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

## **WORKING COURSE SYLLABUS**

### **Immunology**

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

**36.05.01 Veterinary medicine**

## 1. GOALS AND OBJECTIVES OF THE DISCIPLINE

The aim of mastering the discipline "**Immunology**" is to form students' modern knowledge of fundamental and applied immunology, the formation of students' practical skills in using the achievements of immunology in working with animals and in clinical and research laboratories.

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

The development of the discipline "**Immunology**" 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>
GPC -1	The ability to determine the biological status and normative clinical indicators of organs and systems of the animal body.	GPC-1.1 Knows the structure and functions of the main systems of the animal body, taking into account the specific features
		GPC-1.2 He s able to predict the expected violations of the biological status in case of suspected development of diseases
		GPC-1.3 He is able to determine the main indicators of the activity of individual body systems and draw conclusions about the presence of deviations from the standard values
		GPC-1.4 Has the skills of sampling biological fluids and tissues for research, performing laboratory tests, interpreting research results.
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.
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 -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 -15	Ability to organize preventive immunizations (vaccinations), therapeutic and preventive	PC-15.1 He is able to make individual and group plans of preventive immunizations (vaccinations) taking into account the

	treatments of animals in accordance with the plan of antiepizootic measures.	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.

### 3. COURSE IN HIGHER EDUCATION

The discipline "**Immunology**" 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 "**Immunology**".

*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)
GPC -1	The ability to determine the biological status and normative clinical indicators of organs and systems of the animal body.	Animal anatomy Cytology, histology and embryology Physiology and ethology of animals Pathological physiology Clinical diagnosis Pathological anatomy Instrumental diagnostic methods Obstetrics, gynecology and andrology	Clinical laboratory diagnostics Laboratory diagnostics of infectious and invasive diseases Veterinary and industrial laboratories with the basics of design Bee diseases and entomophages Fish pathology and aquaculture Anesthesiology, intensive care and intensive care
GPC-2	The ability to interpret and evaluate in professional	Biology with the basics of ecology	General and veterinary ecology

	<p>activity the influence of natural, socio-economic, genetic and economic factors on the physiological state of the animal organism.</p>	<p>Veterinary genetics  Veterinary microbiology and mycology  Virology and biotechnology  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 non-infectious diseases  General surgery  Private Veterinary surgery  Parasitology and invasive diseases  Epizootology and infectious diseases  Forensic veterinary examination and autopsy of animals</p>	<p>Veterinary sanitation  Forage plants  Zoopsychology  Animal Health  Diseases of horses  Diseases of productive animals  Diseases of small pets  Diseases of small pets  Bee diseases and entomophages  Fish pathology and aquaculture  Diseases of exotic animals  Anesthesiology, intensive care 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</p>	<p>Veterinary sanitation  Technology of processing livestock products  Medicinal and poisonous plants  Forage plants  Fundamentals of intellectual work  Personality psychology and</p>

		microbiology and mycology Virology and biotechnology Physiology and ethology of animals Breeding with the basics of private animal husbandry Pathological physiology Veterinary Radiobiology Clinical diagnosis Pathological anatomy Operative surgery with topographic anatomy Instrumental diagnostic methods Toxicology Obstetrics, gynecology and andrology Internal non-infectious diseases General surgery Private Veterinary surgery Parasitology and invasive diseases Epizootology and infectious diseases Mathematics	professional self-determination Clinical laboratory diagnostics Laboratory diagnostics of infectious and invasive diseases Diseases of horses Diseases of productive animals Diseases of small pets Diseases of small pets Bee diseases and entomophages Fish pathology and aquaculture Diseases of exotic animals Anesthesiology, intensive care and intensive care Dermatology Cardiology Endocrinology Nephrology Reconstructive and reconstructive surgery Veterinary Ophthalmology Animal Dentistry
PC -3	Ability to develop animal research programs using special (instrumental) and laboratory methods.	Animal Anatomy Organic Chemistry Biological physics Physical and colloidal chemistry Biological chemistry Veterinary microbiology and mycology Virology and biotechnology Physiology and ethology of animals	Veterinary deontology Clinical laboratory diagnostics Laboratory diagnostics of infectious and invasive diseases Veterinary and industrial laboratories with the basics of design Diseases of horses

		Pathological physiology Clinical diagnosis Pathological anatomy Instrumental diagnostic methods Toxicology Obstetrics, gynecology and andrology Internal non-infectious diseases General surgery Private Veterinary surgery Parasitology and invasive diseases Epizootology and infectious diseases	Diseases of productive animals Diseases of small pets Diseases of small pets Bee diseases and entomophages Fish pathology and aquaculture Diseases of exotic animals Anesthesiology, intensive care and intensive care Dermatology Cardiology Endocrinology Nephrology Reconstructive and reconstructive surgery Veterinary Ophthalmology Animal Dentistry
PC -6	The ability to develop a treatment plan for animals based on the established diagnosis and individual characteristics of animals.	Veterinary genetics Veterinary microbiology and mycology Virology and biotechnology Pathological physiology Veterinary Pharmacology Toxicology Obstetrics, gynecology and andrology Internal non-infectious diseases General surgery Private Veterinary surgery Parasitology and invasive diseases Epizootology and infectious diseases	Zoopsychology Diseases of horses Diseases of productive animals Diseases of small pets Diseases of small pets Bee diseases and entomophages Fish pathology and aquaculture Diseases of exotic animals Anesthesiology, intensive care and intensive care Dermatology Cardiology Endocrinology Nephrology Reconstructive and reconstructive

		Mathematics	surgery Veterinary Ophthalmology Animal Dentistry
PC -15	Ability to organize preventive immunizations (vaccinations), therapeutic and preventive treatments of animals in accordance with the plan of antiepidemiologic measures.	Virology and biotechnology Parasitology and invasive diseases Epidemiology and infectious diseases	Immunology Veterinary sanitation Bee diseases and entomophages Fish pathology and aquaculture

#### 4. COURSE WORKLOAD AND TRAINING ACTIVITIES

Course workload of the discipline "Immunology " is 2 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				
			6	-	-	-	
Contact academic hours		36	36	-	-	-	
including							
Lectures		18	18	-	-	-	
Lab work		-	-	-	-	-	
Seminars (workshops/tutorials)		18	18	-	-	-	
Self-study		26	26	-	-	-	
Evaluation and assessment (exam/pass/fail grading)		10	10	-	-	-	
Course workload		Academic hour	72	72	-	-	-
		Credit unit	2	2	-	-	-

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			
			8	-	-	-
Contact academic hours		18	18	-	-	-
including						
Lectures		-	-	-	-	-
Lab work		-	-	-	-	-
Seminars (workshops/tutorials)		18	18	-	-	-
Self-study		44	44	-	-	-
Evaluation and assessment (exam/pass/fail grading)		10	10	-	-	-



<b>Course workload</b>	Academic hour	<b>72</b>	<b>72</b>	-	-	-
	Credit unit	<b>2</b>	<b>2</b>	-	-	-

## 5. CONTENT OF THE DISCIPLINE

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

<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>
Section 1. General immunology	Topic 1.1. Introduction. History of immunology. Mechanisms of innate immunity.	Lectures, Seminars
	Topic 1.2. Organs, tissues and cells of the immune system.	Lectures, Seminars
	Topic 1.3. Effector mechanisms of immunity.	Lectures, Seminars
Section 2. Clinical immunology	Topic 2.1. Immune response. Mechanisms of hypersensitivity. Autoimmunity.	Lectures, Seminars
	Topic 2.2. The immune system of ontogenesis and carcinogenesis. Immunodeficiency.	Lectures, Seminars
	Topic 2.3. Immunotherapy.	Lectures, Seminars

## 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>
Lecture	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a board (screen) and technical means of multimedia presentations.	- <i>Information stands.</i> - <i>Microscopes.</i>

Seminary	An auditorium for conducting seminar-type classes, group and individual consultations, ongoing monitoring and interim certification, equipped with a set of specialized furniture and multimedia presentation equipment.	- <i>Information stands.</i> - <i>Microscopes.</i>
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. Skopichev V.G. Morpho-physiological and immunological aspects of animal husbandry : a textbook for bachelors / V.G. Skopichev, N.N. Maksimiyuk. - Electronic text data. - St. Petersburg : Quadro, 2020. - 560 p.
2. Sarukhanova L. E. General microbiology, virology and applied immunology: textbook / Sarukhanova L. E., Volina E. G. Yashina N. V. – 3rd ed., ispr. - M.: RUDN, 2020, 2022. – 172 p.

### *Additional Reading:*

1. Krishtoforova B.V., Lemeshchenko V.In, Practical morphology of animals with the basics of immunology – M.: Lan, 2016 – 164c. <https://e.lanbook.com/book/72987>
2. Gosmanov R.G., Ibragimova A.I. Microbiology and immunology / Galiullin A.K. – M.: Lan, 2013 – 240s. <https://e.lanbook.com/book/12976>
3. Veterinary immunology = Introduction To Veterinary Immunology : an educational and methodical manual / Yu.A. Vatnikov, V.M. Byakhova, E.V. Kulikov, A.A. Gazin. - Book in English; electronic text data. - Moscow : RUDN, 2020. - 105 p.

### *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 "**Immunology**".
2. Seminars workshop on the discipline "**Immunology**".

\* - 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 "**Immunology**" 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 Veterinary  
Medicine

Position, Basic curriculum

Signature

Krotova E.A.

Full name.

### HEAD OF THE DEPARTMENT:

Department of Veterinary Medicine

Name Basic Curriculum

Signature

Vatnikov Yu.A.

Full name.

### HEAD OF THE HIGHER EDUCATION PROGRAM:

Director of the Department of Veterinary Medicine

Position, Basic curriculum

Signature

Vatnikov Yu.A.

Full name