



APPROVED

Vice-Rector for Academic Affairs

E.S. Bogomolova

31 August 2021

## WORKING PROGRAM

Name of the academic discipline: **IMMUNOLOGY-CLINICAL IMMUNOLOGY**

Specialty: **31.05.03 DENTISTRY**

Qualification: **DENTIST**

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

Mode of study: **FULL-TIME**

Labor intensity of the academic discipline: **108 academic hours**

Nizhny Novgorod  
2021

The working program has been developed in accordance with the Federal State Educational Standard for the specialty **31.05.03 DENTISTRY** approved by Order of the Ministry of Science and Higher Education of the Russian Federation No. 984 of 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)

22.04.2021

## **1. The purpose and objectives of mastering the academic discipline "Immunology – clinical immunology" (hereinafter – the discipline):**

1.1. The purpose of mastering the discipline: participation in forming *the relevant competencies* UC-1, UC-8, GPC-5, GPC-9, PC-6.

### **1.2. Tasks** of the discipline:

- formation of students' understanding of the subject of immunology and the immune system as one of the body systems necessary to maintain subjective individuality;
- acquisition by the student of knowledge about general and clinical immunology with allergology;
- study of the causes and pathogenesis of major immune disorders: autoimmune, allergic, immune deficient;
- mastering the basics of rational immunodiagnostics by the student, using methods of assessing the immune status and interpreting the results of an immune examination;
- acquisition by the student of knowledge about the immunity of the mucous membranes and the features of the immune protection of the tissues of the oral cavity and maxillofacial region;
- study of the principles of correction of the main disorders of the immune system: autoimmune, allergic, immunodeficiency;
- mastering by the student of the values of immune disorders in the pathogenesis of various dental diseases;
- formation of an idea about the principles of immunocorrection.

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

As a result of completing the discipline, the student should

#### **Know:**

- rules of work and safety in physical, chemical, biological and clinical laboratories, with reagents, devices, animals;
- the chemical-biological essence of the processes occurring in a living organism at the molecular and cellular levels;
- biosphere and ecology the phenomenon of parasitism and bioecological diseases;
- methods of microbiological diagnostics; the use of basic antibacterial, antiviral and biological drugs;
- scientific principles of sterilization, disinfection and antiseptic treatment to avoid infection when working in dental practice;
- the structure and functions of the immune system, its age-related features, mechanisms of development and functioning, the main methods of immunodiagnostics, methods of assessing the immune status and indications for the use of immunotropic therapy.

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

- use educational scientific, popular scientific literature, the Internet for professional activities;
- use laboratory equipment;
- work with magnifying equipment;
- interpret the results of the most common methods of laboratory and functional diagnostics to identify pathological processes in the organs and systems of patients;
- to substantiate the need for clinical and immunological examination of the patient.

#### **Possess:**

- medico-functional conceptual apparatus;
- methods of sterilization, disinfection and antiseptic treatment;
- the basics of medical diagnostic and therapeutic measures to provide first aid in urgent and life-threatening conditions with disorders of the immune system;
- information on the principles of sterilization, disinfection and antiseptic treatment of instruments and equipment in order to avoid infection of the doctor and patient;
- skills of making a preliminary diagnosis based on the results of laboratory and instrumental examination of patients.

## **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 – clinical immunology" refers to the core part of Block 1 of GEP HE (B1.O.19).

The discipline is taught in 3 and 4 semester II 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, pathological physiology, 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

№	Competence code	The content of the competence (or its part)	Code and name of the competence acquisition metric	As a result of mastering the discipline, the students should:		
				Know	Be able to	Possess
1.	UC-1	Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy	1.1 Knows: methods of critical analysis and evaluation of modern scientific achievements; basic principles of critical analysis 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 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	-methods of critical analysis -safety regulations and work in physical, chemical, biological laboratories, with reagents, devices, animals; -dissemination of information in medical and biological systems, use of information computer systems in medicine and healthcare; -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	- be able to apply critical analysis methods -be able to apply safety regulations -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 justify 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;	- critical analysis skills -work skills in compliance with safety regulations --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; -information on the principles of sterilization, disinfection and antiseptic treatment of instruments and equipment in order to avoid infection of the doctor and patient; -skills of making preliminary diagnosis based on the results of laboratory and instrumental examination.
2.	UC-8	Able to: create and maintain safe living conditions in everyday and professional life for the preservation of the natural environment,	8.1 Knows: factors of harmful influence on vital activity; algorithms of actions in case of emergencies and military conflicts 8.2 Able to: identify dangerous and harmful	-factors of harmful influence on vital activity safety regulations and work in physical, chemical, biological laboratories, with reagents, devices, animals; -dissemination of information in medical and biological systems, use of information computer systems in medicine and healthcare;	-identify harmful factors of vital activity -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	-skills of professional activity in compliance with safety regulations at the workplace -skills of making a preliminary diagnosis based on the results of laboratory and instrumental examination of children and ado-

		ensuring sustainable development of society, including in the case of a threat and occurrence of emergency situations and military conflicts	factors within the framework of its activities, create and maintain safe living conditions in everyday and professional life 8.3 Has practical experience in: participation in planned exercises to work out the rules of conduct in case of emergencies, first aid; complies with safety regulations at the workplace	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	of the most common methods of laboratory and functional diagnostics; -to justify 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;	lescents; -information on the principles of sterilization, disinfection and antiseptic treatment of instruments and equipment in order to avoid infection of the doctor and patient;
3.	GPC-5	Able to conduct an examination of the patient in order to establish a diagnosis in solving professional problems	5.1 Knows the methodology for collecting anamnesis of life and diseases, complaints from children and adults (their legal representatives); 5.2 Is able to: collect complaints, anamnesis of life and disease in children and adults (their legal representatives), identify risk factors and causes of diseases; 5.3 Has practical experience in: collecting complaints, anamnesis of life and diseases in children and adults (their legal representatives), identifying risk factors and causes of diseases;	methods of examination and physical examination; clinical picture, methods of diagnosis of the most common diseases; methods of laboratory and instrumental studies to assess the state of health, medical indications for research, rules for interpreting their results; international statistical classification of diseases and health-related problems (ICD); conditions requiring urgent medical care - risk factors for the occurrence of infectious diseases; a plan for laboratory, instrumental and additional studies in children and adults in accordance with the procedures for providing medical care, clinical recommendations, taking into account the standards of medical care; -fundamentals of 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 re-	apply methods of examination and physical examination of children and adults; interpret the results of examination and physical examination of children and adults; diagnose the most common pathology in children and adults; send children and adults to laboratory, instrumental and additional studies in accordance with the current procedures for providing dental medical care, clinical recommendations, taking into account the standards of medical care; send children and adults for consultations with specialist doctors in accordance with the procedures for providing medical care, clinical recommendations, taking into account the standards of medical care; interpret and	skills of examination and physical examination of children and adults; diagnosis of the most common diseases in children and adults; identification of risk factors for major oncological diseases; formulation of a preliminary diagnosis, drawing up a plan for instrumental, laboratory, additional studies, 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

				quiring urgent medical care - clinical signs of sudden acute diseases, conditions, exacerbations of chronic diseases without obvious signs of life-threatening, requiring urgent medical care	analyze the results of consultations by specialist doctors for children and adults; interpret and analyze the results of basic (clinical) and additional (laboratory, instrumental) examination methods; carry out differential diagnosis of diseases in children and adults;	from additional (laboratory and instrumental) examinations of patients; making a preliminary diagnosis in accordance with the international statistical classification of diseases and health-related problems (ICD);
4.	GPC-9	GPC-5. Able to assess morphofunctional, physiological conditions and pathological processes in the human body to solve professional problems	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	-safety regulations and work in physical, chemical, biological laboratories, with reagents, devices, animals; -pathological anatomy and physiology of human organs and systems, possible pathological processes associated with the vital activity of microorganisms, the effect of enzymes and toxins of bacteria on homeostasis-the main disciplines for assessing pathological processes in the human body -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 - the nature of the pathological process and its clinical manifestations, the principles of pathogenetic therapy of the most common diseases, in particular dental;	to evaluate the main morphofunctional data, physiological conditions and pathological processes in the human body associated with contamination by pathogenic microorganisms, including viruses and fungi to use laboratory equipment; work with magnifying equipment; interpret the results of the most common methods of laboratory and functional diagnostics, thermometry to identify pathological processes in the organs and systems of patients; evaluate the main pathological processes in the human body -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;	assessment of the main morphofunctional data, physiological conditions and pathological processes in the human body when solving professional tasks, diagnosis of infectious lesions of the human skin and mucous membranes during the examination of the patient -skills to assess the main pathological processes in the human body -information on the principles of sterilization, disinfection and antiseptic treatment of instruments and equipment in order to avoid infection of the doctor and patient; -skills of making preliminary diagnosis based on the results of laboratory and instrumental examination.

5.	PC-6	<p>readiness to collect, analyze complaints and other information from the patient (relatives/legal representatives), data from his anamnesis, interpretation of examination results, laboratory, instrumental, pathological-anatomical and other studies in order to recognize the state or establish the fact of the presence or absence of a dental disease, symptoms, syndromes of dental diseases, the establishment of nosological forms in accordance with the International statistical classification of diseases and health-related problems and other regulatory documents of the Ministry of Health of the Russian Federation</p>	<p>6.1 Knows: The methodology for collecting complaints and anamnesis from patients (their legal representatives). The procedure for providing medical care to children with dental diseases          6.2. Able to: interpret the results of the examination, laboratory, instrumental, pathoanatomical and other studies in order to recognize the condition or establish the presence or absence of a dental disease, symptoms, syndromes of dental diseases, the establishment of nosological forms in accordance with the International Statistical Classification of Diseases          6.3 Has practical experience: interpretation of the results of examination, laboratory, instrumental, pathoanatomical and other studies in order to recognize the condition or establish the presence or absence of a dental disease.</p>	<p>- methods of physical examination of patients (examination, palpation, percussion, auscultation).          - the procedure for providing medical care to adults with dental diseases          - rules of work and safety in physical, chemical, biological and clinical laboratories, with reagents, devices, animals;          - the chemical-biological essence of the processes occurring in a living organism at the molecular and cellular levels;          - biosphere and ecology the phenomenon of parasitism and bioecological diseases;          - classification, morphology and physiology of microorganisms and viruses, their impact on human health;          - microbiology of the oral cavity;          - methods of microbiological diagnostics; the use of basic antibacterial, antiviral and biological drugs;          - scientific principles of sterilization, disinfection and antiseptic treatment to avoid infection when working in dental practice;          - clinical recommendations on the provision of medical care to patients with dental diseases          - Standards of medical care (The procedure for providing medical care, the Standard of medical care, Clinical recommendations on the provision of medical care, etc.)</p>	<p>- use laboratory equipment;          - work with magnifying equipment;          - interpret the results of the most common methods of laboratory and functional diagnostics, thermometry to identify pathological processes in the organs and systems of patients;          - to substantiate the nature of the pathological process and its clinical manifestations, the principles of pathogenetic therapy of the most common diseases, in particular dental;          - To develop a treatment plan for children and adults with dental diseases in accordance with the procedures for providing medical care, clinical recommendations, taking into account the standards of medical care.</p>	<p>- medico-functional conceptual apparatus;          - methods of sterilization, disinfection and antiseptic treatment;          - information on the principles of sterilization, disinfection and antiseptic treatment of instruments and equipment in order to avoid infection of the doctor and patient;          - skills of making a preliminary diagnosis based on the results of laboratory and instrumental examination of patients;          - development of a treatment plan for children and adults with dental diseases, taking into account the diagnosis, age and clinical picture in accordance with current medical care procedures, clinical recommendations, taking into account the standards of medical care          - determination of symptoms, syndromes of dental diseases, establishment of nosological forms in accordance with the International Statistical Classification of Diseases and Health-related Problems and other regulatory documents of the Ministry of Health of the Russian Federation</p>
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#### 4. Sections of the discipline and competencies that are formed during when mastering them

№	Competence code	Section name of the discipline	The content of the section in teaching units
1.	UC-1, UC-8, GPC-5, GPC-9, PC-6	General immunology. Immunity of the oral cavity.	<p>The concept of immunity. Types and forms of immunity. Antigens as carriers of structural foreignness and inducers of immunological conflict. Basic differences between antigen-dependent and antigen-independent (innate) immunity. Schematic diagram of the immune response (from induction to implementation). The concept of humoral, cellular immunity and their effectors. Immunological memory. Immunological tolerance.</p> <p>Cells of the immune system. CD antigens. 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 (cloning, auto-tolerance, functional maturation of lymphocytes).</p> <p>Peripheral (secondary) organs/tissues of the immune system. Results of antigen-dependent activation of lymphocytes in peripheral lymphoid tissue (immunogenesis). Lymphocyte recirculation as the basis of the functional unity of the immune system.</p> <p>Antigens. Structure of antigenic specificity. Complete and incomplete antigens. Submolecular organization of the antigen. The nature and sources of antigens. Structural and functional features of B- and T-epitopes. The concept of conformational and sequential (linear) epitopes. The relationship of antigens with antigen-presenting cells (processing of T-dependent antigens). T-dependent and T-independent antigens.</p> <p>Antibodies. The biochemical nature of antibodies. Source of antibodies. Submolecular organization of a typical immunoglobulin molecule (variable and constant domains). Hypervariable and skeletal sites of V-domains of immunoglobulins. Structural bases of specificity (antigen-binding function) of antibodies (paratopes). "Secondary" functions of antibodies and their structural basis.</p> <p>Isotypes (classes), allotypes and idiotypes of immunoglobulins. Isotypes (classes/subclasses) immunoglobulins: structural features, functions. Serum concentration of various classes of immunoglobulins. The dynamics of antibodies during the primary and secondary immune response: qualitative and quantitative seroconversion. Immunological memory.</p> <p>The concept of the secretory immune system (mucosal immunity, or mucosal immunity). Production, structure and functions of secretory IgA (sIgA).</p> <p>Cloning of B-lymphocytes. Selection of antigen-sensitive clones as the basis of the immune response. Polyclonal nature of the immune (antibody) response and its causes. Monoclonal antibodies (principles of hybridomic technology).</p> <p>Formation and differentiation of T- and B-lymphocytes. Features of presentation of antigens to B- and T-lymphocytes. The concept of B- and T-epitopes in the structure of antigens.</p> <p>Antigen-recognizing B-lymphocyte receptors. Basic receptors and their rearrangement during the immune response.</p> <p>CD-antigens and functional classification of T-lymphocytes.</p> <p>The main category of antigen-recognizing T-lymphocyte receptors. Structure, similarities and differences with B-lymphocyte receptors. The principle of double recognition of antigens by T-lymphocytes. Functional cooperation in the system of antigenic receptors of B- and T-lymphocytes (the concept of receptor complexes).</p> <p>Molecular and submolecular bases of B- and T-lymphocyte cloning</p> <p>The main human histocompatibility complex (HLA): genes and their products. The genetic basis of HLA polymorphism. HLA</p>

		<p>polymorphism as a basis for rejection of allogeneic tissues. HLA-1. The principle of structure, subclasses, structural (allelic) polymorphism, tissue localization, immunological function. HLA-2. The principle of structure, subclasses, structural (allelic) polymorphism, distribution in the body, immunological function. The concept of HLA restriction of the immune response (double recognition of antigens). Molecular basis of selective interaction of CD4<sup>+</sup> and CD8<sup>+</sup> T-lymphocytes with antigens represented by HLA-1 and HLA-2. "Professional" and "non-professional" antigen-presenting cells. The principal mechanism of presentation of antigens to T-lymphocytes (processing of antigens by antigen-presenting cells). The concept of antigenic peptides presented to T-lymphocytes by HLA molecules (HLA peptides). HLA-dependent regulation of the immune response.</p> <p>The concept of induction, its components (recognition and activation) and the main stages. Mediators (costimulators) of intercellular cooperation: their classification and functional characteristics. Costimulating (auxiliary) signals in antigen-dependent activation of lymphocytes. The molecular basis of contact and mediator (humoral) interactions.</p> <p>The central regulatory link of T-dependent immunity: CD4<sup>+</sup> lymphocytes and the mechanisms of its relationship with B-lymphocytes and CD8<sup>+</sup> lymphocytes.</p> <p>Cytokines: biochemical nature, sources, polyfunctionality, mechanisms of action, classification, similarities and differences with hormones. Cytokines and their role in the regulation of the immune response.</p> <p>Activation of CD4<sup>+</sup> T-lymphocytes. Functional variants of T-helper cells (Th1, Th2) and their participation in the immune response. Activation of B-lymphocytes. Results of antigen-induced differentiation. Development of immune responses to T-dependent antigens. T-independent antigens: nature, features of reactions. Activation of CD8<sup>+</sup> T-lymphocytes, results of antigen-induced differentiation.</p> <p>Realization of the immune response (cellular and humoral link) and the concept of immunological memory. Features of the interaction of immune effectors in the primary and secondary immune response.</p> <p>The complement system. The nature of the components, activation pathways (classical and alternative pathways). Biologically active factors of the complement system and their properties.</p> <p>Phagocytes. Histological profile of phagocytes: neutrophil granulocytes, macrophages - mobile and immobile, tissue macrophages, alveolar and peritoneal macrophages. Oxygen-dependent and oxygen-independent biocidal activity of phagocytes. Stages of the phagocytic process. The concept of incomplete phagocytosis. Opsonins. The role of opsonins in phagocytic reactions.</p> <p>Effectors of specific (antigen-dependent) immunity. Antibodies. The formation of immune complexes as the basis of the antigen-eliminating function of antibodies. Functional cooperation of specific and non-specific factors in the implementation of the humoral immune response. Molecular and cellular bases of the opsonic effect of antibodies.</p> <p>Specific effectors of T-cell immunity and their targets. Molecular bases and mechanisms of realization of the effector potential of CD8<sup>+</sup> (T-killers, or cytotoxic T-lymphocytes) and CD4<sup>+</sup> T-lymphocytes.</p> <p>Natural killers. Effect functions. The phenomenon of antibody-dependent cellular cytotoxicity.</p> <p>Antiviral immunity. 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 (macrophages, NK lymphocytes, neutrophils), the phenomenon of apoptosis. Non-specific mechanisms - interferon. Classification</p>
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			<p>and biological properties.</p> <p>Protection levels (skin, mucous membranes, loose connective tissue, regional lymph nodes, blood. organs). Protection effectors and their manifestations. Secretory system of immunity and its effector functions. Features of immunity in diseases caused by microorganisms – intracellular parasites.</p> <p>Factors of nonspecific resistance of the oral cavity. Barrier function of the mucous membrane and enamel of teeth, colonization resistance. Oral fluid, its enzymes, lysozyme, complement, lysines. Features of phagocytosis in the oral cavity. Mechanisms of specific immunity of the oral cavity. Saliva immunoglobulins. Features of antiviral immunity of the oral cavity.</p>
2.	UC-1, UC-8, GPC-5, GPC-9, PC-6	Clinical immunology.	<p>Analysis and interpretation of immunological parameters. Methods of studying the immune status and principles of its assessment. Assessment of oral immunity. The content of immunoglobulins sIgA, A, G, M in saliva, gingival fluid, gingival pocket fluid.</p> <p>Allergy. Definition of the concept and general characteristics of allergy. Classification of allergic diseases of types I, II, III, IV, V (according to Gell. Coombs). Allergy of anaphylactic type (anaphylactic shock, local anaphylaxis). Etiology, pathogenesis, clinic. Methods of specific desensitization. Allergy of the atopic type. Cytotoxic allergy. Immunocomplex allergy. Serum sickness. The phenomenon of Artyus. Cell-mediated allergy. Cooperation of effectors of cellular immunity in delayed-type hypersensitivity. Transplant allergy. Drug, food and insect allergies. Skin tests and other methods of allergodiagnosics. Non-allergic forms of intolerance to materials and preparations used in dentistry. Emergency care in allergology.</p> <p>Sensitization of the body of medical personnel of dental institutions.</p> <p>Manifestations of immunopathology in the oral cavity. Intolerance of dental materials from acrylates: etiology, pathogenesis, diagnosis. Intolerance of latex and gypsum products. Intolerance to metal dentures: etiology, pathogenesis, diagnosis, prevention and principles of treatment. Amalgams, their characteristics, effect on oral tissues and the body.</p> <p>Autoimmune pathology, mechanisms of development, classification, immunopathogenesis of the main forms, immunodiagnosics.</p> <p>Primary and secondary immunodeficiency, classification. The main clinical forms, immunodiagnosics. Immunotherapy. Immunomodulators.</p>

### 5. Scope of discipline and types of academic work

The total labor intensity of the discipline is **3** credits.

Type of educational work	Labor intensity		Labor intensity (AH) in semesters	
	volume in credit units (CU)	volume in academic hours (AH)	3	4
<b>Classroom work, including</b>	<b>1,8</b>	<b>66</b>	<b>34</b>	<b>32</b>
Lectures (L)		14	8	6
Practicals (P)		52	26	26
Seminars (S)				
Laboratory practicum (LP)				
Student's individual work (SIW)	<b>1,2</b>	<b>42</b>	<b>20</b>	<b>22</b>
Mid-term assessment				
credit/exam ( <i>specify the type</i> )				<b>test</b>
<b>TOTAL LABOR INTENSITY</b>	<b>3</b>	<b>108</b>	<b>54</b>	<b>54</b>

## 6. Content of the academic discipline

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

n/a	Semester No. (L/PZ)	Name of the section of the academic discipline	Types of academic work *(in AH)					total
			L	LP	P	S	SIW	
1.	3/3	General immunology. Immunity of the oral cavity.	10	-	26	-	20	<b>56</b>
2.	4/4	Clinical immunology.	4	-	26	-	22	<b>52</b>
		total	<b>14</b>	-	<b>52</b>	-	<b>42</b>	<b>108</b>

L – lectures; LP – laboratory practicum; P – practicals; S – seminars; SIW – student's individual work

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

#### 6.2.1 Thematic schedule of lectures

№	Name of lecture topics	Volume in AH	
		semester 3	semester 4
1.	Introduction to immunology. Antigens	2	
2.	Antigen-recognizing molecules in the humoral immunity system (antibodies)	2	
3.	Induction of the immune response. Cytokines	2	
4.	Realization of the immune response. Effectors of humoral and cellular immunity. Complement. Phagocytes and phagocytosis.	2	
5.	Fundamentals of immunoprophylaxis, immunotherapy, serodiagnostics		2
6.	Allergic reactions: the main types and mechanism of development.		2
7.	Autoimmune pathology and immunodeficiency conditions.		2
		<b>8</b>	<b>6</b>
	<b>TOTAL (total 14 AH):</b>	<b>14</b>	
	Antigen-recognizing molecules in the cellular immunity system (T and B lymphocyte receptors, HLA).	2	
	Mechanisms of infectious immunity. Antiviral immunity.	2	
	Immunity of the oral cavity.	2	

6.2.2. The thematic plan of laboratory practicums (*if this type of classes is stipulated in the curriculum*) **are not provided**

#### 6.2.3. Thematic plan of practicals

№ p/p	Name of the topics of practical classes	Volume in AH	
		3 semester	4 semester
1.	Basic concepts in immunology. Antigens. The phenomenon of agglutination. Reactions based on the phenomenon of precipitation.	4	
2.	Antibodies. Immunochemical methods based on the use of labeled antibodies. Biological neutralization reactions.	4	
3.	Basic concepts of immunology. Specific and non-specific immune response. Antigen-recognizing T and B-lymphocyte receptors. Cytokines. CD antigens. Molecules of the main histocompatibility complex.	4	
4.	<u>Induction of specific immune response (phases and results)</u>	4	
5.	<u>Effector phase of immune response (part.1).</u> 1. Effector phase of immune response.	4	

	2. Complement system. 3. Phagocytes and phagocytosis. 4. Functions of antibodies in effector phase of immune response. <u>Effector phase of immune response (part. 2).</u> 1. Functions of T cells and NKs in effector phase of immune response. 2. Cooperation of specific and nonspecific factors in humoral and cell-mediated immunity.		
6.	Mechanisms of antiviral immunity. Interferons.	3	
7.	Anti-infectious immunity.	3	
8.	Immunity of the oral cavity		3
9.	Evaluation of anti-infective immunity. Material for immunological analysis. The main methods of immunological research.		3
10.	Qualitative and quantitative seroconversion. Methods of human immune status research. Assessment of oral immunity. Analysis and interpretation of immunological parameters.		3
11.	Modern methods in immunology. Flow cytometry.		3
12.	Allergy, general characteristics. Classification of allergic diseases.		3
13.	Sensibilization of the body of medical personnel of dental institutions. Allergodiagnosics. Definition and methods.		3
14.	Primary and secondary immunodeficiency, classification. The main clinical forms, immunodiagnosics.		4
15.	Autoimmune pathology, classification, immunopathogenesis of the main forms, immunodiagnosics. Manifestations of immunopathology in the oral cavity. Immune aspects of periodontal disease development.		4
		<b>26</b>	<b>26</b>
<b>Total (total 52 AH)</b>			<b>52</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*) **are not provided**

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

№	Name of the section of the academic discipline	Types and topics of SIW	Volume in AH	
			Semester 3	Semester 4
1.	General immunology. Immunity of the oral cavity.	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).	20	
2.	Clinical immunology.	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.		22
			<b>20</b>	<b>22</b>
<b>Total (total 42 AH)</b>			<b>42</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	3, 4
2.	Immunogram and its interpretation	3, 4
3.	Equipment used in a modern diagnostic laboratory	3, 4
4.	Immunological status of the patient and its significance in clinical practice	3, 4

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

n/a	Se- mester No.	Types of control	Name of section of aca- demic discipline	Compe- tence codes	Assessment formats		
					Types	number of test questions	number of test task options
1.	3/4	Current monitor- ing Control of master- ing the topic • Monitoring the student's individu- al work	General immunology. Immunity of the oral cavity.		Security questions	5	6
					Written control work on the section	2	4
					Test tasks	20	Unlimited (dur- ing computer testing)
					Questions for the test	1	43
2.	3/4	Current monitor- ing Control of master- ing the topic Monitoring the student's individu- al work	Clinical immunology.		Test tasks	5	Unlimited (dur- ing computer testing)
					Security questions	5	2
					Written control	2	4
					Situational tasks	1	5
					Report	1	5
3.	4	Mid-term assess- ment  Credit	All sections of the disci- pline		Security questions	2	46
					Situational tasks	1	46

## 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

№	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 password from the computers of the Scientific Library or University or through the Personal Account of the user of the PRMU Digital Library.	Not limited until 31.12.2022

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	<p>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>	<p><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)</i></p> <p><i>directly on the platform <a href="#">DLS "BookUp"</a>:</i></p> <p><i>- access is free from university computers (without authorization);</i>  <i>- to access from external IP addresses, it is necessary to pass a personal registration from the computers of the Scientific Library or University.</i></p> <p><i>In the future, you can work from any computer or mobile device.</i></p>	<p>Not limited</p> <p>until 31.05.2023</p>
4.	The digital library "Urait".	<p>has a collection of publications on psychology, ethics, conflictology</p>	<p>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);</p> <p>2. Next, select the section "Catalog", "Subscriptions of educational</p>	<p>Not limited</p> <p>Access until 11.02.2023</p>

			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.	
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  Validity period: until 31.12.2021
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  Validity period: 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  Validity period: unlimited
8.	National Digital Library (NDL)	The Virtual Reading Room of the <b>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. 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.	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 content of the NDL at: <a href="http://rusneb.ru">rusneb.ru</a>	Not limited  Access to the resource until 13.11.2023

### 8.3.3 Open access resources

№	Name	Brief description	Access conditions	Number of us-
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p/p	electronic resource	(content)		ers
<b>Russian resources</b>				
1.	<b>Federal Electronic Medical Library (FEMB)</b> <a href="http://неб.рф">http://неб.рф</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://неб.рф">http://неб.рф</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: <a href="http://www.springerprotocols.com">www.springerprotocols.com</a></li> <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>	<b>from PRMU computers</b> - free access;- <b>from 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
2.	the full-text database of periodicals of the American publishing house	Journals annually occupy leading positions in the Journal Citation Report and have high	- from PRMU computers-free access; - from external IP ad-	Not limited

	"Wiley"	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	dresses - 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>	
3.	the digital collection "Freedom"	the platform Science Direct (over 3000 periodicals published by Elsevier). Subject: natural, technical and medical sciences. Chronological coverage: 2011-2022	From the computers of the university, from any computer with an individual login and password.	from PRMU computers at: <a href="https://www.sciencedirect.com">https://www.sciencedirect.com</a> Online catalog of publications at the <a href="#">link</a>
4.	<b>Scopus Database</b> <a href="http://www.scopus.com">www.scopus.com</a>	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.	Access to the resource only from PRMU computers: <a href="http://www.scopus.com">www.scopus.com</a> .	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:	Not limited

			<a href="http://www.doaj.org">http://www.doaj.org</a>	
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 Organization</b>	Reports, reviews, guidelines, recommendations of the World Health Organization	URL: <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 dormitory 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
Computers:	3
- Celeron 1700	1
- Core i3, i7-920	2
- NEW/C2D	1

- Fujitsu Siemens Amilo laptop	1
Laser printers: ML-1645	1
- Samsung ML-1210	1
MFP Canon ME- Y018, 3110	2
Projector-overhead H 1110	1
Epson EMP-S3 Multimedia projector	1
Microscopic and macroscopic preparations for practical training*	86
Tables for practical classes**	80
Tables for lectures**	80
Stands:	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. Thermostats.	8
3. Autoclaves.	1
4. Anaerostats.	3
5. Centrifuges.	9
6. FEC.	1
7. Laminar flow box	1
8. Analytical electronic scales	1
9. Household refrigerators	6
10. Micro – aerostats	1
11. Disintegrators	1
12. Spectrophotometer	1
13. Pipette dispensers	8
14. pH-microvoltmeter	1
15. Writing desks	15
16. Student and classroom tables	42
17. Aquadistillator	1
18. Microtitrator of the Tokachchi system	1
19. Drying cabinet	2
20. Air sterilizer	2
21. Laboratory table	4
22. Bactericidal portable irradiator	1
23. Magnetic marker board	6
24. 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 drugs 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 organism.
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.
15. The structure of T- and B-cell receptors, HLA classes 1 and 2.

### 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,	220	Office Application	LLC "NEW CLOUD TECHNOLOGIES"	283	without limitation, with the right to receive updates for 1 year.

	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)

Department of

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

**CHANGE REGISTRATION SHEET**

working program for the academic discipline

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**IMMUNOLOGY – CLINICAL IMMUNOLOGY**

Specialty: **31.05.03 DENTISTRY**

Qualification: **DENTIST**

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				

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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) (print name)