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**Federal State Autonomous Educational Institution for Higher Education  
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA  
Agrarian and Technological Institute**

## **WORKING COURSE SYLLABUS**

### **Virology and biotechnology**

**Recommended by the Methodological Council for the Education Field:**

**36.05.01 Veterinary medicine**

**2022 г.**

## 1. GOALS AND OBJECTIVES OF THE DISCIPLINE

The aim of mastering the discipline "**Virology and biotechnology**" is to assist students in the development of theoretical questions about the diversity of the world of viruses, their role in general biological processes and in animal pathology, the theoretical foundations of the diagnosis of infectious diseases, the principles of immunological research, the manufacture and control of biological products.

## 2. REQUIREMENTS FOR THE RESULTS OF MASTERING THE DISCIPLINE

The development of the discipline "**Virology and biotechnology**" is aimed at creating the following competencies (parts of competencies) for students:

*Table 2.1. List of competencies formed by students during the development of the discipline (results of the development of the discipline)*

<b>Code</b>	<b>Competence</b>	<b>Indicators of competence accomplishment (within the discipline)</b>
UK -8	The ability to create and maintain safe living conditions in everyday life and in professional activities for the preservation of the natural environment, ensuring the sustainable development of society, including in the event of a threat and occurrence of emergencies and military conflicts.	UK-8.1 Analyzes the factors of harmful influence on the vital activity of elements of the habitat. (technical means, technological processes, materials, buildings and structures, natural and social phenomena);
		UK -8.2 Identifies dangerous and harmful factors within the scope of the task being performed;
		UK-8.3 Identifies and eliminates problems related to safety violations in the workplace;
		UK-8.4 Explains measures to prevent emergencies;
		UK -8.5 "Explains the rules of conduct in the event of emergencies of natural and man-made origin, as well as in the event of military conflicts;"
		UK-8.6 Provides first aid, participates in recovery activities.
GPC-2	The ability to interpret and evaluate in professional activity the influence of natural, socio-economic, genetic and economic factors on the physiological state of the animal organism.	GPC-2.1 Has knowledge of the influence of natural, socio-economic, genetic and economic factors on the animal body.
		GPC-2.2 He is able to establish the presence and reliability of cause-and-effect relationships between the effects of certain etiological factors on the animal's body and the development of diseases.

		GPC-2.3 Possesses methods of preventive and curative correction of the effects of adverse environmental factors that can cause deterioration of animal health.
GPC -4	The ability to use methods of solving problems using modern equipment in the development of new technologies in professional activity and to use modern professional methodology for conducting experimental research and interpreting their results.	GPC-4.1 Possesses the conceptual and methodological apparatus of basic natural sciences at a level sufficient for full-fledged professional activity at the modern level.
		GPC-4.2 He knows the methods of solving problems using modern equipment.
		GPC-4.3 He is ready to use modern methodology in the development and conduct of experimental research.
		GPC-4.4 Uses modern professional methodology in interpreting research results.
GPC -6	The ability to analyze, identify and assess the risk of the risk of the occurrence and spread of diseases.	GPC-6.1 Has knowledge in the field of etiology and pathogenesis of animal diseases of different species.
		GPC-6.2 Has the skills to diagnose non-infectious, infectious and invasive diseases, identify pathogens of infectious and invasive diseases in animals.
		GPC-6.3 He knows the patterns of the occurrence and spread of diseases in animal populations, factors predisposing to diseases and the causes of possible complications.
PC -3	Ability to develop animal research programs using special (instrumental) and laboratory methods.	PC-3.1 He is able to develop individual animal research programs, including the use of special (instrumental) and laboratory methods to detect deviations from the physiological norm of the state of a living organism, conduct differential diagnosis of the detected pathology or control the course of the disease and the effectiveness of the prescribed treatment.
		PC-3.2 Capable of developing mass comprehensive animal research programs (medical examination programs) of animals, taking into account their type and purpose, both general and special.
PC -4	The ability to conduct clinical studies of animals using special	PC-4.1 Able to conduct additional animal studies using laboratory methods to clarify the diagnosis.

	(instrumental) and laboratory methods to clarify the diagnosis.	PC-4.2 Able to conduct additional animal studies using special (instrumental) methods to clarify the diagnosis.
PC -6	The ability to develop a treatment plan for animals based on the established diagnosis and individual characteristics of animals.	PC-6.1 Able to develop a treatment plan for animals based on the established diagnosis and individual characteristics of animals.
		PC-6.2 He is able to develop recommendations on therapeutic and preventive manipulations to prevent diseases, the high probability of which was revealed during the study of the patient.
		PC-6.3 He is able to develop recommendations for carrying out preventive and curative measures based on the results of the examination of animals carried out as part of the medical examination.
PC -7	The ability to choose the necessary drugs of chemical and biological nature for the treatment of animals, taking into account their combined pharmacological effect on the body.	PC -7.1 He is able to choose medicines of chemical and biological nature necessary for the treatment of animals, guided by the principles of evidence-based medicine, taking into account their combined pharmacological effect on the body.
		PC-7.2 He is able to justify the prescription of a drug in a certain clinical case or the impossibility of using this drug in the situation under consideration.
		PC-7.3 He is able to calculate the dose, frequency and duration of the course of application of the drug to the patient, taking into account the form of release and the characteristics of the administration of the drug to the patient.
		PC-7.4 He is able to take into account drug interactions when prescribing a course of treatment to an animal already receiving medications and biologically active additives due to the presence of diseases identified earlier.
		PC-7.5 He is able to take into account economic, species and age characteristics, as well as the results of laboratory studies of the patient when choosing drugs for the treatment of the patient.

PC -8	Ability to choose methods of non-drug therapy, including physiotherapy methods for the treatment of animals.	PC-8.1 He is able to choose and justify his choice of methods of non-drug therapy, including physiotherapy methods, for the treatment of animals;
		PC-8.2 He is able to evaluate the effectiveness of the chosen method in the treatment of the patient and, if necessary, adjust the treatment method or change the chosen method to another one.
PC -9	The ability to carry out therapeutic, including physiotherapy procedures using special equipment in compliance with safety rules.	PC-9.1 Able to carry out therapeutic, including physiotherapy, procedures using special equipment in compliance with safety rules;
		PC -9.2 He is able to take into account the species, age and individual characteristics of animals undergoing treatment using special equipment, choose acceptable methods of fixing the patient during the procedure, the conditions of the procedures and their duration.
PC -15	Ability to organize preventive immunizations (vaccinations), therapeutic and preventive treatments of animals in accordance with the plan of antiepizootic measures.	PC-15.1 He is able to make individual and group plans of preventive immunizations (vaccinations) taking into account the epizootic situation in the territory of the animals' stay, the plan of anti-epizootic measures, as well as state and regional veterinary and sanitary rules and requirements.
		PC-15.2 He is able to organize therapeutic and preventive treatment of animals in accordance with the plan of anti-epizootic measures, as well as, if necessary, taking into account the real epizootic situation in the places where animals stay, including in conditions of agricultural production.
PC -17	Ability to organize disinfection and disinfection of livestock premises to ensure veterinary and sanitary well-being in accordance with the plan of veterinary and sanitary measures	PC-17.1 He is capable of collecting and analyzing information necessary for the organization and planning of veterinary and sanitary measures
		PC-17.2 He is able to choose the optimal equipment, consumables and medicinal and disinfecting preparations necessary and safe enough for the conduct of veterinary and sanitary measures
		PC-17.3 He is able to determine the procedure for disinfection, disinsection, deratization and other veterinary and sanitary measures, taking into account the

		peculiarities of animal husbandry, technical characteristics of premises and epizootic situation
		PC-17.4 He is able to monitor the results of veterinary and sanitary measures
PC -21	The ability to carry out inspections of the veterinary and sanitary condition and microclimate of livestock premises in accordance with the plan of antiepizootic measures, the plan of prevention of non-infectious animal diseases, the plan of veterinary and sanitary measures	PC-21.1 He is able to detect deviations in the parameters of the microclimate in livestock premises from the normative
		PC-21.2 He is able to detect violations of the veterinary and sanitary condition of livestock premises, determine their cause and possible consequences
		PC-21.3 He is able to use the information obtained during the inspection of the veterinary and sanitary condition and microclimate of livestock premises for risk analysis of non-infectious, infectious and invasive diseases
PC -22	Ability to organize measures to protect the organization from the introduction of infectious and invasive diseases in accordance with the plan of antiepizootic measures.	PC -22.1 He is able to assess the epizootic state of an organization (territory), identify risks and possible causes of epizootic foci, as well as factors affecting their spread in specific organizations, territories.
		PC-22.2 Able to choose and apply the most effective measures to protect the organization from the introduction of infectious and invasive diseases.
		PC-22.3 He is able to carry out operational control of the effectiveness of the activities carried out.

### 3. COURSE IN HIGHER EDUCATION

The discipline "**Virology and biotechnology**" refers to the mandatory part of block B1 of the Educational Program of Higher Education.

As part of the Educational Program of Higher Education, students also master other disciplines and /or practices that contribute to achieving the planned results of mastering the discipline "**Virology and biotechnology**".

*Table 3.1. List of Higher Education Program components disciplines that contribute to expected learning outcomes*

Competence code	Competence	Previous Disciplines (Modules)	Subsequent Disciplines (Modules)
UK -8	The ability to create and maintain safe living	History	Veterinary radiobiology

	<p>conditions in everyday life and in professional activities for the preservation of the natural environment, ensuring the sustainable development of society, including in the event of a threat and occurrence of emergencies and military conflicts.</p>	<p>Inorganic and analytical chemistry Organic chemistry Biological physics Physical and Colloidal Chemistry Life safety Biological chemistry Veterinary Microbiology and Mycology</p>	<p>Parasitology and invasive diseases Epizootology and infectious diseases Organization of veterinary affairs General and Veterinary Ecology Veterinary sanitation Veterinary deontology Laboratory diagnostics of infectious and invasive diseases Organization of state veterinary supervision</p>
GPC-2	<p>The ability to interpret and evaluate in professional activity the influence of natural, socio-economic, genetic and economic factors on the physiological state of the animal organism.</p>	<p>Biology with the basics of ecology Veterinary genetics Veterinary Microbiology and Mycology</p>	<p>Physiology and ethology of animals Breeding with the basics of private animal husbandry Animal health and welfare Pathological physiology Veterinary radiobiology Pathological anatomy Instrumental diagnostic methods Toxicology Obstetrics, gynecology and andrology Internal diseases General surgery Private Veterinary Surgery Parasitology and invasive diseases Epizootology and infectious diseases Forensic veterinary examination and dissection of animals Immunology</p>

			<p>General and  Veterinary Ecology  Veterinary sanitation  Fodder plants  Zoopsychology  Здоровье и  благополучие  животных  Horse diseases  Diseases of  Productive Animals  Diseases of small pets  Болезни мелких  домашних  животных  Diseases of bees and  entomophages  Fish pathology and  aquaculture  Diseases of exotic  animals  Anesthesiology,  resuscitation and  intensive care  Dermatology  Cardiology  Endocrinology  Nephrology  Veterinary  ophthalmology  Animal Dentistry</p>
GPC -4	<p>The ability to use  methods of solving  problems using modern  equipment in the  development of new  technologies in  professional activity  and to use modern  professional  methodology for  conducting  experimental research  and interpreting their  results.</p>	<p>Inorganic and  analytical chemistry  Organic chemistry  Biological physics  Computer science  Physical and  Colloidal Chemistry  Cytology, Histology  and Embryology  Biological chemistry  Veterinary  Microbiology and  Mycology</p>	<p>Physiology and  ethology of animals  Breeding with the  basics of private  animal husbandry  Pathological  physiology  Veterinary  radiobiology  Clinical diagnostics  Pathological anatomy  Operative surgery  with topographic  anatomy  Instrumental  diagnostic methods  Toxicology</p>



			<p> Obstetrics,  gynecology and  andrology  Internal diseases  General surgery  Private Veterinary  Surgery  Parasitology and  invasive diseases  Epizootology and  infectious diseases  Maths  Immunology  Veterinary sanitation  Processing  technology for  livestock products  Medicinal and  poisonous plants  Fodder plants  The basics of  intellectual work  Personality  psychology and  professional self-  determination  Clinical laboratory  diagnostics  Laboratory  diagnostics of  infectious and  invasive diseases  Horse diseases  Diseases of  Productive Animals  Diseases of small pets  Болезни мелких  домашних  животных  Diseases of bees and  entomophages  Fish pathology and  aquaculture  Diseases of exotic  animals  Anesthesiology,  resuscitation and  intensive care </p>
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			Dermatology Cardiology Endocrinology Nephrology Reconstructive surgery Veterinary ophthalmology Animal Dentistry
GPC -6	The ability to analyze, identify and assess the risk of the risk of the occurrence and spread of diseases.	Biology with the basics of ecology Life safety Veterinary Microbiology and Mycology	Animal health and welfare Feeding animals with the basics of forage production Veterinary radiobiology Clinical diagnostics Pathological anatomy Instrumental diagnostic methods Toxicology Obstetrics, gynecology and andrology Internal diseases General surgery Private Veterinary Surgery Parasitology and invasive diseases Epizootology and infectious diseases Veterinary and sanitary examination Organization of veterinary affairs Forensic veterinary examination and dissection of animals Introduction to the specialty General and Veterinary Ecology Veterinary sanitation Processing technology for livestock products

			<p>Medicinal and poisonous plants  Fodder plants  Animal health and welfare  Clinical laboratory diagnostics  Laboratory diagnostics of infectious and invasive diseases  Organization of state veterinary supervision  Horse diseases  Diseases of Productive Animals  Diseases of small pets  Болезни мелких домашних животных  Diseases of bees and entomophages  Fish pathology and aquaculture  Diseases of exotic animals  Anesthesiology, resuscitation and intensive care  Veterinary ophthalmology  Animal Dentistry</p>
PC -3	Ability to develop animal research programs using special (instrumental) and laboratory methods.	<p>Animal anatomy  Organic chemistry  Biological physics  Physical and Colloidal Chemistry  Biological chemistry  Veterinary Microbiology and Mycology</p>	<p>Physiology and ethology of animals  Pathological physiology  Clinical diagnostics  Pathological anatomy  Instrumental diagnostic methods  Toxicology  Obstetrics, gynecology and andrology  Internal diseases  General surgery  Private Veterinary Surgery</p>

			Parasitology and invasive diseases Epizootology and infectious diseases Immunology Veterinary deontology Clinical laboratory diagnostics Laboratory diagnostics of infectious and invasive diseases Veterinary and industrial laboratories with design basics Horse diseases Diseases of Productive Animals Diseases of small pets Болезни мелких домашних животных Diseases of bees and entomophages Fish pathology and aquaculture Diseases of exotic animals Anesthesiology, resuscitation and intensive care Dermatology Cardiology Endocrinology Nephrology Reconstructive surgery Veterinary ophthalmology Animal Dentistry
PC -4	The ability to conduct clinical studies of animals using special (instrumental) and laboratory methods to clarify the diagnosis.	Animal anatomy Biological physics Cytology, Histology and Embryology Biological chemistry	Physiology and ethology of animals Pathological physiology Clinical diagnostics Pathological anatomy

		<p>Veterinary Microbiology and Mycology</p>	<p>Instrumental diagnostic methods  Obstetrics, gynecology and andrology  Internal diseases  General surgery  Private Veterinary Surgery  Parasitology and invasive diseases  Epizootology and infectious diseases  Clinical laboratory diagnostics  Laboratory diagnostics of infectious and invasive diseases  Horse diseases  Diseases of Productive Animals  Diseases of small pets  Болезни мелких домашних животных  Diseases of exotic animals  Anesthesiology, resuscitation and intensive care  Dermatology  Cardiology  Endocrinology  Nephrology  Veterinary ophthalmology  Animal Dentistry</p>
PC -6	<p>The ability to develop a treatment plan for animals based on the established diagnosis and individual characteristics of animals.</p>	<p>Veterinary genetics  Veterinary Microbiology and Mycology</p>	<p>Pathological physiology  Veterinary pharmacology  Toxicology  Obstetrics, gynecology and andrology  Internal diseases  General surgery</p>

			Private Veterinary Surgery Parasitology and invasive diseases Epizootology and infectious diseases Maths Immunology Zoopsychology Horse diseases Diseases of Productive Animals Diseases of small pets Болезни мелких домашних животных Diseases of bees and entomophages Fish pathology and aquaculture Diseases of exotic animals Anesthesiology, resuscitation and intensive care Dermatology Cardiology Endocrinology Nephrology Reconstructive surgery Veterinary ophthalmology Animal Dentistry
PC -7	The ability to choose the necessary drugs of chemical and biological nature for the treatment of animals, taking into account their combined pharmacological effect on the body.	Inorganic and analytical chemistry Organic chemistry Physical and Colloidal Chemistry Biological chemistry Veterinary Microbiology and Mycology	Pathological physiology Veterinary pharmacology Toxicology Obstetrics, gynecology and andrology Internal diseases General surgery Private Veterinary Surgery Parasitology and invasive diseases

			<p>Epizootology and infectious diseases  Medicinal and poisonous plants  Horse diseases  Diseases of Productive Animals  Diseases of small pets  Болезни мелких домашних животных  Diseases of bees and entomophages  Fish pathology and aquaculture  Diseases of exotic animals  Anesthesiology, resuscitation and intensive care  Dermatology  Cardiology  Endocrinology  Nephrology  Veterinary ophthalmology  Animal Dentistry</p>
PC -8	Ability to choose methods of non-drug therapy, including physiotherapy methods for the treatment of animals.	Veterinary Microbiology and Mycology	<p>Physiology and ethology of animals  Feeding animals with the basics of forage production  Pathological physiology  Veterinary radiobiology  Internal diseases  General surgery  Private Veterinary Surgery  Horse diseases  Diseases of Productive Animals  Diseases of small pets  Болезни мелких домашних животных</p>

			Diseases of exotic animals Anesthesiology, resuscitation and intensive care Dermatology Cardiology Endocrinology Nephrology Reconstructive surgery Veterinary ophthalmology Animal Dentistry
PC -9	The ability to carry out therapeutic, including physiotherapy procedures using special equipment in compliance with safety rules.	Animal anatomy Life safety Veterinary Microbiology and Mycology	Physiology and ethology of animals Pathological physiology Veterinary radiobiology General surgery Private Veterinary Surgery Horse diseases Diseases of Productive Animals Diseases of small pets Болезни мелких домашних животных Diseases of exotic animals Anesthesiology, resuscitation and intensive care Dermatology Cardiology Endocrinology Nephrology Reconstructive surgery Veterinary ophthalmology Animal Dentistry
PC-15	Ability to organize organizational, technical, zootechnical and veterinary measures	-	Parasitology and invasive diseases Epizootology and infectious diseases



	aimed at the prevention of non-communicable diseases in accordance with the plan for the prevention of non-communicable animal diseases		Immunology Veterinary sanitation Diseases of bees and entomophages Fish pathology and aquaculture
PC -17	Ability to organize disinfection and disinfection of livestock premises to ensure veterinary and sanitary well-being in accordance with the plan of veterinary and sanitary measures	Inorganic and analytical chemistry Organic chemistry Physical and Colloidal Chemistry Life safety Veterinary Microbiology and Mycology	Veterinary pharmacology Veterinary sanitation Здоровье и благополучие ЖИВОТНЫХ
PC -21	The ability to carry out inspections of the veterinary and sanitary condition and microclimate of livestock premises in accordance with the plan of antiepzootic measures, the plan of prevention of non-infectious animal diseases, the plan of veterinary and sanitary measures	Veterinary Microbiology and Mycology	Animal health and welfare Veterinary radiobiology Veterinary sanitation Здоровье и благополучие ЖИВОТНЫХ
PC-22	Ability to organize measures to protect the organization from the introduction of infectious and invasive diseases in accordance with the plan of antiepzootic measures.	Life safety Veterinary Microbiology and Mycology	Animal health and welfare Veterinary pharmacology Private Veterinary Surgery Parasitology and invasive diseases Epizootology and infectious diseases Organization of veterinary affairs General and Veterinary Ecology Veterinary sanitation Processing technology for livestock products

			Здоровье и благополучие животных Laboratory diagnostics of infectious and invasive diseases Organization of state veterinary supervision Diseases of bees and entomophages Fish pathology and aquaculture
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#### 4. COURSE WORKLOAD AND TRAINING ACTIVITIES

Course workload of the discipline "**Virology and biotechnology**" is 3 credits.

*Table 4.1. Types of academic activities during the period of the HE program mastering for **full-time** study*

Types of academic activities		HOURS	Semesters				
			4	-	-	-	
Contact academic hours		72	72	-	-	-	
including							
Lectures		18	18	-	-	-	
Lab work		54	54	-	-	-	
Seminars (workshops/tutorials)		-	-	-	-	-	
Self-study		16	16	-	-	-	
Evaluation and assessment (exam/pass/fail grading)		20	20	-	-	-	
<b>Course workload</b>		Academic hour	<b>108</b>	<b>108</b>	-	-	-
		Credit unit	<b>3</b>	<b>3</b>	-	-	-

*Table 4.2. Types of academic activities during the period of the HE program mastering for **part-time** study*

Types of academic activities		HOURS	Semesters			
			4	-	-	-
Contact academic hours		36	36	-	-	-
including						
Lectures		18	18	-	-	-
Lab work		18	18	-	-	-
Seminars (workshops/tutorials)		-	-	-	-	-
Self-study		62	62	-	-	-
Evaluation and assessment (exam/pass/fail grading)		10	10	-	-	-

<b>Course workload</b>	Academic hour	<b>108</b>	<b>108</b>	-	-	-
	Credit unit	<b>3</b>	<b>3</b>	-	-	-

## 5. CONTENT OF THE DISCIPLINE

*Table 5.1 Content of the discipline (module) by type of academic work*

<b>Name of the discipline section</b>	<b>Content of the section (topics)</b>	<b>Types of academic activities</b>
Section 1. The discovery of viruses and the history of their study	Topic 1.1. The nature and origin of viruses. Their differences from other infectious agents. The role of viruses in infectious pathology of animals and humans. Economic damage caused to livestock by human viral diseases.	Lectures, Lab work.
Section 2. The structure and chemical composition of viruses.	Topic 2.1. Forms of existence of viruses in nature. Principles of Virion Organization. The shape and size of the virions. Types of symmetry and their conditionality. Types of viral genomes. Structural proteins. The ability of virions to self-assemble. Lipids and carbohydrates of virions, their origin and significance.	Lectures, Lab work.
Section 3. Classification of viruses, its scientific and practical value.	Topic 3.1. Brief description of the main families	Lectures, Lab work.
Section 4. Reproduction of viruses.	Topic 4.1. Forms of interaction of viruses with cells: productive, integrative and latent infection. Reproduction of viruses and a diagram of the main processes that ensure the implementation of genetic information.	Lectures, Lab work.
Section 5. Cultivation of viruses.	Topic 5.1. Cultivation of viruses in the body of naturally susceptible and laboratory animals, on chicken embryos, cell culture. The use of these biological systems in laboratory diagnostics of viral diseases.	Lectures, Lab work.
Section 6. Pathogenesis of viral diseases of animals.	Topic 6.1. Pathways for viruses to enter the body of animals and barriers along these pathways. Primary localization and circulation of the virus. The tropism of viruses and its conditionality. The mechanism of the damaging effect of viruses on cells. Latent, chronic	Lectures, Lab work.

	persistent, slow viral and prion infections.	
Section 7. Features of antiviral immunity.	Topic 7.1. Factors of nonspecific antiviral protection of animals. Factors of specific cellular and humoral antiviral immunity. Interaction of cellular and humoral links in the formation of antiviral immunity.	Lectures, Lab work.
Section 8. Specific prevention of viral diseases in animals.	Topic 8.1. Live and inactivated antiviral vaccines. Basic principles of obtaining and control of live vaccines. Principles of obtaining and control of inactivated antiviral vaccines. Subunit and genetically engineered vaccines. Advantages and disadvantages of different types of antiviral vaccines. Their practical application.	Lectures, Lab work.
Section 9. Serological tests in virology.	Topic 9.1. The general principle of serological reactions and their differences from each other. RN, RNGA, RSK, RIF, RDP, IFA.	Lectures, Lab work.
Section 10. Principles of diagnostics of viral diseases of animals.	Topic 10.1. Preliminary diagnosis based on clinical symptoms, pathological changes and epizootic data. The final diagnosis is based on the indication and identification of viruses in the body of sick animals. Evidence for the etiological role of the isolated viruses.	Lectures, Lab work.
Section 11. Poxvirus family	Topic 11.1. Characterization of viruses, classification, main diseases (smallpox viruses, rabbit myxomatosis, African swine fever virus), methods of laboratory diagnostics, specific prevention.	Lectures, Lab work.
Section 12. Herpesvirus family.	Topic 12.1. Characteristics of viruses, classification, main diseases (viruses of Aujeszky's, Marek's diseases, infectious bovine rhinotracheitis), methods of laboratory diagnostics, specific prevention.	Lectures, Lab work.
Section 13. Family of Adenoviruses.	Topic 13.1. Characterization of viruses, classification, main diseases (avian adenoviruses (CELO, EDS), adenovirus infections of cattle, horses, dogs, pigs, sheep and goats), methods of laboratory diagnostics, specific prophylaxis.	Lectures, Lab work.

Section 14. Family Picornaviruses. Calicivirus family	Topic 14.1. Characteristics of viruses, classification, main diseases (FMD. Teschen's disease. SMEDI syndrome), methods of laboratory diagnostics, specific prophylaxis Vesicular exanthema of pigs.	Lectures, Lab work.
Section 15. The Togavirus family. Family Flaviruses Family Orthomyxoviruses	Topic 15.1. Characterization of viruses, classification, major diseases (equine encephalomyelitis viruses), methods of laboratory diagnostics, specific prevention. Swine fever. Characterization of viruses, classification, major diseases (influenza viruses), methods of laboratory diagnostics, specific prevention	Lectures, Lab work.
Section 16. Family Paramyxoviruses	Topic 16.1. Characteristics of viruses, classification, main diseases (Newcastle disease virus. Cattle parainfluenza. Respiratory syncytial virus of cattle. Cattle plague. Carnivore distemper), methods of laboratory diagnostics, specific prevention.	Lectures, Lab work.
Section 17. Reoviruses family. Birnavirus family	Topic 17.1. Characterization of viruses, classification, major diseases (rotavirus diarrhea of calves. Bluetongue), methods of laboratory diagnostics, specific prophylaxis. Gumboro virus.	Lectures, Lab work.
Section 18. Family of Retroviruses.	Topic 18.1. Characteristics of viruses, classification, main diseases (bovine leukemia virus. Oncoviruses of mice, cats, monkeys), laboratory diagnostics, specific prevention.	Lectures, Lab work.
Section 19. Prions and infections caused by them.	Topic 19.1. Scrapy, mink transmissible encephalopathy, bovine spongiform encephalopathy.	Lectures, Lab work.

## 6. CLASSROOM INFRASTRUCTURE AND TECHNOLOGY SUPPORT REQUIREMENTS

*Table 6.1. Material and technical support of the discipline*

<i>Classroom for Academic Activity Type</i>	<i>Equipping the classroom</i>	<b>Specialized educational/laboratory equipment, software and materials for the development of the discipline (if necessary)</b>
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Lecture	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a board (screen) and technical means of multimedia presentations.	
Laboratory	An auditorium for laboratory work, individual consultations, routine monitoring and interim certification, equipped with a set of specialized furniture and equipment.	
Self-studies	An auditorium for independent work of students (can be used for seminars and consultations), equipped with a set of specialized furniture and computers with access to an electronic information and educational environment.	

## 7. RECOMMENDED SOURCES FOR COURSE STUDIES

### *Main reading:*

1. Gosmanov R.G., Kolychev N.M., Pleshakova V.I. Veterinary Virology. SPb, Ed. "Doe", 2017  
[http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn\\_FindDoc&id=464986&idb=0](http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn_FindDoc&id=464986&idb=0)
2. Gosmanov R.G., Kolychev N.M., Pleshakova V.I. Veterinary Virology. SPb, Ed. Doe, 2021.
3. Tretyakova IV, Kalmykova MS, Yarygina EI, Kalmykov VM. Virology. Workshop. SPb, Ed. Doe, 2020.

### *Additional Reading:*

1. Sarukhanova L.E., Volina E.G., Yashina N.V. General microbiology, virology and applied immunology. Moscow, Ed. RUDN, 2020.  
[http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn\\_FindDoc&id=491251&idb=0](http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn_FindDoc&id=491251&idb=0).
2. V.A. Sergeev, B.G. Orlyankin, A.A. Gusev, O. I. Sukharev. "Veterinary Virology". Study guide, Moscow-Vladimir, JSC "Serpukhov paper factory", 2001.

### *Resources of the Internet information and telecommunication network:*

1. Electronic library system of RUDN and third-party Electronic library systems to which university students have access on the basis of concluded contracts:
  - Electronic library system of RUDN - ELS RUDN <http://lib.rudn.ru/MegaPro/Web>
  - ELS "University Library online" <http://www.biblioclub.ru>
  - ELS Yurayt <http://www.biblio-online.ru>

- ELS "Student Consultant" [www.studentlibrary.ru](http://www.studentlibrary.ru)

- ELS "Lan" <http://eZlanbook.com/>

- ELS "Trinity Bridge" <http://www.trmost.com/>

**2. Databases and search engines:**

- electronic fund of legal and regulatory and technical documentation <http://docs.cntd.ru/>

- search engine Yandex <https://www.yandex.ru/>

- search engine Google <https://www.google.ru/>

- abstract database SCOPUS <http://www.elsevierscience.ru/products/scopus/>

Educational and methodological materials for independent work of students during the development of the discipline/ module\*:

1. A course of lectures on the discipline "**Virology and biotechnology**".

2. Laboratory workshop on the discipline "**Virology and biotechnology**".

\* - All educational and methodological materials for independent work of students are placed in accordance with the current procedure on the discipline page in the **Telecommunication educational and Information System!**

## 8. MID-TERM ASSESSMENT

Evaluation materials and a point-rating system\* for assessing the level of competence formation (part of competencies) based on the results of mastering the discipline "**Virology and biotechnology**" are presented in the Appendix to this Work Program of the discipline.

\* - Assessment Materials and a Point Rating System are formed based on the requirements of the relevant local regulatory act of the RUDN.

### DEVELOPER:

Associate Professor of the Department of  
Microbiology and Virology

Position, Basic curriculum

Signature

Yashina N.V.

Full name.

### HEAD OF THE DEPARTMENT:

Department of Microbiology and Virology

Name Basic Curriculum

Signature

Podoprigora I.V.

Full name.

### HEAD OF THE HIGHER EDUCATION PROGRAM:

Director of the Department of Veterinary Medicine

Position, Basic curriculum

Signature

Vatnikov Yu.A.

Full name