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

Agrarian and Technological Institute

educational division (faculty/institute/academy) as higher education programme developer

COURSE SYLLABUS

Virology and biotechnology

course title

Recommended by the Didactic Council for the Education Field of:

36.05.01 Veterinary

field of studies / speciality code and title

The course instruction is implemented within the professional education programme of higher education:

36.05.01 Veterinary

higher education programme profile/specialisation title

1. GOALS AND OBJECTIVES OF THE COURSE

The aim of mastering the course "**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 LEARNING OUTCOMES

The implementation of the course "**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 course (results of the development of the course)

Competence code	**Competence descriptor**	**Indicators of competence accomplishment** (within the course**)**
GC-8	Is able to create and maintain safe living conditions in everyday life and professional activities to preserve the natural environment, ensure the sustainable development of society, including the threat and emergence of emergencies and military conflicts	GC-8.1 Analyzes factors of harmful influence on the life activity of elements of the environment (technical means, technological processes, materials, buildings and constructions, natural and social phenomena);
		GC-8.2 Identifies hazardous and harmful factors within the scope of the job;
		GC-8.3 Identifies and corrects problems related to safety violations in the workplace;

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course "**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 courses and /or practices that contribute to achieving the planned results of mastering the course "**Virology and biotechnology**".

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

Competence code	**Competence descriptor**	**Previous courses/modules, internships***	**Subsequent courses/modules, internships***
GC-8	Is able to create and maintain safe living conditions in everyday life and professional	Basics of Professional Ethics Inorganic and analytical chemistry	Veterinary radiobiology General and Veterinary Ecology

	activities to preserve the natural environment, ensure the sustainable development of society, including the threat and emergence of emergencies and military conflicts	Organic chemistry Biological physics Life safety Veterinary Microbiology and Mycology	Study practice Preparation for and passing the state exam

4. COURSE WORKLOAD AND TRAINING ACTIVITIES

Course workload of the course "**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	-	-	-
Course workload	Academic hour	**108**	**108**	**-**	**-**	-
	Credit unit	**3**	**3**	**-**	**-**	-

5. COURSE CONTENTS

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

Modules	**Content of the modules (topics)**	**Types of academic activities**
Module 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.
Module 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	Lectures, Lab work.

	carbohydrates of virions, their origin and significance.	
Module 3. Classification of viruses, its scientific and practical value.	Topic 3.1. Brief description of the main families	Lectures, Lab work.
Module 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.
Module 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.
Module 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 persistent, slow viral and prion infections.	Lectures, Lab work.
Module 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.
Module 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.
Module 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.
Module 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	Lectures, Lab work.

	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.	
Module 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.
Module 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.
Module 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.
Module 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.
Module 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.
Module 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.
Module 17. Reoviruses family. Birnavirus family	Topic 17.1. Characterization of viruses, classification, major diseases (rotavirus diarrhea of calves. Bluetongue),	Lectures, Lab work.

	methods of laboratory diagnostics, specific prophylaxis. Gumboro virus.	
Module 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.
Module 19. Prions and infections caused by them.	Topic 19.1. Scrapy, mink transmissible encephalopathy, bovine spongiform encephalopathy.	Lectures, Lab work.

6. COURSE EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Material and technical support of the course

Classroom for Academic Activity Type	***Equipping the classroom***	**Specialized educational/laboratory equipment, software and materials for the development of the course** (if necessary)
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. RESOURCES RECOMMENDED FOR COURSE STUDIES

Main readings:

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
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 Readings:

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.
2. V.A. Sergeev, B.G. Orlyankin, A.A. Gusev, O. I. Sukharev. "Veterinary Virology". Study guide, Moscow-Vladimir, JSC "Serpukhov paper factory", 2001.

Internet sources

1. Electronic libraries (EL) of RUDN University and other institutions, to which university students have access on the basis of concluded agreements:

- RUDN Electronic Library System (RUDN ELS) http://lib.rudn.ru/MegaPro/Web
- EL "University Library Online" http://www.biblioclub.ru
- EL "Yurayt" http://www.biblio-online.ru
- EL "Student Consultant" www.studentlibrary.ru
- EL "Lan" http://e.lanbook.com/
- EL "Trinity Bridge"

2.*Databases and search engines:*

- electronic foundation of legal and normative-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 methodological materials for independent work of students during the development of the course/ module*:

1. A course of lectures on the course "**Virology and biotechnology**".
2. Laboratory workshop on the course "**Virology and biotechnology**".

* - The training toolkit and guidelines for the internship are placed on the internship page in the university telecommunication training and information system under the set procedure.

8. ASSESSMENT TOOLKIT AND GRADING SYSTEM* FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL AS COURSE RESULTS

The assessment toolkit and the grading system* to evaluate the level of competences (competences in part) formation as the course results are specified in the Appendix to the course syllabus.

* The assessment toolkit and the grading system are formed on the basis of the requirements of the relevant local normative act of RUDN University (regulations / order).

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