

**Summary of the working program of the academic discipline  
«IMMUNOLOGY»**

General Educational Program of higher education **31.05.01 GENERAL MEDICINE**

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

**1. The purpose and objectives of mastering the academic discipline "Immunology" (participation in the formation of relevant competencies)**

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

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

**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.

**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 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; the spread of microbes, their</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; use physical, chemical and biological equipment; work with</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</p>

				<p>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>magnifying equipment (microscopes, optical and simple magnifiers);</p> <p>-use educational, scientific, popular science literature, the Internet for professional activities;</p>	<p>patient;</p> <p>-skills of making preliminary diagnosis based on the results of laboratory and instrumental examination.</p>
2.	UC-8	<p>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 society, including in the case of a threat and occurrence of emergency situations and mitigation</p>	<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: participation in planned exercises to work out the rules of conduct in case of emergencies, first aid; complies with safety regulations at the workplace</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 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>-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 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>-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 instruments and equipment in order to avoid infection of the doctor and patient;</p>

		arr y conflicts				
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 laboratory, instrumental and additional	-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>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</p>			
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4.	GPC5	GPC-5. Able to assess morphofu	5.1 Knows: anatomy, histology, embryology, topographic anatomy, physiology, pathological	-basic disciplines for the assessment of pathological processes in the	-evaluate the main pathological processes in the human body	- methods of assessing the main pathological

		<p>nctional, physiological conditions and pathological processes in the human body to solve professional problems</p>	<p>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>	<p>human body -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</p>	<p>-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);</p>	<p>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.</p>
5.	GPC-10	<p>GPC-10. Able to understand the principles of modern information technologies and use them to solve the tasks of professional activity</p>	<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 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</p>	<p>- information search methodology -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</p>	<p>- be able to apply the methodology of information retrieval -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</p>	<p>- information retrieval 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</p>

			information and communication technologies in professional activity, taking into account the basic requirements of information security 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	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	biological equipment; work with magnifying equipment (microscopes, optical and simple magnifiers); -use educational, scientific, popular science literature, the Internet for professional activities;	order to avoid infection of the doctor and patient; -skills of making preliminary diagnosis based on the results of laboratory and instrumental examination.
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 into account risk factors in accordance with the current procedures	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 account the standards of medical care  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	- 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 -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	- to organize and carry out immunoprophylaxis of infectious diseases in the adult population in accordance with the current procedures for providing medical care -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	- 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 -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

	<p>l 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>preventive measures to patients taking into account risk factors for the prevention and early detection of diseases, including socially significant diseases</p>	<p>circulation of substances. - methods of microbiological diagnostics the use of basic antibacterial, antiviral and biological drugs</p>	<p>professional activities;</p>	<p>examination.</p>
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#### 4. Volume of the academic discipline and types of academic work

Total labor intensity of the discipline is 2 CU (72 AH)

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>	

#### 5. Sections of the academic discipline and competencies that are formed

№	Competence code	Section name of the	The content of the section in teaching units

		discipline	
1.	UC - 1, UC – 8, GPC - 4, GPC - 5, GPC - 10, PC - 16	The basics immunology	Cells of the immune system: the central position of lymphocytes, auxiliary cells. The main functional variants of T-lymphocytes. 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. Submolecular organization of the antigen. Schematic diagram of the immune response.
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 of 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. Biocidal 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,	Fundamentals of immunopr	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.

	GPC - 5, GPC - 10, PC - 16	ophylaxis, immunoth erapy and serodiagn ostics.	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	Immunolo gical 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. Allergodi agnostics. Immunod efficiency.	Types of allergic reactions. Allergodiagnostics. Immunodeficiency. Autoimmune diseases. Classification. Principles of diagnostics.