Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
NAMED AFTER PATRICE LUMUMBA
RUDN University

Agricultural and Technological Institute

WORKING PROGRAM OF THE DISCIPLINE

Virology and biotechnology

Recommended by the Ministry of Education for the following areas of study / specialty:

36.05.01Veterinary

Mastering the discipline is carried out within the framework of the implementation of the main professional Educational Program of Higher Education (EP HE):

Veterinary Medicine

2025

1. THE PURPOSE OF MASTERING THE DISCIPLINE

The main goal of the discipline is to assist students in mastering theoretical issues about the diversity of the world of viruses, their role in general biological processes and in animal pathology, the theoretical foundations for diagnosing infectious diseases, the principles of immunological research, the manufacture and control of biological products.

2. REQUIREMENTS FOR THE RESULTS OF MASTERING THE DISCIPLINE

Mastering the discipline "**Virology and biotechnology**" is aimed at developing the following competencies (parts of competencies):

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

Code	Competence	Indicators of achievement of competence (within the framework of this discipline)
UK-8	The ability to create and maintain safe living conditions in everyday life and in professional activities to preserve the natural environment, ensure the sustainable development of society, including in the event of a threat and the occurrence of emergency situations and military conflicts	UK-8.1. Analyzes factors of harmful impact on life elements of the environment (technical means, technological processes, materials, buildings and structures, natural and social phenomena)
		UK-8.2. Identifies dangerous and harmful factors within the scope
		UK-8.3. Identifies and resolves issues related to safety violations in the workplace

3. THE PLACE OF THE DISCIPLINE IN THE STRUCTURE OF THE EPHE

The discipline "**Virology and biotechnology**" belongs to the mandatory part of the educational relations of block B1 of the EP HE.

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 components of the EP HE, contributing to the achievement of the planned results of the development of the discipline.

Code	Name competencies	Previous disciplines / modules, practices	Subsequent disciplines/modules, practices
UK-8	The ability to create and maintain safe living conditions in everyday life and in professional activities to preserve the natural environment, ensure sustainable development of society, including in the event	Biology with the basics of ecology Safety	Internal non-infectious diseases General and private surgery Parasitology and invasive diseases Epizootology and infectious diseases

	of threats and emergencies and military conflicts		Veterinary and sanitary expertise Forensic veterinary medicine and animal autopsy Immunology General and veterinary ecology Veterinary sanitation Bee and fish diseases Clinical laboratory diagnostics Laboratory diagnostics of infectious and invasive diseases Horse diseases Diseases of productive animals Diseases of small domestic animals

4. SCOPE OF THE DISCIPLINE AND TYPES OF ACADEMIC WORK

The total labor intensity of the discipline **"Virology and biotechnology"** is 3 creditx units.

*Table 4.1. Types of academic work by periods of development of EP HE for **FULL**-time education*

Type of academic work		**TOTAL,** ak. h.	**Semester (s)**			
			3	**4**	--	-
Contract work, ac.h.		72	-	72	--	-
including:						
Lectures (**L**)		18	-	18	--	-
Laboratory work (**LR**)		54	-	54	--	-
Practical / seminar classes (**S**)		-	-	-	-	-
Independent work of students, ak. h.		16	-	16	--	-
Control (exam/test with assessment), ak.h.		20	-	20	--	-
Total labor intensity of the discipline	ak. h.	**108**	-	**108**	--	-
	zach. units	**3**	-	**3**	--	-

*Table 4.2. Types of educational work by periods of mastering the EP HE for **the EVENING** form of education*

Type of academic work	**TOTAL,** ak. h.	**Semester (s)**			
		3	**4**	--	-
Contract work, ac.h.	36	-	36	--	-
including:					

Lectures (**L**)		18	-	18	--	-
Laboratory work (**LR**)		18	-	18	--	-
Practical / seminar classes (**S**)		-	-	-	-	-
Independent work of students, ak. h.		62	-	62	--	-
Control (exam/test with assessment), ak. h.		10	-	10	--	-
General labor intensity of the discipline	ak. h.	**108**	**-**	**108**	**--**	-
	zach. units	**3**	**-**	**3**	**--**	-

5. CONTENT OF THE DISCIPLINE

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

Name of the discipline section	**Content of the section (topics)**	**Type of academic work***
Section 1. General virology	**Topic 1.1.** Nature and origin of viruses. Distinguish them from other infectious agents. The role of viruses in the infectious pathology of animals and humans. Economic damage caused to animal husbandry by human viral diseases.	**L, LR**
	Topic 1.2. Structure and chemical composition of viruses.	**L, LR**
	Topic 1.3. Classification of viruses, its scientific and practical value. Brief description of the main families	**L, LR**
	Topic 1.4. Reproduction of viruses. Forms of interaction of viruses with cells: productive, integrative and latent infection. Reproduction of viruses and the scheme of the main processes that ensure the implementation of genetic information.	**L, LR**
	Topic 1.5. Cultivation of viruses in the body of naturally susceptible and laboratory animals, on chicken embryos, cell culture. The use of these biological systems in the laboratory diagnosis of viral diseases.	**L, LR**
	Topic 1.6. The pathogenesis of viral diseases in animals. Ways of penetration of viruses into the body of animals and barriers on these ways. Primary localization and circulation of the virus. Tropism of viruses and its conditionality. The mechanism of the damaging effect of viruses on cells. Latent, chronic persistent, slow viral and prion infections.	**L, LR**
Section 2. Features of antiviral immunity.	**Topic 2.1.** 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.	**L, LR**

Name of the discipline section	Content of the section (topics)	Type of academic work*
	Topic 2.2. Specific prevention of viral diseases in animals. Live and inactivated antiviral vaccines. Basic principles for the production and control of live vaccines. Principles for the production and control of inactivated antiviral vaccines. Subunit vaccines and vaccines obtained by genetic engineering methods. Advantages and disadvantages of various types of antiviral vaccines. their practical application.	**L, LR**
	Topic 2.3. Serological reactions in virology. General principle and their differences from each other. RN, RPGA, CFT, RIF, RDP, ELISA.	**L, LR**
	Topic 2.4. Principles of diagnosis of viral diseases in animals. Preliminary diagnosis based on clinical symptoms, pathoanatomical changes and epizootological data. The final diagnosis is based on the indication and identification of viruses in the body of sick animals. Evidence of the etiological role of isolated viruses.	**L, LR**
Section 3. Private virology	**Topic 3.1.** Family Poxviruses Characteristics of viruses, classification, main diseases (pox viruses, rabbit myxomatosis, African swine fever virus), laboratory diagnostic methods, specific prophylaxis.	**L, LR**
	Topic 3.2. Family Herpesviruses. Characteristics of viruses, classification, main diseases (Aueszky's disease, Marek's disease viruses, infectious bovine rhinotracheitis), laboratory diagnostic methods, specific prevention.	**L, LR**
	Topic 3.3. Family Adenoviruses. Characteristics of viruses, classification, main diseases (avian adenoviruses (CELO, EDS), adenovirus infections of cattle, horses, dogs, pigs, sheep and goats), laboratory diagnostic methods, specific prevention.	**L, LR**
	Topic 3.4. Picornavirus family. Characteristics of viruses, classification, main diseases (FMD, Teschen's disease, SMEDI syndrome), laboratory diagnostic methods, specific prevention.	**L, LR**
	Topic 3.5. Family Caliciviruses Vesicular exanthema of pigs.	**L, LR**
	Topic 3.6. Family Togaviruses. Characteristics of viruses, classification, main diseases (equine encephalomyelitis viruses), methods of laboratory diagnostics, specific prevention.	**L, LR**

Name of the discipline section	Content of the section (topics)	Type of academic work*
	Topic 3.7. Family Flaviruses. Plague of pigs.	**L, LR**
	Topic 3.8. Family Orthomyxoviruses. Characteristics of viruses, classification, main diseases (influenza viruses), laboratory diagnostic methods, specific prevention	**L, LR**
	Topic 3.9. Family Paramyxoviruses Characteristics of viruses, classification, main diseases (Newcastle disease virus, bovine parainfluenza, bovine respiratory syncytial virus, rinderpest, canine distemper), laboratory diagnostic methods, specific prophylaxis.	**L, LR**
	Topic 3.10. Reovirus family. Characteristics of viruses, classification, main diseases (rotavirus diarrhea in calves, bluetongue), methods of laboratory diagnostics, specific prevention.	**L, LR**
	Subject. 3.11. Birnavirus family. Gumboro virus.	**L, LR**
	Topic 3.12. Family Retroviruses. Characteristics of viruses, classification, major diseases (bovine leukemia virus. Oncoviruses of mice, cats, monkeys), laboratory diagnostics, specific prevention.	**L, LR**
	Topic 3.13. Prions and infections caused by them. Scrapie, transmissible mink encephalopathy, bovine spongiform encephalopathy.	**L, LR**

6. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE

Table 6.1. Material and technical support of the discipline

Audience type Classroom	***equipment***	**Specialized educational / laboratory equipment, software and material for mastering the discipline (**if necessary**)**
Lecture	Audience for conducting lecture-type classes equipped with a set of specialized furniture; a whiteboard (screen) and technical multimedia presentation tools.	Classroom for conducting lecture and seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification. A set of specialized furniture; technical means: a TOSHIBA X200 multimedia projector, an ASUS F9E Core 2 DUO T5750 laptop, Internet access is

		available. Software: Microsoft products (OS, office suite, including MS Office/ Office 365, Teams, Skype)
Laboratory	Auditorium for conducting practical classes, individual consultations, ongoing monitoring and intermediate certification, equipped with a set of specialized furniture and equipment.	Laboratoriesя are equippeda with specialized laboratory furniture; gas burners, chalk board; technical facilities: Baronet electric screen 3.4 244/96 8 152*203MW, Epson EB-X05 multimedia projector, HP 6715s TL-60 laptop, microscopes "Biomed-5" and "BiOptik", dry-air laboratory thermostat TSvL-160, refrigerator Indesit SD 167. Items required for microbiological research: tools (bacteriological loops and tweezers), laboratory utensils, a set of dyes, nutrient media, cultures of microorganisms.
For students independent work	Audience for independent work of students (can be used for seminars and consultations) equipped with a set of specialized furniture and equipment	laboratory equipped with a with specialized laboratory furniture; chalkboard; microscopes "Biomed-5"and"BiOptik".

7. EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

Main literature:

1. Veterinary Infection Biology: Molecular Diagnostics and High- Throughput Strategies. Edited by Mónica V. Cunha 2021. pdf https://disk.yandex.ru/d/wNbenudw4fKeO
2. Fenner's Veterinary Virology. Fifth Edition. Edited by N. James MacLachlan. 2022. pdf https://disk.yandex.ru/d/wNbenudw4fKeO
3. Yashpal Singh Malik, Raj Kumar Singh, Mahendra Pal Yadav. Emerging and Transboundary Animal Viruses. 2021. pdf https://disk.yandex.ru/d/wNbenudw4fKeO
4. Fields Virology Six Edition. Edited by David M. Knipe, 2021. pdf https://disk.yandex.ru/d/wNbenudw4fKeO
5. Veterinary Microbiology and Immunology PDF 17th Edition by Warren Levinson 2020. pdf https://disk.yandex.ru/d/wNbenudw4fKeO
6. Basic Immunology, Functions and Disorders of the Immune System, 5th Edition.pdf https://disk.yandex.ru/d/wNbenudw4fKeO
7. Bauman Microbiology.pdf 2019 https://disk.yandex.ru/d/wNbenudw4fKeO

8. Campbell Biology, Tenth Edition - Reece, Urry, Cain et al. pdf 2021 https://disk.yandex.ru/d/wNbenudw4fKeO

Additional literature:

1. Gosmanov R.G., Kolychev N.M., Pleshakova V.I. Veterinary virology. SPb, Ed. Lan, 2017.
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 I.V., Kalmykova M.S., Yarygina E.I., Kalmykov V.M. Virology. Workshop. SPb, Ed. "Lan", 2020.
4. 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
5. V.A. Sergeev, B.G. Orlyankin, A.A. Gusev, O.I. Sukharev. "Veterinary Virology". Textbook, Moscow-Vladimir, Serpukhov Paper Factory OJSC, 2001.

Resources of the Internet information and telecommunications network:

1. RUDN University EBS and third-party EBS that university students have access to on the basis of concluded contracts:
- RUDN University Electronic Library System-RUDN University Electronic Library System http://lib.rudn.ru/MegaPro/Web
- EBS "University Library online" http://www.biblioclub.ru
- EBS Urite http://www.biblio-online.ru
- EBS "Student's consultant" www.studentlibrary.ru
- EBS "Lan" http://eZlanbook.com/
- EBS "Troitsky Bridge" http://www.trmost.com/

2. Databases and search engines:
- electronic fund of legal and regulatory and technical documentation http://docs.cntd.ru/
- Yandex search engine https://www.yandex.ru/
- Google search engine https://www.google.ru/
- SCOPUS abstract database http://www.elsevierscience.ru/products/scopus/

Educational and methodical materials for independent work of students during the development of the discipline / module: All educational and methodical materials for independent work of students are placed in accordance with the current procedure on the discipline page **in the TUIS.**

8. EVALUATION MATERIALS AND A POINT-RATING SYSTEM FOR ASSESSING THE LEVEL OF COMPETENCE FORMATION IN THE DISCIPLINE

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

* - AM and PRS are formed on the basis of the requirements of the relevant local regulatory act of the RUDN University.

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