristics of methods.
6. Precipitation reaction. Controls and results.
7. Laboratory diagnosis of swine flu. Characteristics of methods.
8. Precipitation reaction in agar gel.
9. Laboratory diagnosis of bird flu. Characteristics of methods.
10. Laboratory diagnosis of leukemia. Characteristics of methods.
11. Laboratory diagnosis of smallpox. Characteristics of methods.
12. Laboratory diagnosis of canine distemper. Characteristics of methods.
13. Laboratory diagnosis of panleukemia in cats. Characteristics of methods.
14. Laboratory diagnosis of INAN horses. Characteristics of methods.
15. Laboratory diagnosis of transmissible gastroenteritis of pigs. Characteristics of methods.
16. Laboratory diagnosis of avian bursitis. Characteristics of methods.
17. Laboratory diagnosis of reduced egg laying syndrome. Characteristics of methods.
18. Laboratory diagnosis of myxomatosis in rabbits. Characteristics of methods.
19. Laboratory diagnosis of viral hepatitis. Characteristics of methods.
20. The principle of serological reactions. Components and results.
21. Laboratory diagnosis of rabies. Characteristics of methods.
22. The principle of serological reactions. Components and results.
23. Laboratory diagnosis of Newcastle disease. Characteristics of methods.
24. Laboratory diagnosis of infectious rhinotracheitis of cattle. Characteristics of methods.
25. Laboratory diagnosis of Aujeszky's disease. Characteristics of methods.
26. Laboratory diagnosis of swine flu. Characteristics of methods.
27. Laboratory diagnosis of bird flu. Characteristics of methods.
28. Laboratory diagnosis of leukemia. Characteristics of methods.

29. Laboratory diagnosis of smallpox. Characteristics of methods.
30. Laboratory diagnosis of canine distemper. Characteristics of methods.
31. Laboratory diagnosis of transmissible gastroenteritis of pigs. Characteristics of methods.
32. Laboratory diagnosis of avian bursitis. Characteristics of methods.
33. Precipitation reaction. Controls and result.
34. Laboratory diagnosis of reduced egg laying syndrome. Characteristics of methods.
35. Precipitation reaction. The principle of production and components.
36. Laboratory diagnosis of myxomatosis in rabbits. Characteristics of methods.
37. Neutralization reaction. Control and accounting of the result.
38. Neutralization reaction. The principle of production and components

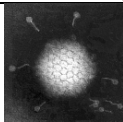
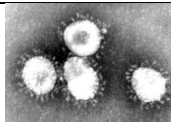

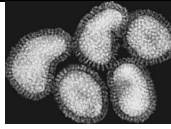
### The set of tests

1. Arrange the names of pathogens of viral diseases in accordance with the names of families in which they are included:	
1. Virus fo Africans swine fever	A- Family Herpesviridae
2. Pox Virus	Б - Family Asfarviridae
3.Virus of cats panleucopenia	B - Family Adenoviridae
4. Vaxina Virus	Г - Family Parvoviridae
5.Virus of dog's hepatitis	Д- Family Poxviridae
Right answer:	

3. Viruses from the family Arenaviridae by the complexity of the structure belong to...:
Right answer:

4. Viruses from the family Iridoviridae by the complexity of the structure belong to...:
Right answer:

5. Viruses from the family Arenaviridae have a type of symmetry...:
Right answer:

6. Put the names of the viruses shown in the pictures:			
1. Coronavirus			3. Calicivirus
2. Adenovirus			4. Orthomyxovirus
Правильна відповідь:			



transcription, translation

transcription, translation, replication

assembly of virions and their exit from a cell

15 What is the process of translating genetic information from virus-specific mRNA to the sequence of amino acid residues in the polypeptide chain of a protein?

adsorption

replication

broadcast

transformation

transcription

16 Selection of viruses is carried out by the following methods:

infection of virus-insensitive bioobjects

consecutive passages in cell culture

centrifugation

hybrid technology

cloning from individual plaques

17 Non-genetic interaction of viruses can be represented by:

complementation

heterozygosity

cross reactivation

transapsidation

phenotypic mixing

18 What is the name of a virus of the same species that differs in neutralizing infectious activity?

wild type (natural isolate)

type (serotype)

clone

spin

version

19 Slow infections include:

rabies

spongiform encephalopathy of cattle

infectious anemia of horses

clamps

Aleutian mink disease

20 The functions of interferon include:

immunomodulatory

phagocytic

providing the adsorption of the virus on the cell

antivirus

reduction of the body's resistance to viral infections thirteen

21 Upon receipt of inactivated vaccines as inactivants use:

ethanol

acetone

formaldehyde

pepton

gamma radiation

22 Monoclonal antibodies produce:

myelocytes

splenocytes

hybridomas

bacteria

lymphocytes

23 The following biosystems are used to cultivate FMD virus:

culture of pig kidney cells

embryos of chickens developing 5-day incubation

culture of hamster kidney cells

culture of Vero cells

fibroblasts of chicken embryo

24 Rabies is diagnosed by:

using RIF

staging a bioassay on dogs

by detecting Taurus inclusions

histological method

bioassay on white mice

25 Newcastle disease virus belongs to the family:  
Poxviridae  
Reoviridae  
Adenoviridae  
Paramyxoviridae  
Herpesviridae

26 The cytopathic effect of viruses can be manifested:  
formation of symplasts  
rounding of cells  
all listed  
increase in the index of cell proliferation  
destruction of all culture cells

27 The hemadsorption reaction is used to:  
indications in cell culture of cytogenetic viruses  
detection of tank cell culture contamination. flora  
detection of the virus in the culture fluid  
indication of viruses that do not cause JRS  
all listed

28 What is the name of the immunity provided by T lymphocytes?  
active  
natural  
cellular  
humoral  
secretory

29 What cell populations are involved in immunogenesis?  
T- and B-lymphocytes  
natural killers (NK cells)  
all listed  
killers (K-cells)  
system of mononuclear phagocytes

30 What is the ability of an antigen to selectively interact only with homologous antibodies and sensitized lymphocytes?  
foreignness  
antigenicity  
immunogenicity  
affinity  
specificity

31 Antibodies to the primary immune response are:  
IgM  
IgE  
IgD  
IgA  
IgG

32 As the set of reactions of interaction of a virus with an organism of the owner is called, what causes the disease and determines the pattern of its development?  
infectious process  
pathogenesis of viral infection  
viral disease  
viral infection

33 As the virus is called, it is deprived of a part of the genome that reproduces only in the presence of an infectious virus and inhibits its reproduction?  
provirus  
epivirus  
prion  
virus-satellite  
defective interfering particle (CI particle)

34 The diameter and mass of viruses are measured in:  
newtons  
nanometers  
daltons  
micrometers  
micrograms

35 The course of viral infection can be:  
integration  
latent  
sharp  
chronic  
autonomous

36 What is the name of the mechanism of transmission of the pathogen, which proceeds in a three-phase type: the release of the virus from the infected organism, its presence in the environment and penetration into the body of a new host?  
aerogenic  
transmittable  
contact  
horizontal  
vertical

37 What is the name of the set of processes aimed at protecting the body from genetically foreign substances and maintaining the stability of the internal environment?  
 non-specific (natural) resistance

38 Chicken embryo fibroblasts are:  
 vital nutrient medium culture of myeloma cells  
 culture of HE-2 cells primary trypsinized cell culture  
 organ culture

40 Morphological unit of the capsid, visible in EM:  
 peplomer capsometer  
 chemical unit protein unit nucleoid

41 Minus strand of viral DNA or RNA:  
 performs mRNA  
 does not perform the function of mRNA  
 has the same nucleotide sequence as viral mRNA  
 complementary viral mRNA

42 Forms of viral DNA:  
 single-chain two-chain  
 linear ring

43 Which viruses have single-stranded plus-stranded RNA (positive genome)?  
 picorna-, toga-, flavi-,  
 arteries-, caliciviruses reo-,  
 birnaviruses corona-, astro- and retroviruses  
 arena- and bunyaviruses paramyxo-, orthomyxo-, philo and rhabdoviruses

44 What is the period between the disappearance of the parent virions due to disintegration and the emergence of viral offspring?  
 phase of maturation stage of deproteinization  
 stage of translation eclipse phase  
 stage of transcription

45 What processes occur during the adsorption of the virion on the cell surface?  
 increased lipid fluidity  
 formation of receptor fields at the point of contact of the virion with the cell  
 aggregation of intramembrane particles  
 increasing the permeability of the plasmolemma

46 What is the process of transcribing genetic information from the viral genome to mRNA called?  
 replication broadcasting transformation  
 transcription adsorption

48 What are the properties of viruses whose information is encoded in genes?  
 genome genetic traits genotype  
 gene pool phenotype

49 What is the exchange of parts of the same gene between viruses in the process of mixed infection called?  
 reassorting resort genes intergenic recombination  
 intragenic recombination gene flow

50 What are the names of progeny virions that contain two parental genomes?  
 mutants complete heterozygotes recombinants  
 Pseudotypes serotypes

## **7. Teaching methods**

The organization of education in National University of Life and Environmental Sciences of Ukraine means a combination of classroom and extracurricular learning, such as:

- Lectures;
- Seminars;
- Workshops (laboratory work, laboratory practice);
- Independent classroom hours;
- Independent class work of students;
- Advice;
- Graduation design (thesis);
- All types of practices.

To control the quality of knowledge and skills students are used:

- Control of work;
- Individual interview;
- Colloquiums;
- Tests;
- Examinations;
- Protection projects and dissertations;
- State exams;
- A comprehensive examination in the specialty.

During the study course "Veterinary Virology" use the following teaching methods:

- Lectures;
- Laboratory classes;
- Independent classroom hours;
- Independent class work of students;

## **8. Forms of control**

Monitoring and evaluation of academic performance of students is an important part of the educational process in higher education. Control (from Fr. Control) in the didactics of higher education should be understood as a pedagogical support, monitoring and verification of successful teaching and learning of students. Process control exercised by the teacher involves several steps:

- 1) test (detection level obtained by the students' knowledge and skills);
- 2) assessment (measurement of knowledge, skills, and compare them with certain standards defined curriculum requirements);
- 3) accounting (fixation results in the form of ratings, scores, rankings magazine student's record book, scoring or examination information). By controlling teaching and learning activities of students, faculty aims to address the following objectives:
  - Identify the quality of learning, the extent to which the obtained skills goals and objectives of the course;
  - Identify difficulties in mastering educational information and standard errors for the purpose of correction and elimination;

- Determination of efficiency of organizational forms, methods and means of education;
- Diagnosing the level of students' readiness to accept new material. Normal control the following functions:
  - Training (education), which is to control measures contributed to the deepening, widening, improvement and systematization of knowledge and skills students provide feedback on learning;
  - Diagnostic and corrective aimed at determining the level of knowledge, skills, and common errors, gaps and difficulties in learning, causes of failure and ensure corrective action;
  - Estimates, which is to clarify the state of knowledge, skills and abilities of individual students and academic group as a whole, and provides accounting and transparency control results, contributing to the objective evaluation and better training;
  - Stimulating, providing for the approval of the students achieved success and formation of positive motivation for learning, systematic teaching and learning activities, developing a sense of responsibility for its effectiveness;
  - Developing, which consists in the fact that under systematic, developing pedagogically appropriate control memory, attention, thinking, oral and written expression, ability, educational interests, activity and independence of students;
  - Educational, aimed at shaping discipline, organization, self-discipline skills, positive attitudes to learning, the need for ongoing formation of selfeducation and self-improvement;
  - Prognostic and methodical, which refers both to the teacher (who is very precise information on the effectiveness of the activity), and students as an optimal teaching, improve teaching methods, can significantly affect the outcome
  - the quality of vocational training graduates.

The following types of controls: previous, current, topical, final.

Ante control is carried out to identify the level of student preparedness to accept new material. Such verification may be conducted in the form of tests, written tests, oral questioning front on practical exercises, individual or group counseling.

Content Knowledge test is aimed at determining the level of mastering a particular topic or more related subjects (modules). One of the main objectives is to create a content check prerequisite for understanding and synthesis of a sufficiently large volume of training data. For the thematic control, which can be done at the final seminar or colloquium in the module or content tests, tasks are selected and constructed so as to eliminate the elements of chance and objectively assess the educational progress of students in all sections of the theme.

Final control is to check the level of learning, practical abilities and skills of students over a long period of time learning semester, the entire period of study at the university. The purpose of the final control is to identify the knowledge structure and knowledge of students. The components of the control – terminal control and state



certification. Allow the student to the final control if the performance of all types of work, the curriculum for the semester in this discipline.

Credit – special means to implement the final inspection and assessment of academic achievement of students.

Semester credit – a form of total control from a single discipline per semester, which aims to test the assimilation of theoretical and practical material. Credits are for the paper, approved by the department. Teacher necessarily introduces students to the content exam questions.

To control the quality of knowledge and skills of students in the discipline "Veterinary Virology", the following control measures:

- Module tests;
- Individual objectives;
- Individual interview;
- Summative assessment.

### 9. Distribution Points that receive students.

Targeting the student is in accordance with the provisions of "On the examinations and tests NUBiP in Ukraine" dated 02/20/2015. The protocol №6 from the table. 1

#### Grading scale: national and ECTS

Total points for all the educational activities	Mark ECTS	Assessment on a national scale	
		for examination, course project (work) practices	for credit
90 – 100	<b>A</b>	excellent	Accepted
82-89	<b>B</b>	good	
74-81	<b>C</b>		
64-73	<b>D</b>	satisfactorily	
60-63	<b>E</b>		
35-59	<b>FX</b>	unsatisfactory with the possibility of recompiling	not accepted with the possibility of recompiling
0-34	<b>F</b>	unsatisfactory with mandatory re-learning	Fail with mandatory re-learning courses

### 10. Methodological support

1. Lecture course from «Veterinary Virology».
2. Калініна О.С. Ветеринарна вірусологія: Підручник. / О.С. Калініна, І.І. Панікар, В.Г. Скибіцький. — К.: Вища освіта, 2004. — 432 с.
3. Яблонська О. В. Ветеринарна мікробіологія: навчальний посібник / О. В. Яблонська, Т. В. Мазур, Ф. Ж. Ібатулліна — К.: ТОВ «НВП «Інтерсервіс», 2017.—432 с.
4. Методологія і методи наукових досліджень у тваринництві та ветеринарній медицині: Навчальний посібник. Друге видання / Укладачі: професор В.А.Яблонський, професор О.В.Яблонська.—Київ: 2014.— 512 с.
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6. Скибіцький В.Г. Практикум з ветеринарної вірусології. / Скибіцький В.Г., Панікар І.І., Ткаченко О.А та ін. — К.: Вища освіта, 2005.

7. Ташута С.Г. Курс лекцій з ветеринарної вірусології: Навчальний посібник. / С.Г. Ташута. — К.: «ФОП Нагорна І.Л.», 2010. — 401 с.

### 11. Recommended reading

1. Ротавірусна інфекція великої рогатої худоби /Скибіцький В.Г.- 1994.
2. Полімеразна ланцюгова реакція. /Ташута С.Г.- Київ, НАУ, 2002.- 27 С.
3. Ветеринарна вірусологія: Метод. вказівки /Онуфрієв В.П., Міськевич С.В.- К.,1994.
4. Пріонні інфекції тварин (трансмисивні губкоподібні енцефалопатії) / Скибіцький В.Г., Козловська Г.В., Ібатулліна Ф.Ж. -Київ, НАУ,2002.
5. Методичні рекомендації з діагностики гострих гастроентеритів сільськогосподарських і домашніх тварин методами прямої та імуноелектронної мікроскопії / Скибіцький В.Г., Ташута С.Г., Постой В.П.- Київ, 2002.
6. Методичні рекомендації по діагностиці, заходах профілактики і боротьби з ротавірусною, коронавірусною та змішаними рота- коронавірусними інфекціями великої рогатої худоби. / В.П.Онуфрієв, С.В.Миськевич, В.Г.Скибіцький, С.Г. Ташута та інші.- Київ, НАУ, 1999.
7. Методичні рекомендації діагностики гострих гастроентеритів сільськогосподарських і домашніх тварин вірусної етіології методами прямої та імуноелектронної мікроскопії. /В.Г.Скибіцький, С.Г. Ташута, Постой В.П.– Київ, 2003.- 27 С.
8. Реакція ензиммічених антитіл (РЕМА) для студентів ФВМ: методичні вказівки /Бортнічук В.А.

### 12. Information resources

1. Електронний курс “Veterinary Virology”  
<https://elearn.nubip.edu.ua/course/view.php?id=393>
2. <http://vet.in.ua/> — Ветеринарний інформаційний ресурс України/ Імунобіологічні препарати.
3. <http://veterinaryvirology.com/>
4. [http://www.virology.net/big\\_virology/bvdiseaselist.html](http://www.virology.net/big_virology/bvdiseaselist.html). The Big Picture Book of Viruses
5. <http://www.microbiologybook.org/book/virol-sta.htm>