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

N⁰	Compe tence code	The content of the competen ce (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	<ul> <li>1.1 Knows: methods of critical analysis and evaluation of modern scientific achievements; basic principles of critical analysis</li> <li>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</li> <li>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</li> </ul>	-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 microobes, their	<ul> <li>be able to apply critical analysis methods</li> <li>be able to apply safety regulations</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; use physical, chemical and biological equipment; work with</li> </ul>	- 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

				impact on human	magnifying	patient;
				health. Ecology of	equipment	-skills of making
				microorganisms,	(microscopes, optical	preliminary
				their role in the	and simple	diagnosis based of
				circulation of	magnifiers);	laboratory on
				methods of	scientific popular	instrumental
				- inculous of microbiological	science literature the	examination
				diagnostics	Internet for	examination.
				the use of basic	professional	
				antibacterial	activities.	
				antiviral and	uoti vitios,	
				biological drugs		
2.	UC-8	UC-8.	8.1 Knows: factors of	- factors of harmful	-identify harmful	-skills of
		Able to:	harmful influence on	influence on vital	factors of vital	professional
		create and	vital activity: algorithms	activity	activity	activity in
		maintain	of actions in case of	-safety regulations and	-to carry out	compliance with
		safe	of actions in case of	work in physical,	sampling, labeling	safety
		living	emergencies and	chemical, biological	and arrange for the	regulations at the
		condition	military conflicts	laboratories, with	direction of	workplace
		s in	8.2 Able to: identify	reagents, devices,	biological material	-skills of making
		everyday	dangerous and harmful	animals;	trom the patient and	a preliminary
		and	factors within the	-dissemination of	habitat objects for	diagnosis based
		professio	framework of its	information in madical	microbiological	on the results of
		for the	activities, create and	hielogical systems	examination;	instrumentel
		nor ule	maintain safe living	biological systems,	of the most common	avamination of
		on of the	conditions in everyday	computer systems in	methods of	children and
		natural	and professional life	medicine and	laboratory and	adolescents.
		environm	8 3 Has practical	healthcare:	functional	-information on
		ent.	experience in:	biosphere and	diagnostics:	the principles of
		ensuring	participation in planned	ecology, the	-to justify from	sterilization,
		sustainabl	exercises to work out the	phenomenon of	microbiological	disinfection and
		e	rules of conduct in case	parasitism and	positions the choice	antiseptic
		developm	of emergencies, first aid;	bioecological	of material for	treatment of
		ent of	complies with safety	diseases;	research during the	instruments and
		society,	regulations at the	-classification,	diagnosis of	equipment in
		including	workplace	morphology and	infectious diseases;	order to avoid
		in the		physiology of	-use physical,	infection of the
		case of a		microorganisms and	chemical and	doctor and
		threat and		viruses, their impact	biological	patient;
		occurrenc		on the health of	equipment;	
		e of		children and	-work with	
		emergenc		the spread of		
		У		microbes their	(microscopes	
		S ·		impact on human	ontical and simple	
				health. Ecology of	magnifiers):	
				microorganisms.	-use educational.	
		u a		their role in the	scientific, popular	
		a t		circulation of	science literature, the	
		i		substances.	Internet for	
		0		- methods of	professional	
		n		microbiological	activities;	
		s		diagnostics		
				the use of basic		
		а		antibacterial,		
		n		antiviral and		
		d		biological drugs		
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		t				

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		r				
		У				
		conflicts				
3.	GPC-4	GPC-4.	4.1 Knows the	-methods of	- to carry out	- skills in
		Able to	methodology of	diagnosis of the most	diagnostic methods	conducting
		apply	collecting anamnesis of	common infectious	for the most	diagnostics of
		medical	life and diseases,	diseases and medical	common infectious	the most
		products,	complaints of patients	indications for	diseases and	common
		provided	(their legal	conducting research,	interpret their results	infectious
		by the	representatives);	rules for interpreting	-to carry out	diseases and
		order of	examination procedure;	their results	sampling, labeling	interpreting their
		healthcare	and physical	-safety regulations	and arrange for the	results
		delivery,	examination; clinical	and work in physical,	direction of	-skills of making
		as well as	diagnosis of the most	laboratorios with	from the notiont and	diagnosis based
		patients	common diseases:	reagents devices	habitat objects for	on the results of
		for the	methods of laboratory	animals. devices,	microbiological	laboratory and
		purpose of	and instrumental	-biosphere and	examination.	instrumental
		determini	investigations to assess	ecology. the	-interpret the results	examination of
		ng the	the state of health.	phenomenon of	of the most common	children and
		diagnosis	medical indications for	parasitism and	methods of	adolescents;
			conducting research,	bioecological	laboratory and	-information on
			rules for interpreting	diseases;	functional	the principles of
			their results;	classification,	diagnostics;	sterilization,
			international statistical	morphology and	-to substantiate from	disinfection and
			classification of diseases	physiology of	microbiological	antiseptic
			and health-related	microorganisms and	positions the choice	treatment of
			problems (ICD);	viruses, their impact	of material for	instruments and
			conditions requiring	on the health of	research during the	equipment in
			emergency medical care;	children and	diagnosis of	order to avoid
			procedure for the use of	adolescents;	infectious diseases;	infection of the
			medical devices in	-the spread of	-use physical,	doctor and
			accordance with the	impact on human	biological	patient;
			providing medical care	health Ecology of	equipment:	
			clinical	microorganisms	work with	
			recommendations	their role in the	magnifying	
			(treatment protocols) on	circulation of	equipment	
			the medical care delivery	substances.	(microscopes,	
			taking into account the	methods of	optical and simple	
			standards of medical	microbiological	magnifiers);	
			care	diagnostics	-use educational,	
			4.2 Able to: collect	-the use of basic	scientific, popular	
			complaints, anamnesis	antibacterial,	science literature,	
			of life and disease of	antiviral and	the Internet for	
			patients (their legal	biological drugs	professional	
			representatives), identify		activities;	
			risk factors and causes			
			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			
		J	and additional			

		investigations of patients		
		in accordance with the		
		procedures for providing		
		medical care, clinical		
		recommendations taking		
		into account the		
		account the		
		standards of medical		
		care; to refer patients to		
		laboratory, instrumental		
		and additional		
		investigations in		
		investigations in		
		accordance with the		
		current procedures for		
		providing medical care,		
		clinical		
		racommondations		
		recommendations,		
		taking into account the		
		standards of medical		
		care: refer patients for		
		consultations to medical		
		spacialists in accordance		
		specialists in accordance		
		with the procedures of		
		medical care, clinical		
		recommendations taking		
		into account the		
		standards of modical		
		standards of incurcar		
		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		
		and additional		
		(laboratory,		
		instrumental)		
		examination methods;		
		carry out differential		
		diagnosis of discasses of		
		diagnosis of diseases of		
		patients; identify clinical		
		signs of sudden acute		
		diseases, conditions,		
		exacerbations of chronic		
		diseases without obvious		
		also as a life the state		
		signs of life-threatening,		
		requiring medical care in		
		an urgent form; use		
		medical devices in		
		accordance with current		
		medical procedures		
		aliniaal		
		ciinicai		
		recommendations		
		(treatment protocols) on		
		the provision of medical		
		care, assistance taking		
		into account the		
		standards of medical		
		care		
		4.3 Has practical		
		experience in: collecting		
		complaints anamnesis		
		of life and discass of		
		notionta (their loss		
		patients (their legal		
		representatives),		
		identifying risk factors		
		and causes of disease		
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			development:			
			examination and			
			physical survey of			
			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			
			spacialist doctors:			
			specialist doctors,			
			instrumental laboratory			
			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			
			(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			
			signs of a threat to the			
			patient's me 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			
4.	GPC5	GPC-5.	5.1 Knows: anatomy.	-basic disciplines for	-evaluate the main	- methods of
		Able to	histology, embryology.	the assessment of	pathological	assessing the
		assess	topographic anatomy.	pathological	processes in the	main
		morphofu	physiology, pathological	processes in the	human body	pathological

	nctional, physiologi cal conditions and pathologic al processes in the human body to solve profession al problems	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	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 drugg	-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);	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 o the results o laboratory an instrumental examination.
5. GPC- 10	GPC-10. Able to understan d the principles of modern informatio n technologi es and use them to solve the tasks of profession al activity	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; modern and communication technologies to solve the tasks of professional activity using reference systems and professional databases; use modern medical and biological terminology; master and apply modern and communication technologies to solve the tasks of professional activity using reference systems and professional databases; use modern medical and biological terminology; master and apply modern activity with the task of task of the task of the task of the task of task of the task of	<ul> <li>- information search methodology</li> <li>-safety regulations and work in physical, chemical, biological laboratories, with reagents, devices, animals;</li> <li>-dissemination of information in medical and biological systems, use of information computer systems in medicine and healthcare;</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</li> </ul>	<ul> <li>be able to apply the methodology of information retrieval</li> <li>be able to apply safety regulations</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; use physical, chemical and</li> </ul>	- 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

			information and	adolescents:	biological	order to avoid
			communication	the spread of	equipment:	infection of the
			technologies in	microbes, their	work with	doctor and
			professional activity.	impact on human	magnifving	patient:
			taking into account the	health. Ecology of	equipment	-skills of making
			basic requirements of	microorganisms,	(microscopes, optical	preliminary
			information security	their role in the	and simple	diagnosis based of
			10.3 Has practical	circulation of	magnifiers);	the results o
			experience in the use of	substances.	-use educational,	laboratory an
			modern information and	- methods of	scientific, popular	instrumental
			bibliographic resources,	microbiological	science literature, the	examination.
			the use of special	diagnostics	Internet for	
			software and automated	the use of basic	professional	
			information systems to	antibacterial,	activities;	
			solve standard tasks of	antiviral and		
			professional activity,	biological drugs		
			taking into account the			
			basic requirements of			
6	DC 16	DC 16	information security			1 1 1 111 6
6.	PC-16	PC-16	16.1 Knows: principles	- principles of	- to organize and	- has the skills of
		Able	of application of specific	application of specific	carry out	organizing and
		to:	and non-specific	and non-specific	immunoprophylaxis	conducting
		organiz	prevention of infectious	prevention of	in the adult	uning of infostions
		e and	diseases, the national	the national calendar	nonulation in	discosos in the
		monito	calendar of preventive	of preventive	accordance with the	adult population
		r the	vaccinations and the	vaccinations and the	current procedures	in accordance
		immun	calendar of preventive	calendar of	for providing	with the current
		oproph	vaccinations for	preventive	medical care	procedures for
		ylaxis	epidemic indications;	vaccinations for	-to carry out	providing
		of	legislation of the	epidemic indications	sampling, labeling	medical care
		infectio	Russian Federation in	-safety regulations	and arrange for the	-basic
		us	the field of health	and work in physical,	direction of	information
		disease	protection, sanitary rules	chemical, biological	biological material	conversion
		s in the	and regulations;	laboratories, with	from the patient and	technologies:
		adult	preventive measures	reagents, devices,	habitat objects for	text, tabular
		populat	taking into account the	animals;	microbiological	editors, Internet
		ion,	diagnosis in accordance	-dissemination of	examination;	search
		prescri	with the current	information in	-interpret the results	skills of making
		be	procedures for medical	medical and	of the most common	a preliminary
		prevent	care, clinical	biological systems,	methods of	diagnosis based
		ive	recommendations	use of information	laboratory and	on the results of
		measur	(treatment protocols)	modicing and	diagnostics	instrumentel
		es to	about medical care	healthcare	to substantiate from	examination of
		natient	delivery taking into	biosphere and	-to substantiate from	children and
		s	account the standards of	ecology. the	positions the choice	adolescents.
		taking	medical care	phenomenon of	of material for	-information on
		into		parasitism and	research during the	the principles of
		accoup	16.2 Able to: organize	bioecological	diagnosis of	sterilization,
		t rick	and carry out	diseases;	infectious diseases;	disinfection and
		factors	immunoprophylaxis of	-classification,	use physical,	antiseptic
		in	infectious diseases in the	morphology and	chemical and	treatment of
		iii accord	adult population in	physiology of	biological	instruments and
		accolu	accordance with the	microorganisms and	equipment;	equipment in
		ance	current procedures for	viruses, their impact	work with	order to avoid
			the provision of medical	on the health of	magnifying	infection of the
		the	care clinical	children and	equipment	doctor and
		current	recommendations	adolescents;	(microscopes, optical	patient;
		proced	(treatment protocols) or	the spread of	and simple	-skills of making
		ures	the provision of medical	microbes, their	magnifiers);	preliminary
		for	ule provision of medical	1mpact on human	-use educational,	diagnosis based of
		providi	care taking into account	health. Ecology of	scientific, popular	the results o
		ng	standards of medical	microorganisms,	science literature, the	laboratory and
		medica	care; prescribe	their role in the	Internet for	instrumental

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

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

	Competen	Section	
N⁰	ce code	name of the	The content of the section in teaching units

		disciplin	
		e	
1.	UC - I,	The	Cells of the immune system: the central position of lymphocytes, auxiliary
	$UU = \delta$ , GPC 4	basics	Cells. The main functional variants of T lymphocytes
	GPC - 5	ov	Central (primary) organs of the immune system. The results of antigen-
	GPC - 10	БУ	independent differentiation of lymphocytes in the central organs of immunity
	PC - 16		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,	Antigen-	Immunoglobulins (antibodies).
	UC - 8,	recognizin	The biochemical nature of antibodies. Submolecular organization of a typical
	GPC - 4,	g malagulag	immunoglobulin molecule. The function of antibodies. Isotypes (classes),
	GPC = 3, GPC = 10	in the	during the primary and secondary immune response. Monoclonal antibodies
	PC - 16	humoral	(principles of hybridomic technology)
		immunity	(principles of information (principle)).
		system	
3.	UC - 1,	Antigen-	Antigen-recognizing T and B-lymphocyte receptors. CD antigens. Molecular
	UC – 8,	recognizin	and submolecular bases of B- and T-lymphocyte cloning. The main human
	GPC - 4,	g	histocompatibility complex (HLA): genes and their products. The principal
	GPC - 5,	molecules	mechanism of presentation of antigens to T-lymphocytes. HLA-dependent
	GPC - 10,	in the	regulation of the immune response.
	PC - 10	immunity	
		system	
4.	UC - 1,	Specific	The concept of induction, its components (recognition and activation) and the
	UC – 8,	immune	main stages. Mediators (costimulators) of intercellular cooperation: their
	GPC - 4,	response.	classification and functional characteristics. T-dependent and T-independent
	GPC - 5,	Induction	antigens, superantigens.
	GPC - 10,	phase/	
5	PC = 10	Realizatio	Realization of the immune response (cellular and humoral link) and the
5.	UC = 1, UC = 8	n	concept of immunological memory. The complement system The nature of
	GPC - 4,	immune	the components, activation pathways (classical and alternative pathways).
	GPC - 5,	response	Biologically active factors of the complement system and their properties.
	GPC - 10,	-	History of development and substantiation of the theory of phagocytic
	PC - 16		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 cytolysis, antibody-
			mechanisms interferon
6	UC - 1	Anti-	Definition of the concept of "immunity" Types and forms of immunity
0.	UC - 8.	infective	Levels of protection - skin, mucous membranes, loose connective tissue,
	GPC - 4,	immunity	regional lymph nodes, blood, organs. Protection effectors and their
	GPC - 5,		manifestations. Features of immunity and its manifestations in various
	GPC - 10,		diseases.
	PC - 16	<b>D</b> 1	
7.	UC - 1,	Fundame	Development of the doctrine of immunoprophylaxis and immunotherapy of
	UU - 8,	ntals of	Infectious diseases. E.Jenner, L. Pasteur. Principles of immunoprophylaxis.
	Urt - 4,	minunopr	modern classification and methods of preparation of vaccines.

	GPC - 5,	ophylaxis,	Seroprophylaxis and serotherapy.
	GPC - 10,	immunoth	Concepts of active and passive immunity. The main methods of
	PC - 16	erapy and	serodiagnostics.
		serodiagn	
		ostics.	
8.	UC - 1,	Immunolo	Immunological method in the diagnosis of infectious diseases. Antibody titer.
	UC – 8,	gical	Qualitative and quantitative seroconversion. Evaluation of immunological
	GPC - 4,	method in	parameters. Principles of the study of antibodies, T and B lymphocytes.
	GPC - 5,	the	Complement, phagocytosis
	GPC - 10,	diagnosis	
	PC - 16	of	
		infectious	
		diseases.	
9.	UC - 1,	Types of	Types of allergic reactions. Allergodiagnostics. Immunodeficiency.
	UC – 8,	allergic	Autoimmune diseases. Classification. Principles of diagnostics.
	GPC - 4,	reactions.	
	GPC - 5,	Allergodi	
	GPC - 10,	agnostics.	
	PC - 16	Immunod	
		eficiency.	