



APPROVED

Vice-Rector for Academic Affairs

E.S. Bogomolova

31 August 2021

## WORKING PROGRAM

Name of the academic discipline: **IMMUNOLOGY**

Specialty: **31.05.01 GENERAL MEDICINE**

Qualification: **GENERAL PRACTITIONER**

Department: **EPIDEMIOLOGY, MICROBIOLOGY  
AND EVIDENCE-BASED MEDICINE**

Mode of study: **FULL-TIME**

Labor intensity of the academic discipline: **72 academic hours**

Nizhny Novgorod  
2021

The working program has been developed in accordance with the Federal State Educational Standard for the specialty **GENERAL MEDICINE - 31.05.01**" approved by Order of the Ministry of Science and Higher Education of the Russian Federation No. 988 dated August 12, 2020.

**Developers of the working program:**

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The program was reviewed and approved at the department meeting (protocol No. 12, date 15.04.2021)

Head of the Department of Epidemiology,  
microbiology and evidence-based medicine,  
DSci. of Medical Sciences, Associate Professor



(Kovalishena O.V.)

(signature)

15.04.2021

AGREED

Deputy Head of EMA ph.d. of biology \_\_\_\_\_ Lovtsova L.V.



(signature)

15.04.2021

## 1. The purpose and objectives of the discipline

### 1.1. The purpose and objectives of mastering the academic discipline "Immunology" (hereinafter – the discipline)

The purpose of mastering the discipline: participation in the formation of the following competencies: UC - 1, UC – 8, GPC - 4, GPC - 5, GPC - 10, PC - 16

### 1.2. Tasks of the discipline:

- formation of students' knowledge on the main theoretical issues of immunology; mechanisms of formation of humoral, cellular immunity, immunological memory and tolerance, the main features of the immunological reactivity of the body;
- study by students of the features of the immune defense formed after the most urgent infectious diseases;
- teaching students the principles and methods of laboratory diagnostics and prevention of infectious diseases;
- students' mastery of safety rules when working in immunological laboratories with microbial cultures, reagents, devices, laboratory animals;
- teaching students the principles and methods of disinfection and sterilization, basic disinfectants and the rules of their use;
- involvement of students in scientific research aimed at solving fundamental and applied problems in the field of immunology;
- formation of the basics of medical thinking, medical ethics, corporate culture among students, expansion of scientific and cultural horizons;
- formation of students' motivated attitude to the prevention of morbidity, sanitary and educational work.
- formation of students' skills to work with scientific literature;

### 1.3. Requirements to the deliverables of mastering the discipline

As a result of completing the discipline, the student should

#### ***Know:***

- safety regulations and work in physical, chemical, biological laboratories, with reagents, devices, animals;
- the structure and functions of the human immune system, its age-related features, cellular and molecular mechanisms of development and functioning of the immune system, the main stages, types, genetic control of the immune response, methods of immunodiagnostics;
- methods of assessing the immune status, indications and principles of its assessment immunopathogenesis,
- methods of diagnosis of the main diseases of the human immune system, types and indications for the use of immunotropic therapy;
- the main groups of antimicrobial chemotherapeutic and immunobiological drugs are their use.

#### ***Be able to:***

- to characterize and evaluate the levels of organization of the human immune system
- to evaluate the mediator role of cytokines; to justify the need for clinical and immunological examination of the patient
- interpret the results of the assessment of the immune status according to the tests of the 1st level;
- interpret the results of the main diagnostic allergological tests;
- to justify the need for the use of immuno-corrective therapy; to use basic biological drugs;
- to carry out immunological diagnostics;
- use physical, chemical and biological equipment;
- observe safety precautions, work with magnifying equipment (microscopes, optical and simple magnifiers), interpret microscopy data;
- use educational, scientific, popular science literature, the Internet for professional activities;

***Possess:***

- medical-anatomical conceptual apparatus;
- an algorithm for making an immunological diagnosis with subsequent referral to an allergist-immunologist;

**2. Position of the academic discipline in the structure of the General Educational Program of Higher Education (GEP HE) of the organization.**

**2.1.** The discipline Immunology refers to the core part of Block 1 of GEP HE (B.1.O.18). The discipline is taught in 5 semester/ III year of study.

**2.2. The following knowledge, skills and abilities formed by previous academic disciplines are required for mastering the discipline:**

— in the cycle of Humanities, social and economic disciplines (philosophy, bioethics; history of medicine; Latin; foreign language);

— in the cycle of Mathematical, natural science and biomedical disciplines (physics, mathematics; computer science, medical informatics and statistics; biological chemistry; biology with ecology; human anatomy, topographic anatomy; histology, embryology, cytology, normal physiology).

**2.3. Mastering the discipline is required for forming the following knowledge, skills and abilities for subsequent academic disciplines:**

infectious diseases, phthisiology, dermatovenerology, obstetrics and gynecology, faculty and hospital therapy; pediatrics; surgery; traumatology and orthopedics, dentistry, oncology, radiation therapy; ophthalmology.

### 3. Deliverables of mastering the academic discipline and metrics of competence acquisition

Mastering the discipline aims at acquiring the following universal (UC) or/and general professional (GPC) or/and professional (PC) competencies

№	Compe- tence code	The content of the competence (or its part)	Code and name of the competence acqui- sition metric	As a result of mastering the discipline students should:		
				know	be able to	possess
1.	UC-1	UC-1. Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy	<p>1.1 Knows: methods of critical analysis and evaluation of modern scientific achievements; basic principles of critical analysis</p> <p>1.2 Able to: gain new knowledge based on analysis, synthesis, etc.; collect data on complex scientific problems related to the professional field; search for information and solutions based on action, experiment and experience</p> <p>1.3 Has practical experience: researching the problem of professional activity using analysis, synthesis and other methods of intellectual activity; developing an action strategy to solve professional problems</p>	<p>-methods of critical analysis</p> <p>-safety regulations and work in physical, chemical, biological laboratories, with reagents, devices, animals;</p> <p>-dissemination of information in medical and biological systems, use of information computer systems in medicine and healthcare;</p> <p>-biosphere and ecology, the phenomenon of parasitism and bioecological diseases;</p> <p>-classification, morphology and physiology of microorganisms and viruses, their impact on the health of children and adolescents;</p> <p>the spread of microbes, their impact on human health. Ecology of microorganisms, their role in the circulation of substances.</p> <p>- methods of microbiological diagnostics</p> <p>the use of basic antibacterial, antiviral and biological drugs</p>	<p>- be able to apply critical analysis methods</p> <p>-be able to apply safety regulations</p> <p>-to carry out sampling, labeling and arrange for the direction of biological material from the patient and habitat objects for microbiological examination;</p> <p>-interpret the results of the most common methods of laboratory and functional diagnostics;</p> <p>-to justify from microbiological positions the choice of material for research during the diagnosis of infectious diseases;</p> <p>use physical, chemical and biological equipment;</p> <p>work with magnifying equipment (microscopes, optical and simple magnifiers);</p> <p>-use educational, scientific, popular science literature, the Internet for professional activities;</p>	<p>- critical analysis skills</p> <p>-work skills in compliance with safety regulations</p> <p>--basic information conversion technologies: text, tabular editors, Internet search</p> <p>skills of making a preliminary diagnosis based on the results of laboratory and instrumental examination of children and adolescents;</p> <p>-information on the principles of sterilization, disinfection and antiseptic treatment of instruments and equipment in order to avoid infection of the doctor and patient;</p> <p>-skills of making a preliminary diagnosis based on the result of laboratory and instrumental examination.</p>
2.	UC-8	UC-8. Able to: create and maintain safe living conditions in everyday and professional life for the preservation of the natural environment, ensuring sustainable development of socie-	<p>8.1 Knows: factors of harmful influence on vital activity; algorithms of actions in case of emergencies and military conflicts</p> <p>8.2 Able to: identify dangerous and harmful factors within the framework of its activities, create and maintain safe living conditions in everyday and professional life</p> <p>8.3 Has practical experience in: participa-</p>	<p>- factors of harmful influence on vital activity</p> <p>-safety regulations and work in physical, chemical, biological laboratories, with reagents, devices, animals;</p> <p>-dissemination of information in medical and biological systems, use of information computer systems in medicine and healthcare;</p> <p>biosphere and ecology, the phenomenon of parasitism and bioecological</p>	<p>-identify harmful factors of vital activity</p> <p>-to carry out sampling, labeling and arrange for the direction of biological material from the patient and habitat objects for microbiological examination;</p> <p>-interpret the results of the most common methods of laboratory and functional diagnostics;</p> <p>-to justify from microbiological</p>	<p>-skills of professional activity in compliance with safety regulations at the workplace</p> <p>-skills of making a preliminary diagnosis based on the results of laboratory and instrumental examination of children and adolescents;</p> <p>-information on the principles of sterilization, disinfection and antiseptic treatment of</p>

		ty, including in the case of a threat and occurrence of emergency situations and military conflicts	tion in planned exercises to work out the rules of conduct in case of emergencies, first aid; complies with safety regulations at the workplace	diseases; -classification, morphology and physiology of microorganisms and viruses, their impact on the health of children and adolescents; -the spread of microbes, their impact on human health. Ecology of microorganisms, their role in the circulation of substances. - methods of microbiological diagnostics the use of basic antibacterial, antiviral and biological drugs	positions the choice of material for research during the diagnosis of infectious diseases; -use physical, chemical and biological equipment; -work with magnifying equipment (microscopes, optical and simple magnifiers); -use educational, scientific, popular science literature, the Internet for professional activities;	instruments and equipment in order to avoid infection of the doctor and patient;
3.	GPC-4	GPC-4. Able to apply medical products, provided by the order of healthcare delivery, as well as examine patients for the purpose of determining the diagnosis	4.1 Knows the methodology of collecting anamnesis of life and diseases, complaints of patients (their legal representatives); examination procedure; and physical examination; clinical aspect, methods of diagnosis of the most common diseases; methods of laboratory and instrumental investigations to assess the state of health, medical indications for conducting research, rules for interpreting their results; international statistical classification of diseases and health-related problems (ICD); conditions requiring emergency medical care; procedure for the use of medical devices in accordance with the current procedures for providing medical care, clinical recommendations (treatment protocols) on the medical care delivery taking into account the standards of medical care 4.2 Able to: collect complaints, anamnesis of life and disease of patients (their legal representatives), identify risk factors and causes of diseases; apply methods of examination and physical survey of patients; interpret the results of examination and physical examination of patients; diagnose the most common pathology among patients; identify risk factors for cancer; formulate a preliminary diagnosis, to make a plan for conducting	-methods of diagnosis of the most common infectious diseases and medical indications for conducting research, rules for interpreting their results -safety regulations and work in physical, chemical, biological laboratories, with reagents, devices, animals; -biosphere and ecology, the phenomenon of parasitism and bioecological diseases; classification, morphology and physiology of microorganisms and viruses, their impact on the health of children and adolescents; -the spread of microbes, their impact on human health. Ecology of microorganisms, their role in the circulation of substances. methods of microbiological diagnostics -the use of basic antibacterial, antiviral and biological drugs	- to carry out diagnostic methods for the most common infectious diseases and interpret their results -to carry out sampling, labeling and arrange for the direction of biological material from the patient and habitat objects for microbiological examination; -interpret the results of the most common methods of laboratory and functional diagnostics; -to substantiate from microbiological positions the choice of material for research during the diagnosis of infectious diseases; -use physical, chemical and biological equipment; work with magnifying equipment (microscopes, optical and simple magnifiers); -use educational, scientific, popular science literature, the Internet for professional activities;	- skills in conducting diagnostics of the most common infectious diseases and interpreting their results -skills of making a preliminary diagnosis based on the results of laboratory and instrumental examination of children and adolescents; -information on the principles of sterilization, disinfection and antiseptic treatment of instruments and equipment in order to avoid infection of the doctor and patient;

		<p>laboratory, instrumental and additional investigations of patients in accordance with the procedures for providing medical care, clinical recommendations taking into account the standards of medical care; to refer patients to laboratory, instrumental and additional investigations in accordance with the current procedures for providing medical care, clinical recommendations, taking into account the standards of medical care; refer patients for consultations to medical specialists in accordance with the procedures of medical care, clinical recommendations taking into account the standards of medical care; to interpret and analyze the results of consultations by medical specialists of patients; to interpret and analyze the results of basic (clinical) and additional (laboratory, instrumental) examination methods; carry out differential diagnosis of diseases of patients; identify clinical signs of sudden acute diseases, conditions, exacerbations of chronic diseases without obvious signs of life-threatening, requiring medical care in an urgent form; use medical devices in accordance with current medical procedures, clinical recommendations (treatment protocols) on the provision of medical care, assistance taking into account the standards of medical care</p> <p>4.3 Has practical experience in: collecting complaints, anamnesis of life and disease of patients (their legal representatives), identifying risk factors and causes of disease development; examination and physical survey of patients; diagnosis of the most common diseases; identification of risk factors for major oncological diseases; formulation of a preliminary diagnosis, drawing up a plan for instrumental, laboratory, additional investigations, consultations of specialist doctors; referral of</p>			
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			<p>patients for instrumental, laboratory, additional investigations, consultations of specialist doctors in accordance with the current procedures for providing medical care, clinical recommendations taking into account the standards of medical care; interpretation of data from additional (laboratory and instrumental) examinations of patients; making a preliminary diagnosis in accordance with the international statistical classification of diseases and problems related to health (ICD); differential diagnosis of diseases; recognition of conditions arising from sudden acute diseases, exacerbation of chronic diseases without obvious signs of a threat to the patient's life and requiring urgent medical care; the use of medical devices in accordance with current medical procedures, clinical recommendations (treatment protocols) on the issues of medical care delivery, assistance taking into account the standards of medical care</p>			
4.	GPC 5	<p>GPC-5. Able to assess morpho-functional, physiological conditions and pathological processes in the human body to solve professional problems</p>	<p>5.1 Knows: anatomy, histology, embryology, topographic anatomy, physiology, pathological anatomy and physiology of human organs and systems  5.2 Able to: evaluate the basic morphological and functional data, physiological conditions and pathological processes in the human body  5.3 Has practical experience in: assessment of basic morphological and functional data, physiological conditions and pathological processes in the human body when solving professional problems</p>	<ul style="list-style-type: none"> <li>-basic disciplines for the assessment of pathological processes in the human body</li> <li>-safety regulations and work in physical, chemical, biological laboratories, with reagents, devices, animals;</li> <li>-biosphere and ecology, the phenomenon of parasitism and bioecological diseases;</li> <li>classification, morphology and physiology of microorganisms and viruses, their impact on the health of children and adolescents;</li> <li>-the spread of microbes, their impact on human health. Ecology of microorganisms, their role in the circulation of substances.</li> <li>methods of microbiological diagnostics</li> </ul>	<ul style="list-style-type: none"> <li>-evaluate the main pathological processes in the human body</li> <li>-to carry out sampling, labeling and arrange for the direction of biological material from the patient and habitat objects for microbiological examination;</li> <li>-interpret the results of the most common methods of laboratory and functional diagnostics;</li> <li>-to justify from microbiological positions the choice of material for research during the diagnosis of infectious diseases;</li> <li>-use physical, chemical and biological equipment;</li> <li>-work with magnifying equipment (microscopes, optical and simple magnifiers);</li> </ul>	<ul style="list-style-type: none"> <li>- methods of assessing the main pathological processes in the human body</li> <li>-information on the principles of sterilization, disinfection and antiseptic treatment of instruments and equipment in order to avoid infection of the doctor and patient;</li> <li>-skills of making a preliminary diagnosis based on the result of laboratory and instrumental examination.</li> </ul>



				-the use of basic antibacterial, antiviral and biological drugs		
5.	GPC-10	GPC-10. Able to understand the principles of modern information technologies and use them to solve the tasks of professional activity	<p>10.1 Knows: the capabilities of reference information systems and professional databases; methods of information retrieval, information and communication technologies; modern medical and biological terminology; fundamentals of information security in professional activities</p> <p>10.2 Able to: apply modern information and communication technologies to solve the tasks of professional activity; carry out an effective search for information necessary to solve the tasks of professional activity using reference systems and professional databases; use modern medical and biological terminology; master and apply modern information and communication technologies in professional activity, taking into account the basic requirements of information security</p> <p>10.3 Has practical experience in the use of modern information and bibliographic resources, the use of special software and automated information systems to solve standard tasks of professional activity, taking into account the basic requirements of information security</p>	<p>- information search methodology</p> <p>-safety regulations and work in physical, chemical, biological laboratories, with reagents, devices, animals;</p> <p>-dissemination of information in medical and biological systems, use of information computer systems in medicine and healthcare;</p> <p>-biosphere and ecology, the phenomenon of parasitism and bioecological diseases;</p> <p>-classification, morphology and physiology of microorganisms and viruses, their impact on the health of children and adolescents; the spread of microbes, their impact on human health. Ecology of microorganisms, their role in the circulation of substances.</p> <p>- methods of microbiological diagnostics</p> <p>the use of basic antibacterial, antiviral and biological drugs</p>	<p>- be able to apply the methodology of information retrieval</p> <p>-be able to apply safety regulations</p> <p>-to carry out sampling, labeling and arrange for the direction of biological material from the patient and habitat objects for microbiological examination;</p> <p>-interpret the results of the most common methods of laboratory and functional diagnostics;</p> <p>-to justify from microbiological positions the choice of material for research during the diagnosis of infectious diseases;</p> <p>use physical, chemical and biological equipment;</p> <p>work with magnifying equipment (microscopes, optical and simple magnifiers);</p> <p>-use educational, scientific, popular science literature, the Internet for professional activities;</p>	<p>- information retrieval skills</p> <p>-work skills in compliance with safety regulations</p> <p>--basic information conversion technologies: text, tabular editors, Internet search skills of making a preliminary diagnosis based on the results of laboratory and instrumental examination of children and adolescents;</p> <p>-information on the principles of sterilization, disinfection and antiseptic treatment of instruments and equipment in order to avoid infection of the doctor and patient;</p> <p>-skills of making a preliminary diagnosis based on the result of laboratory and instrumental examination.</p>
6.	PC-16	PC-16 Able to: organize and monitor the immunoprophylaxis of infectious diseases in the adult population, prescribe preventive measures to patients taking	<p>16.1 Knows: principles of application of specific and non-specific prevention of infectious diseases, the national calendar of preventive vaccinations and the calendar of preventive vaccinations for epidemic indications; legislation of the Russian Federation in the field of health protection, sanitary rules and regulations; preventive measures taking into account the diagnosis in accordance with the current procedures for medical care, clinical recommendations (treatment protocols) about medical care delivery taking into</p>	<p>- principles of application of specific and non-specific prevention of infectious diseases, the national calendar of preventive vaccinations and the calendar of preventive vaccinations for epidemic indications</p> <p>-safety regulations and work in physical, chemical, biological laboratories, with reagents, devices, animals;</p> <p>-dissemination of information in medical and biological systems, use of information computer systems in medicine and healthcare;</p> <p>-biosphere and ecology, the phenom-</p>	<p>- to organize and carry out immunoprophylaxis of infectious diseases in the adult population in accordance with the current procedures for providing medical care</p> <p>-to carry out sampling, labeling and arrange for the direction of biological material from the patient and habitat objects for microbiological examination;</p> <p>-interpret the results of the most common methods of laboratory and functional diagnostics;</p> <p>-to substantiate from microbiologi-</p>	<p>- has the skills of organizing and conducting immunoprophylaxis of infectious diseases in the adult population in accordance with the current procedures for providing medical care</p> <p>-basic information conversion technologies: text, tabular editors, Internet search skills of making a preliminary diagnosis based on the results of laboratory and instrumental examination of</p>

	<p>into account risk factors in accordance with the current <b>procedures</b> for providing medical care, <b>clinical recommendations</b> (treatment protocols) on the provision of medical care taking into account the <b>standards</b> of medical care and monitor compliance with preventive measures</p>	<p>account the standards of medical care</p> <p>16.2 Able to: organize and carry out immunoprophylaxis of infectious diseases in the adult population in accordance with the current procedures for the provision of medical care, clinical recommendations (treatment protocols) on the provision of medical care taking into account standards of medical care; prescribe preventive measures to patients taking into account risk factors for the prevention and early detection of diseases, including socially significant diseases</p>	<p>enon of parasitism and bioecological diseases;</p> <p>-classification, morphology and physiology of microorganisms and viruses, their impact on the health of children and adolescents; the spread of microbes, their impact on human health. Ecology of microorganisms, their role in the circulation of substances.</p> <p>- methods of microbiological diagnostics</p> <p>the use of basic antibacterial, antiviral and biological drugs</p>	<p>cal positions the choice of material for research during the diagnosis of infectious diseases;</p> <p>use physical, chemical and biological equipment;</p> <p>work with magnifying equipment (microscopes, optical and simple magnifiers);</p> <p>-use educational, scientific, popular science literature, the Internet for professional activities;</p>	<p>children and adolescents;</p> <p>-information on the principles of sterilization, disinfection and antiseptic treatment of instruments and equipment in order to avoid infection of the doctor and patient;</p> <p>-skills of making a preliminary diagnosis based on the results of laboratory and instrumental examination.</p>
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#### 4. Sections of the academic discipline and competencies that are formed when mastering them

№	Competence code	Section name of the discipline	The content of the section in teaching units
1.	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	The basics immunology	<p>Cells of the immune system: the central position of lymphocytes, auxiliary cells.</p> <p>The main functional variants of T-lymphocytes.</p> <p>Central (primary) organs of the immune system. The results of antigen-independent differentiation of lymphocytes in the central organs of immunity. Peripheral (secondary) organs/tissues of the immune system. The categories of "own" and "alien" as the basis of the concept of immunological surveillance. Antigens, basic concepts. Complete and incomplete antigens.</p> <p>Submolecular organization of the antigen. Schematic diagram of the immune response.</p>

2.	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Antigen-recognizing molecules in the humoral immunity system	Immunoglobulins (antibodies). The biochemical nature of antibodies. Submolecular organization of a typical immunoglobulin molecule. The function of antibodies. Isotypes (classes), allotypes and idiotypes of immunoglobulins. The dynamics of antibodies during the primary and secondary immune response. Monoclonal antibodies (principles of hybridomic technology).
3.	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Antigen-recognizing molecules in the cellular immunity system	Antigen-recognizing T and B-lymphocyte receptors. CD antigens. Molecular and submolecular bases of B- and T-lymphocyte cloning. The main human histocompatibility complex (HLA): genes and their products. The principal mechanism of presentation of antigens to T-lymphocytes. HLA-dependent regulation of the immune response.
4.	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Specific immune response. Induction phase/	The concept of induction, its components (recognition and activation) and the main stages. Mediators (costimulators) of intercellular cooperation: their classification and functional characteristics. T-dependent and T-independent antigens, superantigens.
5.	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Realization immune response	Realization of the immune response (cellular and humoral link) and the concept of immunological memory. The complement system. The nature of the components, activation pathways (classical and alternative pathways). Biologically active factors of the complement system and their properties. History of development and substantiation of the theory of phagocytic immunity. Bactericidal potential of phagocytes. Effectors of humoral and cellular immunity in the implementation of antiviral activity. Forms of implementation: complement-dependent and T-cell cytotoxicity, antibody-dependent cellular cytotoxicity, the phenomenon of apoptosis. Non-specific mechanisms - interferon.
6.	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Anti-infective immunity	Definition of the concept of "immunity". Types and forms of immunity. Levels of protection - skin, mucous membranes, loose connective tissue, regional lymph nodes, blood, organs. Protection effectors and their manifestations. Features of immunity and its manifestations in various diseases.
7.	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Fundamentals of immunoprophylaxis, immunotherapy and serodiagnostics.	Development of the doctrine of immunoprophylaxis and immunotherapy of infectious diseases. E.Jenner, L. Pasteur. Principles of immunoprophylaxis. Modern classification and methods of preparation of vaccines. Seroprophylaxis and serotherapy. Concepts of active and passive immunity. The main methods of serodiagnostics.
8.	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Immunological method in the diagnosis of infectious diseases.	Immunological method in the diagnosis of infectious diseases. Antibody titer. Qualitative and quantitative seroconversion. Evaluation of immunological parameters. Principles of the study of antibodies, T and B lymphocytes. Complement, phagocytosis

9.	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Types of allergic reactions. Allergodiagnosics. Immunodeficiency.	Types of allergic reactions. Allergodiagnosics. Immunodeficiency. Autoimmune diseases. Classification. Principles of diagnosis.
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## 5. Volume of the academic discipline and types of academic work

Type of educational work	Labor intensity		Labor intensity in semester (AH) 5
	volume in credit units (CU))	volume in academic hours (AH)	
<b>Classroom work, including</b>	<b>1,22</b>	<b>44</b>	<b>44</b>
Lectures (L)	0,27	10	10
Laboratory practicum (LP)			
Practicals(P)	0,94	34	34
Seminars (S)			
Student's individual work (SIW)	<b>0,77</b>	<b>28</b>	<b>28</b>
Mid-term assessment			
Credit			<b>Credit</b>
<b>TOTAL LABOR INTENSITY</b>	<b>2</b>	<b>72</b>	

## 6. Content of the academic discipline

### 6.1. Sections of the discipline and types of academic work

№	Name of the section of the academic discipline	Types of academic work* (in AH)					
		L	LP	P	S	SIW	total
1.	5/5 The basics Immunology Antigens	2		4		5	<b>11</b>
2.	5/5 Antigen-recognizing molecules in the humoral immunity system	2		5		4	<b>11</b>
3.	5/5 Antigen-recognizing molecules in the cellular immunity system			5		5	<b>10</b>
4.	5/5 Specific immune response. Induction phase	2		5		3	<b>10</b>
5.	5/5 Realization of the immune response	2		5		3	<b>10</b>
6.	5/5 Anti-infective Immunity			5		5	<b>10</b>
7.	5/5 Fundamentals of immunoprophylaxis, immunotherapy and serodiagnostics	2		5		3	<b>10</b>
		<b>10</b>		<b>34</b>		<b>28</b>	<b>72</b>
	total	<b>72</b>					

Note: L- lectures, LP – laboratory workshop, PZ – practical exercises, KPZ – clinical practical exercises, C – seminars, SRS – independent work of the student.

### 6.2. Thematic schedule of educational work types:

#### 6.2.1 Thematic schedule of lectures

№ p/p	Name of lecture topics	Volume in AH
		<b>5th semester</b>
1.	Introduction to immunology. Antigens	2
2.	Antigen-recognizing molecules in the humoral immunity system (antibodies)	2
3.	Induction of the immune response.	2

	Cytokines and intercellular cooperation.	
4.	Realization of the immune response. Effectors of humoral and cellular immunity. Complement. Phagocytes and phagocytosis.	2
5.	Fundamentals of immunoprophylaxis, immunotherapy, serodiagnostics	2
	<b>TOTAL (total - 10 AH)</b>	<b>10</b>
	Mechanisms of infectious immunity. Antiviral immunity.	2
	Antigen-recognizing molecules in the cellular immunity system (T and B-lymphocyte receptors, HLA).	2

**\*(full-time, with the use of LMS and DET)**

6.2.2. The thematic plan of laboratory practicums (*if this type of classes is stipulated in the curriculum*)

6.2.3. Thematic plan of practicals

№ p/p	Name of the topics of practical classes	Volume in AH 5th semester
1.	Introduction to immunology. Basic concepts of immunology. Central (primary) organs of the immune system. Antigen-independent differentiation of lymphocytes in the central organs of immunity. Antigens.	4
2.	Antibodies: structure, characteristics of isotypes. Primary and secondary immune response. Monoclonal antibodies.	5
3.	Antigen-recognizing T and B-lymphocyte receptors. CD antigens. The main complex of human histocompatibility	5
4.	Induction of the immune response. Cytokines and intercellular cooperation. T-dependent and T-independent antigens, superantigens.	5
5.	Realization of the function of effectors of cellular and humoral immunity Complement. Phagocytes and phagocytosis.	5
6.	Functions of antibodies in effector phase of immune response. Functions of T cells and NKs in effector phase of immune response. Cooperation of specific and nonspecific factors in humoral and cell-mediated immunity. Anti-infective immunity. Mechanisms of antiviral immunity. Interferons	5
7.	Principles of immunoprophylaxis of infectious (vaccines). Modern classification and methods of preparation of vaccines. Seroprophylaxis and serotherapy. The main methods of serodiagnostics.	5
	<b>TOTAL (total - 34 AH)</b>	<b>34</b>

**\*(full-time, with the use of EIOS and DOT)**

6.2.4. Thematic plan of seminars (*if this type of classes is stipulated in the curriculum*)

6.2.5. Types and topics of student's individual work (SIW)

n/a	Chapter disciplines	Name of the type of SRS*	Volume in AH
			5th semester
1.	The basics immunology	Work with literature sources; preparation for classes in an interactive form; preparation for boundary control, including work with electronic educational resources (computer testing in on-line mode on the website of distance education of PIMU)	5
2.	Antigen-recognizing molecules in the humoral immunity system	Work with literature sources, including lecture materials; preparation for classes in an interactive form; preparation for boundary control, including work with electronic educational resources (computer testing in on-line mode on the website of distance education of PIMU)	4
3.	Antigen-recognizing	Independent work with lecture material and	5

	molecules in the cellular immunity system	educational literature to prepare for practical and credit classes; writing essays*	
4.	Specific immune response	Work with literature sources, including lecture materials; preparation for classes	3
5.	Realization phase of the immune response	Work with literature sources, including lecture materials; preparation for classes in an interactive form; preparation for boundary control, writing abstracts*	3
6.	Infective immunity	Work with literature sources, including lecture materials; preparation for classes in interactive form; preparation for boundary control, including work with electronic educational resources (computer testing in on-line mode on the website of distance education of the University of Higher Education)	5
7.	Fundamentals of immunoprophylaxis, immunotherapy and serodiagnostics.	Work with literature sources, including lecture materials; preparation for classes in an interactive form; preparation for boundary control, including work with electronic educational resources (computer testing in on-line mode on the website of distance education of PIMU), writing abstracts*	3
		<b>Total (total - 28 AH)</b>	<b>28</b>

### 6.3. Student's research work:

n/a	The name of the topics of the student's research work	
		term
1.	Modern immunological methods of examination of the patient	5
2.	Immunogram and its interpretation	5
3.	Equipment used in a modern diagnostic laboratory	5
4.	Immunological status of the patient and its significance in clinical practice	5

### 7. Types of assessment formats for ongoing monitoring and mid-term assessment

№	Semester No.	Types of control	Name of section of academic discipline	Competence codes	Assessment formats		
					Types	number of test questions	number of test task options
5	Current monitoring • Control of mastering the topic • Monitoring the student's individual work	The basics immunology	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Security questions	5	2	
				Written control work on the section "Fundamentals of Immunology" (boundary control)	5	2	
				Test tasks	20	Unlimited (during computer testing)	
				Security questions	1	total questions on the section - 1	
5	Current monitoring • Control of mastering the topic Monitoring the student's individual work	Antigen-recognizing molecules in the humoral immunity system	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Test tasks	20	Unlimited	
				Security questions	5	2	
				Written control work on the section "Antibodies" (frontier control)	5	2	
				Security questions	1	total questions on the section - 1	
5	Current monitoring • Control of mastering the topic • Monitoring the student's individual work	Antigen-recognizing molecules in the cellular immunity system	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Test tasks	20	Unlimited	
				Security questions	5	2	
				Control work on the section "Main histocompatibility complex" (boundary control)	5	2	
				Report	1	10	
				Security questions	1	total questions on the section - 7	
5	Current monitoring • Control of mastering the topic	Specific immune response	UC - 1, UC - 8, GPC - 4, GPC - 5,	Test tasks	20	Unlimited	
				Security questions	2	2	
				Control work on the section "Induction of the immune response" (boundary control)	5	2	



	• Monitoring the student's individual work		GPC - 10, PC - 16	Security questions	1	total questions on the section - 7
5	Current monitoring • Control of mastering the topic • Monitoring the student's individual work	Realization immune response	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Test tasks	20	Unlimited
				Security questions	5	2
				Control work on the section "Implementation immune response" (boundary control)	5	2
				Report	1	10
				Security questions	1	total questions on the section - 2
5	Current monitoring • Control of mastering the topic • Monitoring the student's individual work	Anti-infective immunity	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Test tasks	20	Unlimited
				Security questions	5	2
				Report	1	10
				Control work: individual survey on the topic "Anti- infectious immunity" (border control)	5	2
				Security questions	1	total questions on the section - 14
5	Current monitoring • Control of mastering the topic • Monitoring the student's individual work	The basics immunoprophylaxis, immunotherapy and serodiagnostics.	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Test tasks	20	Unlimited
				Short-term control work on the classification of vaccines (current control)	5	2
				Security questions	5	2
				Report	1	10
				Questions for the test	1	total questions on the section - 15
	Mid-term assessment  <i>Credit at the end of the 5th semester</i>	All sections of the discipline	UC - 1, UC - 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	Security questions	2	35
				Situational tasks	1	30

## 8. Educational, methodological and informational support for mastering the academic discipline (printed, electronic publications, the Internet and other network resources)

### 8.1. Key literature references

p/no.	Name according to bibliographic requirements	Number of instances	
		in the library	at the department
1	2	3	4
1.	Zverev, V.V. Medical Microbiology, Virology, Immunology: textbook. Vol. 1: textbook / V. V. Zverev, M. N. Boichenko; Zverev V. V.; Boichenko M. N. - Moscow: GEOTAR-Media, 2020. - 384 p. – ISBN 978-5-9704-5607- 1		
2.	Zverev, V.V. Medical Microbiology, Virology, Immunology : textbook : Vol. 2. : textbook / V. V. Zverev, M. N. Boichenko; Zverev V. V.; Boichenko M. N. - Moscow: GEOTAR-Media, 2020. - 392 p. – ISBN 978-5-9704-5719-1.		
3.	Medical Microbiology, Virology and Immunology. Lecture Notes: textbook / M. N. Artamonova, N. I. Potaturkina-Nesterova, N. A. Ilyina, I. S. Nemova; Artamonova M. N.; Potaturkina-Nesterova N.I.; Ilyina N. A.; Nemova I. S. - Moscow: GEOTAR-Media, 2021. - 352 p. – ISBN 978-5-9704-6043-6.		
4.	Maianskii, A.N. Lectures in immunology / A. N. Maianskii, S. M. Belotsky; Maianskii A.N.; Belotsky S. M. - N. Novgorod : NSMA , 2004.		
5.	Murray, P. R. Basic medical microbiology / P. R. Murray. – Philadelphia : Elsevier, 2018. – 232 p. : il. – (Student consult). – ISBN 9780323476768.		
6.	<i>Jawetz, Melnick and Adelberg's medical microbiology / K. C. Carroll, J. A. Hobden, S. Miller, S. A. Morse. – 27th ed. – New York : McGraw-Hill Education, 2016. – IX, 852 p. : il. – ISBN 978-1-2592-5534-2.</i>		

### 8.2. Further reading

p/no.	Name according to bibliographic requirements	Number of instances	
		in the library	at the department
1	2	3	4
1.	General microbiology and microflora of plants : textbook / M. I. Zaslavskaya, T. V. Makhrova, N. I. Ignatova [et al.] ; FSBEI HE PRMU MOH Russia. – N. Novgorod : Publishing House of Privolzhskiy Research Medical University, 2021.		
2.	General microbiology: bacteriology, virology, mycology : textbook / M. I. Zaslavskaya, T. V. Makhrova, N. I. Ignatova [et al.] ; FSBEI HE PRMU MOH Russia. – N. Novgorod : Publishing House of Privolzhskiy Research Medical University, 2021.		
3.	General microbiology and microbiota of the oral cavity = General microbiology and microbiota of the oral cavity : testbook / M. I. Zaslavskaya, T. V. Makhrova, O. A. Lukova [and others]. - Nizhny Novgorod: PIMU Publishing House, 2021. - 1 file (4.3 Mb). Maiyanskii, A.N.		
4.	Immunology = Tests in general immunology: tests / A. N. Maiyanskii, M. I. Zaslavskaiia; Maiyanskii, A.N.; Zaslavskaiia, M. I. - N. Novgorod : NSMA , 2005.		

5	Zaslavskaja, M. I. Applied microbiology and immunology : textbook for the international english speaking medical students / M. I. Zaslavskaja ; Zaslavskaja M. I. – N. Novgorod : Published House NSMA, 2007. – 92		
6	Mims`medical microbiology and immunology / P. L. Chiodini, H. M. Dockrell, R. Goering, M. Zuckerman. – 6th ed. – Edinburgh ; London ; New York : Elsevier, 2019. – 551 p. : il. – (Student consult). – ISBN 978-0-7020-7156-0.		

### 8.3. Electronic educational resources for teaching academic subjects

#### 8.3.1. Internal Electronic Library System of the University (IELSU)

Name of the electronic Resource	Brief description (content)	Access conditions	Number of users
<b>Internal Electronic Library System (ELS)</b> <a href="http://nbk.pimunn.net/MegaPro/Web">http://nbk.pimunn.net/MegaPro/Web</a>	The works of the teaching staff of the University: textbooks, textbooks, collections of tasks, methodological manuals, laboratory work, monographs, collections of scientific papers, scientific articles, dissertations, abstracts of dissertations, patents	From any computer and mobile device using an individual login and password. Access mode: <a href="http://nbk.pimunn.net/MegaPro/Web">http://nbk.pimunn.net/MegaPro/Web</a>	Not limited

#### 8.3.2. Electronic educational resources acquired by the University

№ p/p	Name electronic resource	Brief description (content)	Access conditions	Quantity users
1.	The digital library system " <b>Student's Consultant</b> "	contains full-text versions of digital textbooks and study guides in all areas and disciplines of medical education in accordance with the curricula and requirements of the Federal State Educational Standard. There is an English interface.	<i>on the <a href="#">platform of the PRMU Digital Library</a> through the appropriate banner or directly through the e-book found in the catalog. To access the full text, you need to log in to the reader's Personal Account (login – the number of the campus card (eleven numerals), password – date of birth without spaces (for example – 05022002) directly on the platform of <a href="#">DLS "Student's Consultant"</a>. To access the resource, it is necessary to pass a personal registration from the computers of the Scientific Library or University.</i> In the future, you can work from any computer or mobile device. Users who have not worked with the database for more than a year need to confirm their registration: log in to the database with their user name and	Not limited until 31.12.2022

			password from the computers of the Scientific Library or University or through the Personal Account of the user of the PRMU Digital Library.	
2.	The digital library "Doctor's Consultant" i	<p>includes:</p> <ul style="list-style-type: none"> <li>• national guidelines for all areas of medicine</li> <li>• clinical recommendations</li> <li>• training manuals</li> <li>• monographs</li> <li>• atlases</li> <li>• pharmaceutical reference books</li> </ul>	<p>on the <a href="#">platform of the PRMU Digital Library</a> using the appropriate banner or directly through the e-book found in the catalog. To access the full text, you need to log into the Reader's Personal Account (login – the number of the campus card (eleven numerals), password – date of birth without spaces (for example – 05022002))</p> <p>directly on the <a href="#">DLS "Doctor's Consultant"</a> platform or on the <a href="#">DLS "Student's Consultant"</a> platform. To access the resource, it is necessary to pass a personal registration from the computers of the Scientific Library or University. <b>Please note:</b> for users <b>already registered in the Student's Consultant DLS</b>, the re-registration is not required.</p> <p>In the future, you can work from any computer or mobile device.</p>	<p>Not limited</p> <p>Access until 31.12.23</p>
3.	The digital library BookUp	The digital library BookUp contains educational and scientific medical literature of Russian publishers. The list of publications available for reading can be found in the section "My Books".	<p>on the <a href="#">platform of the PRMU Digital Library</a> through the appropriate banner or directly through the e-book found in the catalog. To access the full text, you need to log in to the reader's Personal Account (login – the number of the campus card (eleven numerals), password – date of birth without spaces (for example – 05022002))</p> <p>directly on the platform <a href="#">DLS "BookUp"</a> :</p> <ul style="list-style-type: none"> <li>- access is free from university computers (without authorization);</li> <li>- to access from external IP addresses, it is necessary to pass a personal registration from the computers of the Scientific Li-</li> </ul>	<p>Not limited</p> <p>until 31.05.2022</p>

			<i>brary or University. In the future, you can work from any computer or mobile device.</i>	
4.	The digital library "Urait".	has a collection of publications on psychology, ethics, conflictology	1. By means of the corresponding banner on the home page <a href="#">of the PRMU Digital Library</a> or directly through an e-book found in the catalog. To access the full text, you need to log in (login – the number of the campus card, password – date of birth without spaces (for example – 05022002)); 2. Next, select the section "Catalog", "Subscriptions of educational institutions" (Privolzhsky Research Medical University). To work with a specific digital publication, you need to go to the section you are interested in, select the desired book and click the "Study" button.	Not limited Access until 11.02.2023
5.	<b>Electronic periodicals</b> as part of the database "Scientific Electronic Library eLibrary <a href="https://elibrary.ru">https://elibrary.ru</a>	Electronic medical magazines	From university computers. Access mode: <a href="https://elibrary.ru">https://elibrary.ru</a>	Not limited until 31.12.2022
6.	<b>Integrated Information and Library system (IBS) of the scientific and educational medical cluster of the Volga Federal District - "Srednevolzhsky"</b> (contract on a free basis)	Electronic copies of scientific and educational publications from the collections of libraries participating in the scientific and educational medical cluster of the Volga Federal District "Srednevolzhsky"	Access by individual login and password from any computer and mobile device. Access mode: websites of libraries participating in the project	Not limited Unlimited
7.	<b>Electronic legal reference system "Consultant Plus"</b> (contract on a free basis) <a href="http://www.consultant.ru">http://www.consultant.ru</a>	Regulatory documents regulating the activities of medical and pharmaceutical institutions	From the computers of the scientific library. Access mode: <a href="http://www.consultant.ru/">http://www.consultant.ru/</a>	Not limited
8.	National Digital Library (NDL)	The Virtual Reading Room of <b>the National Digital Library (NDL)</b> contains a combined digital catalog of the collections of major Russian libraries, archives, museums and digital copies of works on a wide range of subject areas.	Works restricted by copyright are accessible only from the Library computers ( Medizinskaya Str.3a, Hall of Catalogues and Electronic Information Resources ).  You can get acquainted with the	Not limited Access to the resource until 13.11.2023

		Some publications (works that have passed into the public domain; works of educational and scientific significance that have not been reprinted in the last 10 years) are on open access.	content of the NDL at: <a href="http://rusneb.ru">rusneb.ru</a>	
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### 8.3.3 Open access resources

№ p/p	Name electronic resource	Brief description (content)	Access conditions	Number of users
<b>Russian resources</b>				
1.	<b>Federal Electronic Medical Library (FEMB)</b> <a href="http://HЭБ.pф">http://HЭБ.pф</a>	Full-text electronic copies of printed publications and original electronic publications on medicine and biology	From any computer located on the Internet. Access mode: <a href="http://HЭБ.pф">http://HЭБ.pф</a>	Not limited
2.	<b>Scientific Electronic Library eLIBRARY.RU</b> <a href="https://elibrary.ru">https://elibrary.ru</a>	Abstracts and full texts of scientific publications, electronic versions of Russian scientific journals	From any computer located on the Internet. Access mode: <a href="https://elibrary.ru">https://elibrary.ru</a>	Not limited
3.	<b>Scientific electronic library of the Open CyberLeninka access</b> <a href="http://cyberleninka.ru">http://cyberleninka.ru</a>	Full texts of scientific articles with annotations published in scientific journals of Russia and neighboring countries	From any computer located on the Internet. Access mode: <a href="https://cyberleninka.ru">https://cyberleninka.ru</a>	Not limited
<b>Foreign resources</b>				
1.	digital scientific resources of Springer publishing house	<ul style="list-style-type: none"> <li>• Access to digital scientific resources of Springer publishing house is open for students and employees of PRMU. Materials from the following digital collections are available:</li> <li>• Full-text collection of digital journals (1997-2021) and Springer e-books (2005-2021): <a href="https://rd.springer.com/">https://rd.springer.com/</a></li> <li>• Full-text collection of digital journals Springer Nature : <a href="http://www.nature.com/siteindex/index.html">http://www.nature.com/siteindex/index.html</a></li> <li>• Collection of scientific protocols on various branches of knowledge Springer Protocols:</li> </ul>	<b>from PRMU computers</b> - free access;- from <b>external IP addresses</b> : with individual login / password (personal registration from the university network using corporate mail is required - pimunn.net ); send an email to lib@pimunn.ru with indication of full name, personal corporate mail).	Not limited

		<p><a href="http://www.springerprotocols.com">www.springerprotocols.com</a></p> <ul style="list-style-type: none"> <li>• Abstract database on pure and applied mathematics Zentralblatt MATH: <a href="https://zbmath.org/">https://zbmath.org/</a></li> <li>• Collection of scientific materials in the field of physical sciences and engineering Springer Materials: <a href="http://materials.springer.com/">http://materials.springer.com/</a></li> <li>• Nano database (information about nanomaterials and nanodevices): <a href="http://nano.nature.com/">http://nano.nature.com/</a></li> </ul>		
2.	the full-text database of periodicals of the American publishing house "Wiley"	<p>Journals annually occupy leading positions in the Journal Citation Report and have high impact factors. The content is represented by more than 1,600 scientific journals in various disciplines, including medicine and natural sciences. Chronological coverage: 2015-2022</p>	<p>- from PRMU computers- free access; - from external IP addresses - with individual login / password (<i>personal registration from the university network is required</i>). Attention! Remote access is valid for 60 days. To renew, you need to log in to your account from the university network. <b>Access to the collection at:</b> <a href="http://www.onlinelibrary.wiley.com">www.onlinelibrary.wiley.com</a></p>	Not limited
3.	the digital collection "Freedom"	<p>the platform Science Direct (over 3000 periodicals published by <b>Elsevier</b>). Subject: natural, technical and medical sciences. Chronological coverage: 2011-2022</p>	<p>From the computers of the university, from any computer with an individual login and password.</p>	<p>from PRMU computers at: <a href="https://www.sciencedirect.com">https://www.sciencedirect.com</a> Online catalog of publications at the <b>link</b></p>
4.	<b>Scopus Database</b> <a href="http://www.scopus.com">www.scopus.com</a>	<p>Scopus is an international scientometrical database of abstracts and citations of peer-reviewed scientific literature with built-in tools for monitoring, analysis and visualization of research data.</p>	<p>Access to the resource only from PRMU computers: <a href="http://www.scopus.com">www.scopus.com</a>.</p>	Not limited

5.	<b>Web of Science Core Collection Database</b> <a href="https://www.webofscience.com">https://www.webofscience.com</a>	International Abstract Database of Scientific Citation	From the computers of the university, from any computer with an individual login and password. Access mode: <a href="https://www.webofscience.com">https://www.webofscience.com</a>	Not limited
6.	<b>Questel database Orbit</b> <a href="https://www.orbit.com">https://www.orbit.com</a>	The patent database of the company Questel	From university computers. Access mode: <a href="https://www.orbit.com">https://www.orbit.com</a>	Not limited
<b>Foreign open access resources (the main ones are indicated)</b>				
1.	<b>PubMed</b> URL: <a href="http://www.ncbi.nlm.nih.gov/pubmed">www.ncbi.nlm.nih.gov/pubmed</a> US National Library of Medicine search engine  <b>PubMed (Bookshelf)</b> URL: <a href="http://www.ncbi.nlm.nih.gov/books">www.ncbi.nlm.nih.gov/books</a> Full-text collection of books on medicine and biological sciences of the US National Library of Medicine	The search engine of the US National Library of Medicine for the databases "Medline", "PreMedline"	From any computer and mobile device. Access mode: <a href="https://www.ncbi.nlm.nih.gov/pubmed">https://www.ncbi.nlm.nih.gov/pubmed</a>	Not limited
2.	<b>Directory of Open Access Journals</b> <a href="http://www.doaj.org">http://www.doaj.org</a>	Directory of open access to the full-text collection of periodicals	From any computer and mobile device. Access mode: <a href="http://www.doaj.org">http://www.doaj.org</a>	Not limited
3.	<b>Directory of open access books (DOAB)</b> URL: <a href="http://www.doabooks.org">www.doabooks.org</a> Directory of open access to the full-text collection of scientific books (over 10 thousand)	Directory of open access to the full-text collection of scientific books	From any computer and mobile device. Access mode: <a href="http://www.doabooks.org">http://www.doabooks.org</a>	Not limited
4	<b>Science Direct</b>	Catalog of magazines and books of the Elsevier publishing house (more than 250 thousand articles in the public domain)	URL: <a href="http://www.sciencedirect.com">www.sciencedirect.com</a>	
5	<b>World Health Or-</b>	Reports, reviews, guidelines,	URL:	



	<b>ganization</b>	recommendations of the World Health Organization	<a href="http://www.who.int/en/">www.who.int/en/</a>	
6	<b>BASE</b>	The system of the international project ORCID DE provides a search for scientific information among 100 million open access documents of the world's archival collections	URL: <a href="http://www.base-search.net">www.base-search.net</a>	
7	<b>EDP OPEN</b>	Collection of journals, books, materials of scientific conferences on the platform of the publishing house "EDP Science"	URL: <a href="http://www.edp-open.org">www.edp-open.org</a>	
8	<b>Proceedings of the National Academy of Science (PNAS)</b>	Polythematic database of scientific articles of the US National Academy of Sciences	URL: <a href="http://www.pnas.org">www.pnas.org</a>	
9	<b>The Online Books Page</b>	University of Pennsylvania website offering free access to full-text scientific publications	URL: <a href="http://online-books.library.upenn.edu">online-books.library.upenn.edu</a>	

## 9. Material and technical support for mastering an academic discipline

### 9.1. List of premises for classroom activities for the discipline

#### 1. For lectures there are:

- BFC lecture halls (large and small halls);
- lecture hall of the Morphological Building;
- lecture hall of building No. 3;
- lecture hall of building No. 9.

#### 2. For practical training on the basis of building No. 2 (BFC) there is:

4 specially equipped rooms (classrooms) for seminars and practical classes in the study of disciplines with an area of 12, 15, 43, 44.3 m<sup>2</sup>;  
including a training laboratory for practical classes in microbiology and immunology with an area of 59 m<sup>2</sup>.

### 9.2. List of equipment for classroom activities for the discipline

Name	Quantity
<b>Computers:</b>	3
- Celeron 1700	1
- Core i3, i7-920	2
- NEW/C2D	1
- Fujitsu Siemens Amilo laptop	1
<b>Laser printers: ML-1645</b>	1
- Samsung ML-1210	1
<b>MFP Canon ME- Y018, 3110</b>	2
<b>Projector-overhead H 1110</b>	1
<b>Epson EMP-S3 Multimedia projector</b>	1
<b>Microscopic and macroscopic preparations for practical training*</b>	86
<b>Tables for practical classes**</b>	80
<b>Tables for lectures**</b>	80
<b>Stands:</b>	12

- on the organization of the educational process at the department	8
- chronology of discoveries in microbiology and immunology	5
- virology	1
<b>Equipment</b>	
1. Immersion microscopes.	28
2. Luminescent microscope.	1
3. Thermostats.	8
4. Autoclaves.	1
5. Anaerostats.	3
6. Centrifuges.	9
7. FEC.	1
8. Laminar box	1
9. Analytical electronic scales	1
10. Household refrigerators	6
11. Micro – aerostats	1
12. Disintegrators	1
13. Spectrophotometer	1
14. Pipette dispensers	8
15. pH-microvoltmeter	1
16. Writing tables	15
17. Student and classroom tables	42
18. Aquadistillator	1
19. Microtitrator of the Tokachchi system	1
20. Drying cabinet	2
21. Air sterilizer	2
22. Laboratory table	4
23. Bactericidal portable irradiator	1
24. Bactericidal wall-mounted irradiator	2
25. Single-element board for chalk 1000*2000	4

*Sets of slides for the lecture course.*

- a set of electronic presentations (slides),

- an audience equipped with presentation equipment (projector, screen, computer), etc.

Electronic educational resources - films for classes in immunology.

The set of methodological support for the control of students includes 2 computer tests on immunology.

**\*Macroscopic preparations**

1. Ingredients for staging a hemagglutination reaction.
2. Sets of ingredients for the formulation of immunochemical analysis reactions (RA, RP, RTGA, RPGA, immunoelectrophoresis, RSC, enzyme immunoassay, immunoblotting)
3. Biological preparations for the diagnosis of infectious diseases (main types).
4. Biological preparations for treatment and prevention (main types).
5. Diagnostic kits, diagnostic serums, therapeutic and prophylactic biologics against intestinal infections.
6. A set of biological preparations for the prevention and treatment of coccal infections.
7. Demonstration of growth on nutrient media of various pathogens of purulent-septic infections.
8. Biologics used for diphtheria.
9. Biologics for the diagnosis and prevention of tuberculosis.
10. Sets of ingredients for Wasserman reactions and demonstration of results.
11. Biological and other drugs for the diagnosis, prevention and treatment of spirochetosis.
12. Demonstration reaction of indirect hemagglutination with Provacek's diagnosticum. A set of ingredients for RSK.

13. Biological preparations for the diagnosis and prevention of rickettsiosis.
14. Sets of ingredients for RGA and RTGA for influenza (virus identification and detection of antibody titer increase).
15. Biological preparations used for influenza, measles, rubella.
16. Biological preparations for the prevention of rabies.
17. Preparations of cell cultures infected with enteroviruses and adenoviruses.
18. A set of ingredients for RSC for tick-borne encephalitis.
19. Biological preparations used for the diagnosis and prevention of entero-, adeno - and arbovirus infections.
20. A set of vaccines and immunoglobulins from Pasteur Merrier (France).

**\*\* Tables.**

1. Phagocytosis.
2. Development of immunology.
3. Types of immunity of the body.
4. Development of the immune system.
5. RSK scheme.
6. Immunofluorescence methods.
7. The phenomenon of hemagglutination.
8. Precipitation reaction.
9. The molecular structure of immunoglobulin.
10. Schematic diagram of the induction of the immune response.
11. The involvement of immune system cells in the immune response.
12. Realization of effector functions of T-cytotoxic lymphocytes.
13. Natural killers.
14. Antigenic structure of salmonella.

**9.3. A set of licensed and freely distributed software, including domestic production**

<b>Item no.</b>	<b>Software</b>	<b>number of licenses</b>	<b>Type of software</b>	<b>Manufacturer</b>	<b>Number in the unified register of Russian software</b>	<b>Contract No. and date</b>
1	Wtware	100	Thin Client Operating System	Kovalev Andrey Alexandrovich	1960	2471/05-18 from 28.05.2018
2	MyOffice is Standard. A corporate user license for educational organizations, with no expiration date, with the right to receive updates for 1 year.	220	Office Application	LLC "NEW CLOUD TECHNOLOGIES"	283	without limitation, with the right to receive updates for 1 year.
3	LibreOffice		Office Application	The Document Foundation	Freely distributed software	

4	Windows 10 Education	700	Operating systems	Microsoft	Azure Dev Tools for Teaching Subscription	
5	Yandex Browser		Browser	«Yandex»	3722	
6	Subscription to MS Office Pro for 170 PCs for FGBOU VO "PIMU" of the Ministry of Health of Russia	170	Office Application	Microsoft		23618/HN10030 LLC "Softline Trade" from 04.12.2020

**10. List of changes to the working program (to be filled out by the template)**

Federal State Budgetary Educational Institution of Higher Education  
 "Privolzhsky Research Medical University"  
 Ministry of Health of the Russian Federation  
 (FSBEI HE "PRMU" of the Ministry of Health of Russia)

**EPIDEMIOLOGY, MICROBIOLOGY AND EVIDENCE-BASED MEDICINE**  
*Name of the department*

**CHANGE REGISTRATION SHEET**

working program for the academic discipline  
**IMMUNOLOGY**

Field of study / specialty / scientific specialty **31.05.01 GENERAL MEDICINE:**  
**GENERAL PRACTITIONER**

Mode of study: **FULL-TIME**

Position	Number and name of the program section	Contents of the changes made	Effective date of the changes	Contributor's signature
1				

Approved at the department meeting  
 Protocol No. \_\_\_\_\_ of \_\_\_\_\_ 20\_\_

Head of the Department of Epidemiology,  
 microbiology and evidence-based medicine,  
 DSci. of Medical Sciences, Associate Professor \_\_\_\_\_ (Kovalishena O.V.)  
 (signature)