

Ministry of Health of the Russian Federation
Federal State Budgetary Educational Institution
Higher education
"DAGESTAN STATE MEDICAL UNIVERSITY"
(FSBEI HE DSMU of the Ministry of Health of Russia)



APPROVES

Vice-Rector for Academic Affairs,
Doctor of Medical Sciences, Professor
R.M. Ragimov

"01" 07 2022

WORK PROGRAM OF THE DISCIPLINE
«MICROBIOLOGY, VIROLOGY»

Index of discipline according to the curriculum – **B1.O.25**
Direction of training (specialty) - **31.05.01 General Medicine**
Level of higher education **specialist**
Qualification of the graduate - **medical doctor**
Faculty of **Medical**
Department of **Microbiology, Virology and Immunology**
Form of **full-time** education
Course **2**
Semester **III - IV**
Total labor intensity (in credit units/hours) **7 c.u./ 252 hours**
Lectures **50 hours**
Practical (seminar) classes **112 hours**
Independent work - **54 hours**
Exam control form in **the IV** semester

Makhachkala 2022

The work program of the discipline "Immunology" was developed in accordance with the Federal State Educational Standards of Higher Education in the direction of training (specialty) 31.05.01 General Medicine, approved by the order of the Ministry of Education and Science of the Russian Federation No. 988 of August 12, 2020.

The work program of the discipline was approved at the meeting of the department of "29" June 2022 Minutes No. 18

The work programme has been agreed upon:

1. Director of NMB DSMU _____ Musaeva V.R.
2. MR KKO _____ Karimova A.M.
3. Dekan _____ Savzhikhanov R.T.

Head of the Department – Doctor of Biological Sciences, Professor S.M. Omarova



Developer(s) of the work program:

1. Omarova S.M. - Doctor of Biological Sciences, Professor, Head of the Department of Microbiology, Virology and Immunology
2. Isaeva R.I. – Associate professor of the Department of Microbiology, Virology and Immunology
3. Saidova B.M. - Associate professor of the Department of Microbiology, Virology and Immunology

Reviewers:

1. Saidov M.Z. – Associate professor, training director of the Department pathological physiology
2. Korkmasova M.A. – Associate professor of the Department of Microbiology, Virology and Immunology

I. THE PURPOSE AND OBJECTIVES OF MASTERING THE DISCIPLINE

The purpose of studying the discipline "Microbiology, Virology" is to form the ability and readiness to perform professional tasks in the field of medical activities aimed at making a preliminary diagnosis based on the results of microbiological studies and the selection of drugs for adequate specific prevention and therapy of infectious diseases.

The objectives of the discipline are:

- acquisition by students of knowledge about the classification of microbes, the structure and functioning of microbes as living systems, their role in ecology and decontamination methods, including the basics of disinfectology and sterilization techniques;
- acquisition by students of knowledge about the patterns of interaction of the human body with the world of microbes, about epidemiology, pathogenesis of major infectious diseases, about the features of the epidemic process, about the mechanisms of development of the immune response to infectious and non-infectious agents (antigens);
- teaching students the principles and techniques of modern methods of laboratory diagnosis of infectious diseases, interpretation of the results obtained when conducting microbiological, molecular-biological and immunological studies of biological fluids, virus-containing materials and pure cultures of microbes;
- teaching students the choice and methods of preventive measures to prevent bacterial, fungal, parasitic and viral diseases, as well as the tactics of anti-epidemic measures in the focus of infection;
- teaching students to choose the optimal treatment regimens for infectious and opportunistic human diseases (bacterial, fungal, parasitic, viral);
- formation of students' skills in working with scientific literature;
- familiarization of students with the principles of organizing work in the microbiological laboratory, with measures for labor protection and safety.

II. PLANNED LEARNING OUTCOMES IN THE DISCIPLINE

Competencies formed in the process of studying the discipline

Competence code and name (or parts of it)	Code and name of the competency achievement indicator
General Professional Competencies (GPC)	
GPC-5 Is able to assess morpho-functional, physiological states and pathological processes in the human body to solve professional problems	ID-1 GPC-5 Evaluates morpho-functional processes in physiological conditions
know: systematics, classification, structure, physiology, genetics and ecology of microorganisms-causative agents of infectious diseases; basic patterns and mechanisms of development of the infectious process, the role of pathogen microorganisms in the infectious process, ways of realizing their pathogenic potencies in the human body; influence of virulence factors of pathogens on the morphofunctional state and physiological processes of the human body be able to: identify and analyze the patterns of epidemiology and mechanisms of pathogenesis of infectious diseases; conduct microbiological methods for diagnosing infectious diseases possess: skills in assessing and interpreting the results of microbiological methods for diagnosing infectious diseases; knowledge of the principles of the organization of viruses, their systematics and taxonomy, evolution and emergence of viruses; knowledge of modern physicochemical methods of studying the structural organization of viral particles of various nature and their components; including methods of electron microscopy, including cryoelectronic; methods of molecular spectroscopy, mass spectrometry, etc.	

	ID-2 GPC-5 Evaluates morpho-functional processes in pathological conditions
<p>know: systematics, classification, physiology and ecology of microorganisms-causative agents of infectious diseases; basic patterns and mechanisms of development of the infectious process, the role of pathogen microorganisms in it and ways of realizing their pathogenic potencies in the human body; microbiological foundations of chemotherapy of infectious diseases; principles of obtaining and using vaccines, therapeutic and therapeutic diseases. prophylactic serums, immunoglobulins, bacteriophage preparations; national calendar of preventive vaccinations and calendar of preventive vaccinations for epidemic indications</p> <p>be able to: identify and analyze the patterns of epidemiology and mechanisms of pathogenesis of infectious diseases; conduct microbiological methods for diagnosing infectious diseases; determine the sensitivity of infectious disease pathogens to antibiotics</p> <p>possess: skills in assessing and interpreting the results of microbiological methods for diagnosing infectious diseases; skills in selecting drugs for adequate specific prevention and therapy of infectious diseases; provides an understanding of the mechanisms of pathogenesis of viral infections.</p>	

III. PLACE OF DISCIPLINE IN THE STRUCTURE OF THE EDUCATIONAL PROGRAM

The discipline "Microbiology, Virology" belongs to the mandatory part B1.O.25 according to the curriculum of the specialty 31.05.01 General Medicine.

The antecedents, on which the discipline "Microbiology, Virology" is directly based, are "History of Medicine", "Latin Language", "Biology, Ecology", "Histology, Embryology, Cytology", "Biological Chemistry", "Pharmacology", "Pathological Physiology".

The discipline "Microbiology, Virology" is fundamental for the study of the following disciplines: "Public Health and Public Health", "Military Hygiene", "Clinical Laboratory Diagnostics", "General Hygiene, Social and Hygienic Monitoring", "Infectious Diseases, Parasitology".

The development of competencies in the process of studying the discipline contributes to the formation of knowledge, skills and abilities that allow for effective work on the implementation of the following types of tasks of professional activity:

Medical activities:

- Prevention of the occurrence of diseases among the population through preventive and anti-epidemic measures;
- diagnostics of diseases and pathological conditions;
- Participation in the provision of emergency medical care in conditions requiring urgent medical intervention;

Research:

- analysis of scientific literature and official statistical reviews, participation in statistical analysis and public presentation of the results obtained;
- participation in solving certain research and scientific-applied problems in the field of health care in the diagnosis, treatment, medical rehabilitation and prevention.

IV. SCOPE OF DISCIPLINE AND TYPES OF EDUCATIONAL WORK

The total labor intensity of the discipline is 7 credits

Type of educational work	Total hours	Semesters	
		III	IV
Contact work of students with the teacher	162	108	54
Classroom classes (total)	162	108	54
Including:			
Lectures (L)	50	32	18
Practical exercises (PE)	112	76	36
Laboratory classes (LC)			
Independent work of the student (IWS)	54	36	18
Type of intermediate certification (test, exam)	36, copies.	Credit	36, copies.
Total labor intensity:			
Hours	252	144	108
credits	7	4	3

V. CONTENT OF THE WORK PROGRAM OF THE DISCIPLINE

5.1. Sections of the discipline and competence that are formed during their study

№ time Case	Name of the discipline section	Contents	Code supervised competence (or part of it)
1	2	3	4
1.	Introduction of microbiology. Systematics of microorganisms. Bacterial morphology	<p>The subject and tasks of microbiology. The connection of the subject with other disciplines. History of Microbiology. Modern achievements. Types of microbiological laboratories, rules of operation, laboratory equipment. Safety briefing. The diversity of the world of microbes and its representatives, the features of the organization. The importance of the works of great microbiologists for the development of science. Bodies.</p> <p>Microbiology: subject, tasks, objects of study. Historical stages of development of microbiology. Systematics, nomenclature, classification of microorganisms.</p> <p>Microbiology (from the Greek micros - small, bios - life, logos - the doctrine, i.e. the doctrine of small forms of life) - the science that studies organisms invisible to the naked eye, i.e. microorganisms (microbes).</p> <p>Microorganisms are invisible to the naked</p>	ID-1 GPC-5

		<p>eye representatives of all the kingdoms of life. They play a crucial role in the economy, the cycle of substances in nature, in the normal existence and pathology of plants, animals, humans. Microbes represent the largest and most diverse group of living beings.</p> <p>Microorganisms carry out the cycle of substances and energy in nature. With the help of microorganisms, important production processes are carried out - bakery, winemaking and brewing, production of organic acids, enzymes, food proteins, hormones, antibiotics and other medicines.</p> <p>Pathogenic microorganisms (microbes-pathogens) are the causative agents of human, animal, and plant diseases. Microorganisms that acquire pathogenicity for humans (the ability to cause diseases) in the process of evolution cause epidemics that claim millions of lives. To date, infectious diseases caused by microorganisms remain one of the main causes of mortality, causing significant damage to the economy.</p> <p>The subject of microbiology is the study of the biological properties of microorganisms: morphology, physiology, systematics, genetics, ecology, i.e. relationship with other forms of life and the external environment.</p> <p>The main objects of study of microbiology are the lowest eukaryotes (parasitic fungi and protozoa), prokaryotes (bacteria, actinomycetes, spirochetes, rickettsia, chlamydia and mycoplasma), as well as viruses.</p> <p>Stages of development of microbiology: Heuristic - J. Fracastoro; Descriptive (micrographic) - A. Leeuwenhoek; Physiological - L. Pasteur, R. Koch; Immunological - I. I. Mechnikov, P. Ehrlich; Virological - D. I. Ivanovsky; Modern (molecular genetic).</p> <p>In microbiology, special terms are widely used: strain, pure culture, clone. A <i>strain</i> is a culture isolated from a particular source, or from the same source at different times. Strains are indicated either by protocol numbers, or by the source of excretion (human, animal, external environment), or</p>	
--	--	---	--

		by terrain. (to the city) where it was allocated.	
2.	Physiology of microorganisms. Antagonism of bacteria	<p>The physiological value of proteins, carbohydrates, lipids contained in the bacterial cell. Energetic and constructive metabolism of bacteria. Nutrition of bacteria. Feeding phases. Sources of nitrogen, carbon, minerals growth factors. Holophytic method of nutrition. Plastic (constructive) metabolism: biosynthesis of carbohydrates, amino acids, lipids. Ion exchange. Energy metabolism. Ways of obtaining energy in photoautotrophs, chemoautotrophs, chemoorganotrophs. Aerobes, anaerobes, facultative anaerobes, microaerophiles. Pigments.</p> <p>Growth and reproduction of bacteria. Rate and phases of reproduction under standard conditions. The concept of M-concentration. Principles and conditions of bacterial culture. The concept of a pure culture of a microbe, a strain, a clone. Methods for isolating pure cultures of aerobic bacteria. Cultural properties of aerobic bacteria. Requirements for nutrient media. Classification of nutrient media. Ways to create anaerobic conditions. Nutrient media used for the cultivation of anaerobes. Methods of isolation of pure cultures of anaerobes. The concept of asepsis, antiseptic, sterilization and disinfection. The effect of physical factors on microorganisms. Sterilization methods, goals, principles, equipment. Quality control of sterilization. Antiseptic and disinfectant substances.</p> <p>Biochemical properties of bacteria. Enzymes of microorganisms, their classification. Permanent and non-permanent enzymes, genetic regulation. Exo- and endoenzymes. Specificity of the action of enzymes. Pathogenicity enzymes. Methods for studying the enzymatic activity of bacteria and using it to identify bacteria (cultural and biochemical). Use of enzymes in the microbiological industry.</p> <p>Microbiological basis of antibiotic therapy and prevention. History of the development of chemotherapy. Microbial antagonism, its mechanisms. Antibiotics, their classification (by chemical structure, mechanism, spectrum of action), obtaining</p>	ID-1 GPC-5

		<p>antibiotics. The mechanism of action of antibiotics on the microbial cell. Bactericidal and bacteriostatic effect of antibiotics. Antibacterial drugs. Units of measurement of antimicrobial activity of antibiotics. The concept of a minimum inhibitory concentration (MIC) and a therapeutic dose. Methods for studying the sensitivity of bacteria to antibiotics in vitro. Antibiotics of choice directed against obligate non-spore-forming anaerobic microorganisms. Principles of rational antibiotic therapy. Drug resistance. Mechanism of formation (genetic and biochemical mechanisms of drug resistance). Side effects of antibiotics. Complications of antibiotic therapy. Antiviral chemotherapy drugs and interferon inducers.</p>	
3.	Ecology and genetics of microorganisms	<p>Ecology (Latin oikos - house, dwelling, logos - science) - the science of the relationship of living beings, their relationship with each other and with the environment. The term "ecology" was introduced in 1866 by Haeckel. A significant contribution to the development of ecology was made by S. N. Vinogradsky (the doctrine of soil microorganisms) and V. I. Vernadsky (the doctrine of the biosphere). The objects of ecology are species, populations of organisms, ecosystems and the biosphere as a whole. At first, ecology developed slowly. But by the 60s of the twentieth century. accumulated many negative factors in nature caused by human activity: severe pollution of the environment with industrial waste, pesticides, radioactive emissions; depletion of natural resources; disappearance or severe change of many natural systems (water bodies, forests, swamps).</p> <p>A biotope (ecological niche) is a territorially limited area of the biosphere with relatively homogeneous living conditions. A population is a collection of individuals of the same species living in the same biotope.</p> <p>Biocenosis is a set of populations of different species of organisms living in a particular biotope. Microbiocenosis - a set</p>	ID-1 GPC-5

		<p>of populations of microorganisms living in a certain biotope - is the most important object of study of ecological microbiology. An ecosystem is a biotope with a biocenosis inhabiting it. The biosphere is a set of Earth's ecosystems (the living shell of the planet). Environmental factors are elements of the habitat or environmental conditions to which microorganisms react with adaptive reactions. Ecovar is a variant of the species adapted to living in a certain ecosystem (host species, hospital environment, food product).</p> <p>Soil is the main reservoir and natural habitat of microorganisms (bacteria, fungi, protozoa, and viruses). Soil microorganisms take part in the cycle of substances in nature, as well as in the processes of soil formation and purification. The vital activity of microorganisms in the soil, their qualitative and quantitative composition is determined by soil conditions: the presence of nutrients, humidity, aeration, environmental reaction, temperature.</p> <p>Water is a natural habitat for various microorganisms. The microflora of water is divided into autochthonous and allochthonous. Autochthonous (own) microflora is represented by microorganisms that constantly live and multiply in water: <i>Micrococcus candidans</i>, <i>Sarcina lutea</i>, <i>Pseudomonas fluorescens</i>, <i>Bacillus cereus</i>. In the silt, at the bottom of water bodies, anaerobic bacteria live. Allochthonous (drifting) microflora enters open water bodies from soil, air, animal and human organisms and dramatically changes the microbial biocenosis and sanitary regime. The quantitative and qualitative composition of the water microflora depends on the composition and concentration of mineral and organic substances, temperature, pH, water velocity, massiveness of stormwater, fecal-household and industrial wastewater.</p> <p>The atmosphere is an unfavorable environment for the reproduction of microorganisms, which is due to the lack of nutrients and lack of moisture. Despite this, microorganisms in the air are constantly present. Their vital activity in</p>	
--	--	--	--

		<p>the air is provided by suspended particles of water, mucus, dust. Due to their low weight, microorganisms easily spread with air currents. Atmospheric air and indoor air differ significantly in the quantitative and qualitative composition of the microflora.</p> <p>Bacterial genetics is the science of the heredity and variability of bacteria.</p> <p>Bacterial heredity is the ability of bacteria to retain and transmit parental traits to daughter cells. Bacteria have a number of important advantages over other organisms and are a convenient material for genetics, because:</p> <ul style="list-style-type: none"> - have a short generation period: many bacteria divide every 20-40 minutes and quickly accumulate biomass; - many of them are easily cultivated in the laboratory on relatively simple nutrient media; - the small size of microorganisms makes it possible to obtain in one test tube or cup and to study mass populations consisting of 10^8 - 10^{10} individual cells, and thereby identify such rare events as mutation or transmission of an acquired trait, without complex auxiliary means and being content with a small space; - they are haploid (have one set of genes), which excludes the dominance of traits; - have a high frequency of recombinations and mutations; - genetic metabolism goes beyond the species; - some have sexual differentiation in the form of donor and recipient cells; - have various DNA fragments integrated into chromosomes and separate ones. <p>The genetic apparatus of bacteria is represented by chromosomal (nucleoid) and extrachromosomal (plasmids, insertion sequences, transposons) structures.</p>	
4.	Infection and immunity	<p>Infection (Latin "infectio" - infection), or infectious process is a complex of pathological, protective-adaptive and compensatory reactions and processes that occur in a susceptible organism when it interacts with a pathogenic or conditionally pathogenic microorganism under certain environmental conditions.</p> <p>There are 3 participants in the infectious process:</p> <p>Several manifestations of symbiotic relationships:</p>	ID-1 GPC-5

		<ul style="list-style-type: none"> • <i>mutualism</i> - both cohabitants do not harm each other, but on the contrary benefit (for example, nodule bacteria and legume plants); this is mutually beneficial cohabitation; • <i>commensalism</i> - one of the cohabitants lives at the expense of the other, but does not harm him (for example, the normal microflora of all natural biotopes of the human body); • <i>true parasitism</i> - one organism lives at the expense of another and brings harm to it. <p>The role of the microorganism in the infectious process.</p> <p>The infectious process can only be caused by a pathogenic or conditionally pathogenic microorganism (patos - suffering, genes - giving birth).</p> <p>Pathogenicity (pathogenicity) is the potential ability of a microorganism to cause an infectious process in a person (animal) sensitive to it.</p> <p>Pathogenicity is a species trait of a microorganism that is genetically determined. This feature reflects the potential ability of the microorganism to penetrate into the macroorganism (infectivity), multiply and spread in it (invasiveness), causing a complex of pathological reactions that occur during the disease.</p> <p><i>Opportunistic microorganisms</i> are microorganisms that cause an infectious process only under certain conditions. Pathogenicity can be realized or not. It depends on virulence.</p> <p>Virulence is a measure of pathogenicity, its phenotypic manifestation.</p> <p>Virulence has its own qualitative and quantitative characteristics. This is an individual rather than a species trait (young colonies are more virulent, old and R-forms of colonies are less virulent).</p> <p>Weakening the virulence of microorganisms was first undertaken by Louis Pasteur (live vaccines against chicken cholera, anthrax, rabies were created). Purposeful weakening of virulence is <i>attenuation</i>.</p>	
--	--	--	--

		<p>The role of macroorganism in the infectious process.</p> <p><i>Susceptibility</i> is a genetically determined trait, it is the ability to respond to the introduction of a microorganism by the development of an infectious process; it is associated with the reactivity of cells.</p> <p><i>Resistance</i> is the resistance of the body, which is caused by non-specific factors of anti-infectious protection. Factors that weaken the protective functions of the body contribute to the spread of infection, and those that increase resistance - prevent it.</p> <p><i>The entrance "gates" of infection</i> are tissues that lack physiological protection against specific microorganisms (i.e., the place through which the microorganism penetrates into the macroorganism).</p> <p>Infectious disease is one of the phases of development of the infectious process (terminal phase), its extreme degree of manifestation.</p> <p><i>Immunology</i> is a general biological medical science that studies the structure and functioning of the immune system, the ways and mechanisms of the body's defense against genetically foreign substances of exogenous and endogenous origin.</p> <p><i>General immunology</i> studies the immunological processes and mechanisms of regulation of immunogenesis at the molecular, cellular and organismal levels.</p> <p>Depending on the object of study in <i>private immunology</i>, a number of areas are distinguished: infectious immunology, immunoprophylaxis, vaccinology, immunology of malignant tumors (immuno-oncology), transplantation immunology, allergology, environmental immunology, immunology of embryogenesis, reproductive (immunology of the mother and fetus), immunobiotechnology, immunochemistry, immunogenetics, etc.</p> <p><i>Infectious immunology</i> develops methods for the prevention, diagnosis and treatment of infectious diseases.</p> <p>Methods (mechanisms, levels) of protection of the human body from infections</p>	
--	--	---	--

		<i>Immunity</i> is an integral system of biological mechanisms of self-defense of the body, with the help of which it recognizes and destroys everything foreign (genetically different from it) that has penetrated the body from the outside or formed in it.	
5.	Microbiological diagnostics coccum and anaerobic infections	<p>Pathogenic cocci</p> <p>Staphylococci. General characteristics. Characteristics of toxins and pathogenicity enzymes. Pathogenesis of staphylococcal infections, their role in hospital infections. The importance of staphylococcal infections in pediatric pathology. Microbiological diagnostics. Drugs for specific prevention. Streptococci. Taxonomy. Biological properties. Characteristics of toxins and pathogenicity enzymes. Pathogenesis of streptococcal infections. Features of immunity. The role of streptococci in respiratory infections, erysipelas, sore throat, acute glomerulonephritis, rheumatism, sepsis. Etiology and microbiological diagnosis of scarlet fever. Streptococci pneumonia. General characteristics. Pathogenicity factors. Microbiological diagnostics. Meningococci. Biological properties. Forms of meningococcal infection. Microbiological diagnostics. Drugs for specific prevention. Gonococci. Biological properties. Pathogenesis of gonococcal infections. Microbiological diagnosis of acute and chronic gonorrhea. Specific prevention.</p> <p>Causative agents of anaerobic infections. Anaerobic bacteria (spore-forming). Clostridia. Biological properties. Pathogenicity to humans. Clostridia is a wound anaerobic infection. General characteristics. Pathogenicity factors, toxins. Pathogenesis. Antitoxic immunity. Laboratory diagnostics. Specific treatment and prevention. Clostridia tetanus. Morphology, cultural, antigenic properties. Pathogenicity factors. Tetanus in newborns. Laboratory diagnostics. Specific treatment and prevention. Clostridia botulism. Morphology, cultural, biochemical, antigenic properties. Pathogenicity factors. Pathogenesis of the disease. Immunity. Specific treatment and</p>	ID-2 GPC-5

		<p>prevention. Anaerobic gram-positive cocci. Peptococci, peptostreptococci. Biological properties. Pathogenicity factors. Role in pathology. Anaerobic gram-negative cocci. Veillonella. Biological properties. Role in pathology. Gram-negative non-spore-forming anaerobic bacteria. Childbirth: bacterioids, fusobacteria, propionobacteria, eubacteria. Classification. Ecology. Biological properties. Pathogenicity to humans. Features of non-clostridial infections. Principles of microbiological diagnostics. Specific prevention and treatment.</p>	
6.	Microbiological diagnosis of acute intestinal infections	<p>Bacteria - causative agents of OKI</p> <p>Enterobacteria. General characteristics of the family Enterobacteriaceae. Morphobiological, cultural, biochemical properties. Classification. Escherichia. The main properties of pathogenic escherichia. Classification. The importance of escherichia in the pathology of childhood. Pathogenesis of escherichiasis caused by various strains of Escherichia (EPCP, EICP, ETCP, O-157). Immunity. Laboratory diagnostics. The role of Escherichia as a conditionally pathogenic flora. The role of opportunistic strains in human pathology. Prevention and treatment.</p> <p>Shigella. Morphobiological properties. Modern classification. Pathogenesis of dysentery. Chronic dysentery. Microbiological diagnostics. Features of the course of dysentery in children and adults. Prevention, specific therapy.</p> <p>Salmonella. Morphobiological properties. Kaufman-White classification. Pathogenicity to humans and animals. Salmonella are the causative agents of typhoid and paratyphoid. Morphobiological properties. Antigenic structure. Pathogenesis of the disease. Pathogenetic foundations of microbiological diagnostics. Features of immunity. Bacterial carriage. Preparation of monoreceptor agglutinating O and H serums. Specific prevention and treatment of typhoid fever. Salmonella are the causative agents of salmonellosis. The main factors of pathogenicity of pathogens and their manifestations in the</p>	ID-2 GPC-5

	<p>pathogenesis of infection. Features of microbiological diagnostics. Principles of treatment. Salmonella are the causative agents of nosocomial infections.</p> <p>Yersinia are the causative agents of intestinal yersiniosis. Morphobiological characteristics. Ecology and distribution. Pathogenesis of the disease. Immunity. Clinical manifestations. Microbiological diagnostics. The causative agent of pseudotuberculosis. Morphobiological properties. Transmission routes. Basics of pathogenesis and clinical forms. Microbiological diagnosis of pseudotuberculosis. Representatives of other genera of the enterobacteria family that play a role in human pathology. Hafnium, Edwardsiella, Klebsiella, Protea, etc. Morphobiological properties. Methods of microbiological diagnostics. Role in hospital-acquired infections.</p> <p>Convolutated bacteria. Vibrio are the causative agents of cholera. Biological properties, biovars. Classification of Vibrio. Pathogenicity factors. Toxins and their characteristics. Pathogenesis and immunity in cholera. Methods of microbiological diagnostics. Specific prevention. Parahemolytic Vibrio. Cultural, biochemical, serological signs. Biovars. Microbiological diagnostics and therapy. Campylobacters and Helicobacters. Causative agents of campylobacteriosis. Morphobiological properties. Transmission routes. Features of the clinical course. Pathogenesis. The role of Helicobacter in the occurrence of gastric ulcer of the 12th duodenum. Microbiological diagnostics.</p> <p>Causative agents of food toxicoinfections and intoxications. The concept of food toxicoinfections and intoxications. Causative agents of food intoxication. Morphobiological properties. Pathogenesis, clinical course. Features of microbiological diagnostics. Specific prevention and treatment. Causative agents of food toxicoinfections. General characteristics. Pathogenesis, clinic and microbiological diagnostics. Features of food toxicoinfection in children. Conditionally pathogenic microorganisms,</p>	
--	--	--

		causative agents of OKI. Characteristics of pathogens. Ways of infection. Features of opportunistic infections. The role of representatives of resident microflora in their occurrence. Forms of opportunistic infections. Dysbacteriosis. Classification of dysbacteriosis by pathogen and localization. Principles and criteria for microbiological diagnosis of CSI caused by UPF.	
7.	Microbiological diagnostics airborne infections	<p>Gram-positive aerobic bacteria. Mycobacteria. Causative agents of tuberculosis. Morphological, cultural, antigenic, allergenic properties. Pathogenicity factors. Tuberculin. Pathogenesis of tuberculosis. Features of immunity. Laboratory diagnostics. Antimicrobial drugs. Specific prevention. The causative agent of leprosy. Morphology, cultivation, pathogenesis, immunity. Microbiological diagnostics. Specific prevention. Corynebacteria. The causative agent of diphtheria. General characteristics. Biovars. Pathogenicity factors. Pathogenesis. Antitoxic immunity. Microbiological diagnostics. Specific treatment and prevention.</p> <p>Gram-negative sticks are non-spore-forming. Hemoglobinophilic bacteria. General characteristics. Biological properties. Role in human pathology. The causative agent of whooping cough. Morphological, cultural, antigenic properties. Pathogenicity to humans. Pathogenesis of the disease. Immunity. Laboratory diagnostics. Specific prevention.</p>	ID-2 GPC-5
8.	Microbiological diagnosis of especially dangerous infections	<p>Bacterial zoonanthroponosis. Characteristics of especially dangerous zoonotic infections. Sanitary-epidemiological regime in anti-plague laboratories. The causative agent of anthrax. Morphological, cultural, biochemical, antigenic properties. Pathogenicity factors. Transmission routes. Forms of infection. Microbiological diagnostics. Specific prevention. The causative agent of the plague. Morphobiological properties. Ways of infection, forms of infection. Pathogenesis,</p>	ID-2 GPC-5

		immunity. Methods of microbiological diagnostics, specific prevention. The causative agent of tularemia. Morphobiological properties. Pathogenesis, immunity. Methods of microbiological diagnostics and specific prevention. The causative agent of brucellosis. Morphobiological properties. Transmission routes. Forms of infection. Pathogenesis. Immunity. Chronic brucellosis. Methods of microbiological diagnostics. Specific prevention and therapy.	
9.	Microbiological diagnosis of transmissible infections	Pathogenic rickettsia, chlamydia, mycoplasma. Biological properties. Features of cultivation. Rickettsiosis. Classification. Characteristics of anthroponotic rickettsiosis (typhus, Brill-Cinser disease). The causative agent of epidemic typhus and Brill-Zinser disease. Morphobiological properties. Aetiology. Cultivation. Toxin formation. Ways of infection. Immunity. Laboratory diagnostics. Specific prevention. Endemic rickettsiosis (group of spotted fevers; Tsutsugamushi fever, endemic (rat) typhus). Aetiology. Transmission routes. Immunity. Microbiological diagnostics. Specific prevention. Pneumotropic rickettsiosis (Q fever). Morphobiological properties. Ways of infection. Pathogenesis. Immunity. Microbiological diagnostics. Specific prevention. Pathogenic mycoplasmas. Morphobiological characteristics of pathogenic mycoplasmas. Types of mycoplasmas pathogenic to humans. The importance of mycoplasmas in the pathology of pregnancy and fetus. Virulence factors. Features of the immune response. Mycoplasmas are causative agents of pneumonia, acute respiratory diseases, urethritis, endocarditis. Ureaplasma. Pathogenesis. Forms of infection. Immunity. Microbiological diagnosis of mycoplasmosis. Antimicrobial drugs. Prophylaxis. Pathogenic chlamydia. General characteristics. Ecology. Cultivation. Antigenic structure. Pathogenicity factors. Chlamydia is a role	ID-2 GPC-5

		<p>in pediatric pathology. The causative agent of ornithosis. Pathogenicity to humans and animals. Pathogenesis and immunity. Laboratory diagnostics. Antimicrobial drugs. The causative agent of trachoma. Pathogenicity to humans. Transmission routes. Role in urogenital pathology. Conjunctivitis of newborns. Pathogenesis. Laboratory diagnostics. Prophylaxis. Antimicrobial therapy. The causative agent of inguinal lymphogranulomatosis. Morphobiological properties. Transmission routes. Forms of infection. Pathogenesis. Immunity. Microbiological diagnostics. Prophylaxis. Reiter's disease. Pathogenesis. Immunity. Laboratory diagnostics. Antimicrobial therapy.</p> <p>Pathogenic spirochetes. General characteristics and differential properties of pathogenic spirochetes. Treponemas. The causative agent of syphilis. Morphological, cultural properties. Specific therapy. Congenital syphilis. The causative agents of tropical treponematoses are badger, yaws, yaws, yaws. Morphological and cultural properties. Ways of infection. Pathogenesis. Microbiological diagnostics. Borrelia. Causative agents of epidemic and endemic relapsing typhus (Lyme disease). Morphological and cultural properties. Pathogenesis and immunity. Microbiological diagnostics. Specific prevention, treatment. Leptospira. General characteristics and differentiation of basic properties. Causative agents of leptospirosis. Morphological and cultural properties. Serovars. Pathogenicity. For humans and animals. Pathogenesis. Immunity. Microbiological diagnostics. Specific prevention. Legionella. The causative agent of Legionnaires' disease. Morphological, cultural properties. Antigenic structure. Pathogenesis. Microbiological diagnostics. Prophylaxis.</p>	
10.	Microbiological diagnostics fungal and protozoal Infections	<p>Pathogenic fungi. General characteristics and classification of microscopic fungi - causative agents of mycoses in humans. Morphobiological properties of dermatophytes - causative agents of microsporia, trichophytosis, pathogenesis, clinical manifestations.</p>	ID-2 GPC-5

		Principles and methods of laboratory diagnostics of dermatophytosis. Yeast-like fungi of the genus <i>Candida</i> . Morphological and cultural properties. Pathogenesis and clinical properties. Pathogenesis and clinical forms of candidiasis. Laboratory diagnostics. Principles of treatment. The causative agents of deep mycoses, blastomycosis, histoplasmosis, cryptococcosis, coccidiosis. Morphological and cultural properties. Laboratory diagnostics. Antimicrobial drugs.	
11.	Microbiological diagnosis of viral infections	<p>The structure of bacteriophages. Morphological types. Virulent and moderate phages. Production, typing and practical application. The mechanism of interaction of the phage with the bacterial cell. Lysogenia. Phase conversion. The use of bacteriophages (phagoidentification, prevention, treatment). Reproduction of viruses. The main stages of interaction between the virus and the cell. Interference. Defective interfering particles. Satellite viruses. Types of interaction between viruses and cells: productive, abortive, iterative. Methods of culturing viruses. Features of the pathogenesis of viral infections. General scheme of virological studies. Indication and identification of viruses using RSK, RTGA, RIA, RIF, ELISA, PCR.</p> <p>Causative agents of influenza and parainfluenza. Orthomixoviruses. Morphology and structure. Features of reproduction. Laboratory diagnosis of influenza. Prevention and treatment. The causative agent of parainfluenza (paramyxoviruses). Morphology and structure. Laboratory diagnostics. The causative agent of measles. Features of the structure and reproductions. Specific prevention of measles. The causative agent of rubella. Features of the structure. Ways of transmission of rubella, the basis of pathogenesis, the role in the pathology of the fetus. Laboratory diagnostics. Specific prevention.</p> <p>Causative agents of herpetic infections. General characteristics and classification. Structure. Antigens. Herpes viruses pathogenic to humans: herpes 1, P, U1</p>	ID-2 GPC-5

		<p>types, chickenpox, shingles, cytomegaly, Epstein-Barr. Biological properties. Role in human pathology. Laboratory diagnostics. Specific prevention. Treatment.</p> <p>Picornaviruses are causative agents of poliomyelitis, ECHO infections, Coxsackie, enteroviruses. Characteristics of viruses. Antigens. Pathogenesis. The role of enteroviruses in human pathology. Pathogenesis of poliomyelitis and other enterovirus infections. Immunity. Specific prevention. Laboratory diagnostics.</p> <p>Rotaviruses. Classification. General characteristics. Role in pathology. Laboratory diagnostics. Rotavirus gastroenteritis in children. The causative agents of hepatitis with parenteral mechanisms of infection (B, C, D, G). Morphology and structure. Laboratory diagnostics. Specific prevention.</p> <p>The causative agents of viral hepatitis with an enteral mechanism of infection (A, E, F). Picornaviruses. Classification. Morphology and structure. Laboratory diagnostics. Specific prevention.</p> <p>Causative agents of HIV and other slow infections. Retroviruses. General characteristics. Classification. Morphology. Variability and its mechanisms. Pathogenesis of HIV infection. Immunological disorders. AIDS-associated infections. Laboratory diagnostics. Prospects for prevention.</p> <p>Slow viral infections. Modern ideas about pathogens. Persistence of viruses, its mechanisms: defective interfering particles, etc. General characteristics of pathogens: measles virus, rabies, lentiviruses, Vilyui encephalitis virus. Causative agents of Kuru, Skrepi, Creutzfeldt disease. Prions. Methods of detection.</p> <p>Arboviruses. Ecological group of viruses transmitted by arthropods with natural focality: Togaviridae, Flaviviridae, Bunyaviridae, Reoviridae, Azenaviridae, Rhabdoviridae. Properties of viruses. Laboratory diagnostics. Specific prevention.</p> <p>Oncogenic viruses. Oncogenic DNA - containing viruses (family Papovaviridae,</p>	
--	--	---	--

		herpesviruses, etc.). General characteristics, pathogenesis of carcinogenesis. Oncogenic RNAs are viruses (family of retroviruses). Morphology, classification.	
--	--	---	--

5.2. Sections of discipline and labor intensity by types of educational work

№ Raz- dela	Semester	Name of the discipline section	Types of educational work, hour.					All- go hour.
			classroom				external classro om IWS	
			L	PE/ KPE	C	LC		
1.	3	Introduction of microbiology. Systematics of microorganisms. Bacterial morphology	4	24	-	-	4	32
2.	3	Physiology of microorganisms. Antagonism of bacteria	8	18	-	-	6	32
3.	3	Ecology and genetics of microorganisms	4	12	-	-	4	20
4.	3	Infection and immunity	12	9	-	-	16	37
5.	3	Microbiological diagnosis of coccal and anaerobic infections	4	13	-	-	6	23
6.	4	Microbiological diagnosis of acute intestinal infections	4	12	-	-	4	20
7.	4	Microbiological diagnosis of airborne infections	2	4	-	-	4	10
8.	4	Microbiological diagnosis of especially dangerous infections	2	4	-	-	2	8
9.	4	Microbiological diagnosis of transmissible infections	2	6	-	-	2	10
10.	4	Microbiological diagnostics of fungal and protozoal infections	4	2	-	-	2	8
11.	4	Microbiological diagnosis of viral infections	4	8	-	-	4	16
Total:			50	112	-	-	54	216

5.3. Thematic plan of lectures

No. Case	Discipline section	Topics of lectures	Number of hours per semester	
			III	IV

1.	Introduction of microbiology. Systematics of microorganisms. Bacterial morphology	L 1. Introduction to Microbiology. Systematics of microorganisms. The structure of a bacterial cell. Morphology of bacteria.	4	
2.	Physiology of microorganisms. Antagonism of bacteria	L.2. Physiology of microorganisms.	4	
		L 3. Antagonism of bacteria. Antibiotics. Bacteriophage.	4	
3.	Ecology and genetics of microorganisms	L.4. Genetics of microorganisms. Phenotypic and genotypic variation. Mutations. Recombination. Molecular biological diagnostic methods.	4	
4.	Infection and immunity	L.5. Infection. Pathogenicity. Virulence. Pathogenicity factors. Forms of infections.	4	
		L.6. Immunity. Types of immunity. Innate immunity. Immune system.	4	
		L.7. Acquired immunity. Antigens. Antibodies. Serological diagnosis of infectious diseases.	4	
5.	Microbiological diagnosis of coccal and anaerobic infections	L.8. Causative agents of purulent infections. Anaerobes.	4	
Total in semester No3			32	
6.	Microbiological diagnosis of acute intestinal infections	L.9. Microbiological diagnostics of intestinal infections. The causative agents of escherichiasis, typhoid fever and paratyphoid. Causative agents of salmonellosis. Food toxicoinfections.		2
		L.10. Causative agents of shigellosis and cholera. Diagnosis of campyl-helicobacteriosis. Yersineosis.		2
7.	Microbiological diagnosis of airborne infections	L.11. Microbiological diagnostics of diphtheria and whooping cough. Microbiological diagnosis of tuberculosis.		2
8.	Microbiological diagnosis of especially dangerous infections	L.12. Microbiological diagnostics of zoonotic infections: plague, anthrax, brucellosis, tularemia.		2
9.	Microbiological diagnosis of transmissible infections	L.13. Microbiological diagnostics of spirochetosis, rickettsiosis		2

10.	Microbiological diagnosis of fungal and protozoal infections	L.14. Microbiological diagnostics of candidiasis		2
		L.15. Microbiological diagnosis of protozoal infections		2
11.	Microbiological diagnosis of viral infections	L.16. Microbiological diagnosis of ARVI. Influenza virus. HIV. Herpesviruses. polio viruses, Coxsackie, ECHO. Hepatitis		4
Total in semester No4				18
TOTAL:				50

5.4. Thematic plan of practical exercises

No raz- dela	Partition Discipline	Topics of practical exercises	Forms of current control	Number of hours per semester	
				III	IV
1.	Introduction of microbiology. Systematics of microorganisms. Bacterial morphology	PE.1 "Mode of operation in the bacteriological laboratory. Microscopy methods. The immersion system of the microscope. Morphology of bacteria»	T, Pr, R	3	
		PE.2 "Morphology of bacteria. The technique of preparing a smear preparation. Simple painting methods»	S, Pr, AP	3	
		PE.3 "The structure of the bacterial cell. L forms of bacteria. Sophisticated staining techniques. Gram and Neisser staining."	S, Pr, AP	3	
		PE.4 "The structure of the bacterial cell. Acid-resistant bacteria. Disputes. Methods of their coloring"	S, Pr, AP	3	
		PE.5 "The structure of the bacterial cell. Capsules. Flagella. Burri-Gins Staining Method"	S, Pr, AP	3	
		PE.6 Morphology of actinomycetes, spirochetes, rickettsia, chlamydia, mycoplasmas	S, Pr, AP	3	
		PE.7 Morphology of fungi and protozoa. Morphology of viruses	S, Pr, AP	3	
		PE.8 Final test session on topics 1-7	S, T	3	
2.	Physiology of microorganisms. Antagonism of bacteria.	PE.9 "The effect of physical and chemical factors on microorganisms. Methods of sterilization. Disinfection»	S, Pr, AP	3	
		PE.10 "Nutrient media. Cultivation of bacteria. Isolation of pure culture of	S, Pr, AP	3	

		aerobic bacteria (1 day of study)»			
		PE.11 "Nutrition, growth and reproduction of microbes. Isolation of a pure culture of aerobic bacteria (day 2 of the study). Study of the cultural properties of bacteria"	S, Pr, AP	3	
		PE.12 "Growth and reproduction of bacteria. Enzymes and pigments of bacteria. Bacteriological examination of aerobes (3-4 days of the study). Study of biochemical properties of the selected culture"	S, Pr, AP	3	
		PE.13 "Types of respiration of bacteria. Cultivation of anaerobic bacteria (bacteriological study of the soil)»	S, Pr, AP	3	
		PE.14 "Antagonism of bacteria. Antibiotics. Methods for determining sensitivity to antibiotics. Bacteriophages (basic properties)"	S, Pr, AP T	3	
3.	Ecology and genetics of microorganisms	PE.15 "Genetics of microorganisms. Modifications, mutations. Genetic recombinations. Molecular biological method of diagnostics»	S, Pr, AP,	3	
		PE.16 "Normal microbiota of the human body. Research Methods»	S, Pr, AP	3	
		G.17 "Microbiota of air, water, soil, research methods"	S, Pr, AP	3	
		FG.18 Final control session on topics 9-17	S, T	3	
4.	Infection and immunity	PE.19 "The Doctrine of Infection. Infectious process. Methods of diagnosis of infectious diseases. Methods of infection and autopsy of laboratory animals. Pathogenicity and virulence. Pathogenicity factors"	S, Pr, ZS, T, R	3	
		PE.20 "Immunity. Types of immunity. Non-specific factors of immunity (lysozyme, complement). Phagocytosis. Indicators of phagocytic activity of cells»	S, pr, ZS, R	3	
		PE.21 "Antigens. Antibodies. Serological reactions. Agglutination reaction. RPGA. The precipitation reaction and its variants. Toxin neutralization reaction. Lysis reactions (bacteriolysis, hemolysis). Complement binding reaction (RSC)"	S, Pr, AP	3	
5.	Microbiological diagnosis of coccal and anaerobic infections	PE.22 "Causative agents of purulent infections. Microbiological diagnostics of staphylococcal, streptococcal infections»	S, Pr, AP R	3	
		PE.23 "Microbiological diagnosis of	S, Pr, AP	3	

		meningococcal and gonococcal infections"			
		PE.24 Microbiological diagnosis of anaerobic infections: tetanus, gas gangrene, botulism. Non-sporeogenic anaerobes"	S, Pr, AP	3	
		PE.25 Final correspondence session on topics 19-24	S, T	4	
Total per semester				76	
6.	Microbiologic al diagnosis of acute intestinal infections	PE.1 "General characteristics of the family Enterobacteriaceae. Escherichiasis. Microbiological diagnostics of escherichiasis»	S, Pr, AP		2
		PE.2 "Bacteriological and serological diagnosis of typhoid fever, paratyphoid A and B"	S, Pr, AP		2
		PE. 3 "Microbiological diagnostics of food toxicoinfections and intoxications"	S, Pr, AP		2
		PE.4 "Microbiologic diagnosis of shigellosis, campyl-, helicobacteriosis. Microbiological diagnosis of yersiniosis"	S, T, Pr, ZS, R		2
		PE.5 "Microbiological diagnosis of cholera"	S, Pr, AP		2
		PE.6 Final test session on topics 1-6	S, T, ZS		2
7.	Microbiologic al diagnosis of airborne infections	PE. 7 "Microbiological diagnosis of tuberculosis. Mycobacteriosis»	S, Pr, AP		2
		PE. 8 "Microbiological diagnosis of diphtheria, whooping cough"	S, Pr, AP		2
8.	Microbiologic al diagnosis of especially dangerous infections	PE. 9 "Especially dangerous zoonotic bacterial infections. Microbiological diagnostics of plague, tularemia"	S, Pr, AP		2
		PE.10 "Microbiological diagnosis of brucellosis and anthrax"	S, pr, ZS, R		2
9.	Microbiologic al diagnosis of transmissible infections	PE.11 "Microbiological diagnosis of spirochetosis	S, Pr, AP		2
		PE.12 "Microbiological diagnosis of rickettsiosis, chlamydia, mycoplasmosis"	S, Pr, ZS R		2
		PE.13 Final test session on topics 7-12	S, T, ZS		2
10.	Microbiologic al diagnosis of fungal and protozoal infections	PE.14 Fungi. Pathogens of mycoses. Microbiological diagnosis of protozoal infections. "Opportunistic infections. Nosocomial infections (HMIs)"	S, Pr, AP,		2
11.	Microbiologic al diagnosis of viral infections	PE.15 "Methods for diagnosing viral infections. COMMON COLD. Influenza. Coronavirus infection»	S, Pr, AP R		2
		PE. 16 "Enterovirus infections:	S, Pr, AP		2

		poliomyelitis viruses, Coxsackie, ECHO, viral hepatitis"			
		PE. 17 "Microbiological diagnosis of HIV infection. Herpes viruses. Oncogenic viruses»	S, Pr, AP		2
		PE. 18 Final lesson on topics 13 to 17	S, T		2
Total per semester					36
TOTAL:					112

5.5. Educational and methodological support for independent work on the discipline

5.5.1. Independent work of the student by discipline

No p/n	Partition Discipline	Title of works	Work Capacity (hour)	Forms of control
1.	Introduction of microbiology. Systematics of microorganisms. Bacterial morphology	Preparation for practical exercises - filling in the main drawings and terms of the section morphology of bacteria in the workbook; study of educational and scientific literature.	4	S, T, ZS, R
2.	Physiology of microorganisms. Antagonism of bacteria	Preparation for practical exercises - filling in the main drawings and terms of the section physiology of bacteria in the workbook; study of educational and scientific literature. Abstracts on the works of Koch, Pasteur and Mechnikov. Preparation for practical exercises - filling in the main drawings and terms of the section in the workbook; study of educational and scientific literature;	6	S, T, ZS
3.	Ecology and genetics of microorganisms	Preparation for practical exercises - filling in the workbook of the main terms of the section; preparation of abstracts on the section ecology of microorganisms.	4	S, T, ZS
4.	Infection and immunity	Preparation for practical exercises - filling in the workbook the basic terms of the section infection and immunity; solution of situational problems on the topic.	16	S, T, ZS, R
5.	Microbiological diagnosis of coccal and	Preparation for practical exercises - filling in the workbook protocols of the	6	S, T, ZS

	anaerobic infections	section microbiological diagnosis of coccal infections; abstract messages on microbiological diagnostics of purulent-inflammatory diseases		
6.	Microbiological diagnosis of acute intestinal infections	Preparation for practical exercises - filling in the workbook protocols of the section microbiological diagnosis of intestinal infections; abstract messages on the topics: "Features of microbiological diagnostics of colienteritis".	4	S, T, ZS, R
7.	Microbiological diagnosis of airborne infections	Preparation for practical exercises - filling in the workbook protocols section microbiological diagnosis of droplet infections.	4	S, T, ZS
8.	Microbiological diagnosis of especially dangerous infections	Preparation for practical exercises - filling in the main terms of the section of especially dangerous zoonotic infections in the workbook. Study of educational and scientific literature.	2	S, T, ZS
9.	Microbiological diagnosis of transmissible infections	Preparation for practical exercises - filling in the workbook protocols of the section microbiological diagnosis of transmissible infections.	2	S, T, ZS, R
10.	Microbiological diagnosis of fungal and protozoal infections	Preparation for practical exercises - filling in the workbook protocols of the section microbiological diagnosis of coccal infections; abstract messages on microbiological diagnostics of fungal and protozoal infections	2	S, T, ZS
11.	Microbiological diagnosis of viral infections	Preparation for practical exercises - filling in the drawings and terms of the section microbiological diagnostics of viral infections in the workbook; study of educational and scientific literature; preparation of abstracts on the topics "Viral hepatitis" and "Oncogenic viruses"	4	S, T, ZS, R
Altogether			54	
	Exam Preparation	Work with electronic educational resources placed in the electronic information system of DSMU	24	
	Exam		12	

5.5.2. Methodical instructions for students on mastering the discipline

This section of the work program of the discipline is developed as an independent document "Methodological recommendations for the student" in the form of an appendix to the work program of disciplina.

VI. ASSESSMENT TOOLS FOR ONGOING PERFORMANCE MONITORING AND

INTERMEDIATE CERTIFICATION BASED ON THE RESULTS OF THE DISCIPLINE

6.1. Current monitoring of academic performance

6.1.1. List of competencies indicating the stages of their formation in the process of mastering the work program of the discipline

№ Time Case	Name of the discipline section	Supervised competency code (or parts of it)	Forms of control
1	2	3	4
1.	Introduction of microbiology. Systematics of microorganisms. Bacterial morphology	ID-1 GPC-5	S, T, ZS, R
2.	Physiology of microorganisms. Antagonism of bacteria	ID-1 GPC-5	S, T, ZS
3.	Ecology and genetics of microorganisms	ID-1 GPC-5	S, T, ZS
4.	Infection and immunity	ID-1 GPC-5	S, T, ZS, R
5.	Microbiological diagnosis of coccal and anaerobic infections	ID-2 GPC-5	S, T, ZS
6.	Microbiological diagnosis of acute intestinal infections	ID-2 GPC-5	S, T, ZS, R
7.	Microbiological diagnosis of airborne infections	ID-2 GPC-5	S, T, ZS
8.	Microbiological diagnosis of especially dangerous infections	ID-2 GPC-5	S, T, ZS, R
9.	Microbiological diagnosis of transmissible infections	ID-2 GPC-5	S, T, ZS, R
10.	Microbiological diagnostics of fungal and protozoal infections	ID-2GPC-5	S, T, ZS
11.	Microbiological diagnosis of viral infections	ID-2 GPC-5	S, T, ZS, R

6.1.2. Examples of assessment tools for current and milestone monitoring of academic performance

SECTION 1. Introduction microbiology. Systematics of microorganisms.

Bacterial morphology

Topic of lesson No1. The subject and tasks of microbiology. Stages of development.

Codes of controlled competencies: ID-1GPC-5

1. L. Pasteur - the founder of microbiology as a science. Influence of Pasteur's works on the development of medical microbiology.

2. The works of R. Koch and their significance in practical microbiology and infectious pathology.

3. I.I. Mechnikov and his doctrine of immunity to infectious diseases.

4. The significance of the discovery of D.I. Ivanovsky. Stages of development of virology.
5. Light microscope, its device, resolving power and work with it in a microbiological laboratory. Study of microbes in light, fluorescent and other microscopes.
6. Simple and complex methods of coloring microbes. Principles of coloring according to Gram, Zil-Nielsen, Neisser. Romanovsky-Giemsa, their application.
7. Stages of development of bacteriology. Principles of classification of bacteria. The concept of species. Culture. Strain. Clone.
8. Structure of a bacterial cell: shell, nuclear substance, cytoplasm, capsules, spores, inclusions, flagella. Chemical composition of bacteria. Groups of bacteria.
9. Morphology and ultrastructure of fungi. Systematics of fungi. Cultural properties Pathogenic representatives.
10. Morphology of protozoa. Principles of classification. Pathogens for humans protists.
11. 0 Features of morphology and biology of viruses. Principles of classification.
12. Structure and chemical composition of viruses.

Criteria for assessing the current monitoring of academic performance (security interview):

✓ "Excellent":

The student has deep knowledge of the educational material on the topic of the practical lesson, formulated a complete and correct answer to the questions of the topic of the lesson, in compliance with the logic of the presentation of the material, shows the assimilation of the relationship of the basic concepts used in the work, was able to answer all clarifying and additional questions. The student demonstrates knowledge of theoretical and practical material on the topic of the lesson.

✓ "Good":

The student showed knowledge of the educational material, mastered the basic literature, was able to answer almost completely all the additional and clarifying questions asked. The student demonstrates knowledge of theoretical and practical material on the topic of the lesson, allowing minor inaccuracies.

✓ "Satisfactory":

The student as a whole mastered the material of the practical lesson, answered not all clarifying and additional questions. The student finds it difficult to correctly assess the proposed task, gives an incomplete answer that requires leading questions from the teacher.

✓ "Unsatisfactory":

The student has significant gaps in the knowledge of the main educational material of the practical lesson, did not fully disclose the content of the questions, could not answer clarifying and additional questions. The student gives an incorrect assessment of the situation, incorrectly chooses the algorithm of actions. An unsatisfactory grade is given to a graduate who refuses to answer the questions of the topic of the practical lesson.

TESTING

SECTION 1. Introduction microbiology. Systematics of microorganisms. Bacterial morphology

The topic of lesson No. 2-3. Morphology and physiology of microorganisms
Codes of controlled competencies: ID-IGPC-5

Choose one or more of the correct answers:

Task 1

The essence of the discovery of D.I. Ivanovsky:

1. creation of the first microscope
2. +virus discovery
3. discovery of the phenomenon of phagocytosis
4. obtaining rabies vaccine
5. discovery of the phenomenon of transformation

Task 2

The following scientific discoveries are associated with the name of Louis Pasteur: (a) the development of a method for the attenuation of microorganisms; b) the discovery of the phenomenon of phagocytosis; c) creation of an anti-rabies vaccine; d) discovery and study of fermentation processes in microorganisms; e) introduction into the practice of microbiology of the method of isolation of pure cultures of bacteria on dense nutrient media. Choose the right combination of answers:

1. a, b, d
2. b, c, d
3. a, g, d
4. G, G, D
5. b, d, d

Task 3

Anthropoanotic infections include: (a) campylobacteriosis; b) shigellosis; c) typhoid fever; d) gonorrhea; e) legionellosis. Choose the right combination of answers:

1. a, b, c
2. b, c, d
3. G, G, D
4. a, g, d
5. b, d, d

Task 4

The toxic effect of molecular oxygen on obligate anaerobes is due to the accumulation of:

- 1) Pyruvate
- 2) Final fermentation products
- 3) +hydrogen peroxide
- 4) Carbon dioxide
- 5) Glyceraldehydophosphate

Task 5

Microaerophiles include:

- 1) +brucella
- 2) *Vibrio cholerae*
- 3) *Diphtheria bacilli*
- 4) *Salmonella*
- 5) *E. coli*

Task 6

Not capable of growth and reproduction in vitro:

- 1) *Mycobacterium tuberculosis*
- 2) +*mycobacterium leprosy*
- 3) *Gonococci*

- 4) Meningococci
- 5) causative agents of tularemia

Criteria for assessing the current monitoring of academic performance (testing):

- ✓ "Excellent": 100-90%
- ✓ "Good": 89-70%
- ✓ "Satisfactory": 69-51%
- ✓ "Unsatisfactory": <50%

PRACTICAL SKILLS

SECTION 1. Introduction microbiology. Systematics of microorganisms.

Bacterial morphology

The topic of lesson No. 2-3. Morphology of microorganisms

Codes of controlled competencies: ID-1 GPC-5

1. STUDY OF BACTERIAL MORPHOLOGY

- 1.1 Technique of preparation of a microbiological preparation;
- 1.2 Coloring of the preparation by a simple and complex method of coloring;
- 1.3 Microscopy of the finished product.

Criteria for assessing the current monitoring of academic performance:

- ✓ "Unsatisfactory":

The student does not have practical skills in microbiology.

- ✓ "Satisfactory":

Student has basic skills, but makes mistakes and inaccuracies in the scientific terminology used and when answering to. The student is basically able to independently state the main points in the material studied. The student is able to master the skill of preparing a microbiological preparation.

- ✓ "Good":

The student has knowledge of all the studied program material, the material is presented consistently, makes minor mistakes and shortcomings in the reproduction of the studied material. The student does not have sufficient skill in working with reference literature, textbooks, primary sources; correctly orients, but works slowly with a microscope.

- ✓ "Excellent":

The student independently identifies the main provisions in the studied material and is able to give a brief description of the main ideas of the developed material. The student has the skill of demonstrating the preparation and coloring of drugs. The student shows a deep and complete knowledge of the sections of morphology and physiology of microorganisms.

ABSTRACT

SECTION 1. Introduction microbiology. Systematics of microorganisms.

Bacterial morphology

Codes of controlled competencies: ID-1 GPC-5

Topics of abstracts:

1. "The role of Louis Pasteur in the development of microbiology"
2. "Great Russian Microbiologists"

Criteria for assessing current control (abstract):

- Novelty of the refereed text: max. – 20 points;
- Degree of disclosure of the essence of the problem: max. – 30 points;
- Validity of the choice of sources: max. – 20 points;
- Compliance with the requirements for registration: max. – 15 points;
- Literacy: max. – 15 points.

Evaluation of the essay:

The abstract is evaluated on a 100-point scale, the points are translated into academic performance assessments as follows (points are taken into account in the process of current assessment of the knowledge of the program material):

- ✓ 86 – 100 points – "excellent";
- ✓ 70 – 75 points – "good";
- ✓ 51 – 69 points – "satisfactory";
- ✓ less than 51 points - "unsatisfactory".

INTERVIEWS ON CONTROL QUESTIONS BY SECTIONS OF THE DISCIPLINE

SECTION 1. Introduction microbiology. Systematics of microorganisms.

Bacterial morphology

The topic of the practical lesson. "Morphology of bacteria. The technique of preparing a smear preparation. Simple painting methods".

Codes of controlled competencies: ID-1 GPC-5

1. Distribution and role of microbes in nature.
2. Types and mechanisms of nutrition of microbes.
3. Respiration of microbes, its types.
4. Growth and reproduction of microbes (generation time, reproduction phases, etc.).
5. Enzymatic activity of microbes, its importance and methods of study.
6. Cultivation of pathogenic microbes. Artificial nutrient media. Classification.
7. Isolation of pure crops of aerobes.
8. Isolation of pure cultures of anaerobes.
9. Nutrient media for the cultivation of microbes.
10. Sterilization methods. Equipment and conditions of sterilization.
11. The effect of physical and chemical factors on microorganisms. The concept of sterilization, disinfection, asepsis and antiseptic.
12. The phenomenon of antagonism of microbes. Antibiotics.

Criteria for assessing the current monitoring of progress (interview):

"Unsatisfactory":

✓ Knowledge: the student is not able to independently identify the main provisions in the studied material of the discipline. Does not know or understand much or most of the program material within the questions posed.

✓ Skills: The student does not know how to apply incomplete knowledge to solving specific questions and situational problems according to the model.

✓ Skills: The student does not have practical skills in microbiology.

"Satisfactory":

✓ Knowledge: the student has mastered the main content of the material of the discipline, but has gaps in the assimilation of the material that do not prevent the further assimilation of the educational material in the discipline "Microbiology, Virology". Has unsystematized knowledge in the sections of the discipline. The material is presented fragmentarily, not sequentially.

✓ Skills: the student has difficulties in presenting the material in the sections of the discipline "Microbiology, Virology". The student inconsistently and systematically knows how to use incomplete knowledge of the material. The student finds it difficult to apply the knowledge necessary to solve problems of various situational types, when explaining specific concepts in the sections "Microbiology, Virology"

✓ Skills: the student has basic skills, but makes mistakes and inaccuracies in the scientific terminology used and in microbiology answers. The student is basically able to independently make the main points in the material studied. The student is able to master the skill of using some microbiological methods.

"Good":

✓ Knowledge: The student is able to independently identify the main provisions in the studied material. Shows knowledge of all the studied program material. Gives a complete and correct answer based on the studied theoretical and practical materials; minor errors and shortcomings in the reproduction of the studied material, definitions of concepts gave incomplete, small inaccuracies when using scientific terms.

✓ Skills: The student is able to independently highlight the main provisions in the studied material; on the basis of facts and examples to generalize, draw conclusions, establish intra-subject connections. The student is able to use the knowledge gained in practice in a modified situation, to observe the basic rules of the culture of oral speech, to use scientific terms.

✓ Skills: The student has knowledge of all the studied program material, the material is presented sequentially, makes minor mistakes and shortcomings in the reproduction of the studied material. The student does not have sufficient skill in working with reference literature, textbooks, primary sources; correctly orients, but works slowly with a microscope.

"Excellent":

✓ Knowledge: The student independently identifies the main provisions in the studied material and is able to give a brief description of the main ideas of the developed material of the discipline "Microbiology, Virology". He knows the basic concepts in the sections of microbiology and virology. Shows a deep knowledge and understanding of the entire volume of program material.

✓ Skills: The student is able to make a complete and correct answer on the basis of the material studied, highlight the main provisions, independently confirm the answer with various situational tasks, independently and reasonably make analysis, generalizations,

conclusions. To establish interdisciplinary (on the basis of previously acquired knowledge) and intra-subject connections, creatively apply the knowledge gained to solve microbiological problems. Consistently, clearly, coherently, reasonably and accurately present the educational material; give an answer in a logical sequence using the accepted terminology; draw your own conclusions; formulate a precise definition and interpretation of the basic concepts and rules; when answering, do not repeat verbatim the text of the textbook; to present the material in literary language; correctly and thoroughly answer additional questions of the teacher. Independently and rationally use visual aids, reference materials, a textbook, additional literature, primary sources.

✓ Skills: The student independently identifies the main provisions in the studied material and is able to give a brief description of the main ideas of the developed material. The student has the skill of preparing a microbiological smear and its microscopy. The student shows a deep and complete knowledge of the entire volume of the discipline being studied.

SITUATIONAL TASKS BY SECTIONS OF THE DISCIPLINE

SECTION 6. Practical lesson No1. Private Microbiology: Microbiological Diagnosis of Intestinal Infections

Codes of controlled competencies: ID-2 GPC-5

Target 1.

When sowing the child's feces on Endo medium, red colonies with a metallic luster were obtained. With 10 colonies, an indicative agglutination reaction with polyvalent O-serum was performed. The reaction was negative with all ten colonies. What conclusion will you give on the conducted bacteriological study?

Target 2.

When the child's feces were sown, red colonies grew on Endo Wednesday and dark blue colonies on Levin's medium, one colony out of 10 selected colonies gave a positive agglutination reaction with polyvalent O-serum. What is the further course of the study?

Target 3.

When studying the biochemical properties of the culture isolated from the feces of the child, the following result was obtained: fermentation of glucose, lactose, maltose and mannitol to acid and gas, sucrose is not fermented. Hydrogen sulfide and indole, ammonia are formed on the BCH. For which microbe from the intestinal group is this characteristic?

Target 4.

A patient with food poisoning was admitted to the clinic. How to isolate the pathogen? What is the material for the study? What nutrient media should the material be sown on?

Criteria for assessing the current control of academic performance (situational tasks):

✓ "Excellent":

The answer to the question of the problem is given correctly. The explanation of the course of its solution is detailed, consistent, competent, with theoretical justifications (including from the lecture course), with the necessary schematic images and demonstrations on drugs, with correct and fluent mastery of microbiological terminology; the answers to additional questions are correct, clear.

✓ "Good":

The answer to the question of the problem is given correctly. The explanation of the course of its solution is detailed, but not logical enough, with isolated errors in details, some difficulties in the theoretical justification (including from lecture material), in schematic images and demonstrations on diagrams, with isolated errors in the use of microbiological terms; the answers to additional questions are correct, but not clear enough.

✓ "Satisfactory":

The answer to the question of the problem is given correctly. The explanation of the course of its solution is not complete enough, inconsistent, with errors, weak theoretical justification (including lecture material), with significant difficulties and errors in schematic images, demonstrations on diagrams, in the use of microbiological terms; the answers to additional questions are not clear enough, with errors in detail.

✓ "Unsatisfactory":

The answer to the question of the problem is given incorrectly. The explanation of the course of its solution is given incomplete, inconsistent, with gross errors, without theoretical justification (including lecture material); answers to additional questions are incorrect (missing).

TESTING BY DISCIPLINE SECTIONS

SECTION 7. Private microbiology.

Microbiological diagnosis of airborne infections.

Codes of controlled competencies: ID-2 GPC-5

Task 1

The causative agents of particularly dangerous infections are

- 1) *Yersinia pestis*
- 2) *Mycobacterium tuberculosis*
- 3) *Staphylococcus aureus*
- 4) *Clostridium tetani*
- 5) *Salmonella typhi*

Task 2

A reaction is used to detect anthrax antigen

- 1) Vidal
- 2) Wright

- 3) Heddison
- 4) +Ascoli
- 5) Coombs

Task 3

The causative agent of the plague is morphologically

- 1) +bipolar colored gram-negative, immobile, small sticks rounded shape
- 2) Gram-positive cocci, arranged in the form of a chain
- 3) Gram-positive sticks with rounded ends
- 4) Gram-negative movable rods that do not form spores and capsules

Task 4

Opportunistic infections are called infections caused by microorganisms:

- (a) Pathogenic
- b) +opportunistic
- c) non-pathogenic
- d) viruses
- e) mycoplasmas

Task 5

What microorganisms cause health care-related infections (ISIS):

- (a) Pathogenic
- b) +opportunistic
- c) non-pathogenic
- d) viruses
- e) mycoplasmas

Task 6

What properties do nosocomial strains of bacteria that cause hospital infections have:

- (a) + multi-resistance to antibiotics
- b) reduced virulence
- c) hypersensitivity to antiseptics
- d) all of the above is true
- e) all of the above is not true

Criteria for assessing the current monitoring of academic performance (tests):

- ✓ "Excellent": 100-90%
- ✓ "Good": 89-70%
- ✓ "Satisfactory": 69-51%
- ✓ "Unsatisfactory": <50%

6.2. Intermediate certification based on the results of mastering the discipline

6.2.1. Form of intermediate certification – EXAM. Semester - IV

6.2.2. Procedure for intermediate certification - INTERVIEW

6.2.3. Sample Exam Preparation Questions

Codes of controlled competencies: ID-1, ID-2 GPC-5

I. History of the development of microbiology. Morphology of microorganisms.

1. L. Pasteur is the founder of microbiology as a science. The influence of Pasteur's works on the development of medical microbiology.
2. The works of R. Koch and their importance in practical microbiology and infectious pathology.
3. I.I. Mechnikov and his doctrine of immunity to infectious diseases.
4. The significance of the discovery of D.I. Ivanovsky. Stages of development of virology.
5. A light microscope, its device, the resolving force and working with it in a microbiological laboratory. Study of microbes in light, fluorescent and other microscopes.
6. Simple and complex methods of coloring microbes. Principles of painting according to Gram, Zil-Nielsen, Neisser. Romanovsky -Gimza, their application.
7. Stages of development of bacteriology. Principles of classification of bacteria. The concept of the species. Culture. Strain. Clone.
8. Structure of the bacterial cell: membrane, nuclear substance, cytoplasm, capsules, spores, inclusions, flagella. Chemical composition of bacteria. Groups of bacteria.
9. Morphology and ultrastructure of fungi. Systematics of fungi. Cultural properties Pathogenic representatives.
10. Morphology of protozoa. Principles of classification. Pathogenic to humans protists.

II. Physiology of microorganisms. Genetics of microorganisms.

11. The distribution and role of microbes in nature.
12. Types and mechanisms of nutrition of microbes.
13. Respiration of microbes, its types.
14. Growth and reproduction of microbes (generation time, reproduction phases, etc.).
15. Enzymatic activity of microbes, its importance and methods of study.
16. Cultivation of pathogenic microbes. Artificial nutrient media. Classification.
17. Isolation of pure crops of aerobes.
18. Isolation of pure cultures of anaerobes.
19. Nutrient media for the cultivation of microbes.
20. Methods of sterilization. Equipment and conditions of sterilization.

III. Infection and immunity.

21. Normal microflora of the human body and its functions. Dysbiosis. Eubiotics.
22. Determination of infection, infectious process, infectious disease. Conditions for the occurrence of an infectious process.
23. Forms of the infectious process. Generalized form of infection. Sepsis, bacteremia, toxemia.
24. Viral infection. Forms of interaction of the virus with the macroorganism.
25. Pathogenicity and virulence of microbes. Quantification of virulence.
26. Microbes are parasites and saprophytes. Pathogenic and opportunistic microorganisms. Pathogenicity factors.
27. Characteristics of pathogenic microbes (invasiveness, specificity, virulence, toxicity, etc.).
28. Microbial toxins (exo- and endotoxins). Properties and chemical composition.
29. The role of microorganisms in the infectious process (susceptibility, dose of infection, entrance gate of infection, organotropy).
30. Dynamics of the development of the infectious process, periods. Carriage of pathogenic microorganisms.

IV. Private microbiology.

31. Microbiological methods of diagnosis of infectious diseases.

32. Pathogenic cocci. Staphylococci, morphology, taxonomy, pathogenicity factors. Infectious processes of staphylococcal origin, their microbiological diagnosis.
33. Streptococci, taxonomy, pathogenicity factors, microbiological diagnosis of streptococcal infections.
34. Meningococci, a characteristic of the pathogen. Forms of infection. Microbiological diagnosis - meningococcal infection. Therapeutic and prophylactic drugs.
35. Gonococci. Microbiological diagnosis of gonorrhea.
36. Causative agents of typhoid fever and paratyphoid. Taxonomy. Characteristics of the causative agents of the disease. Pathogenesis of infection, microbiological diagnostics. Therapeutic and prophylactic drugs.
37. Escherichiasis. The role of E. coli in the norm and pathology. Microbiological diagnostics.
38. Causative agents of dysentery. Taxonomy. Characteristics of pathogens. Microbiological diagnostics. Therapeutic and prophylactic drugs.
39. Salmonella - causative agents of food toxicoinfections. Taxonomy. Characteristics of pathogens, pathogenicity factors. Microbiological diagnostics.
40. Causative agents of whooping cough and paraptussis. Taxonomy. Characteristics of pathogens. Pathogenesis of infection, microbiological diagnostics, diagnostic and specific therapeutic and prophylactic drugs.

6.2.4. Exam ticket forms

Codes of controlled competencies: ID-1 GPC-5; ID-2 GPC-5

FSBEI HE DGMU

Ministry of Health of Russia

Department of Microbiology,
Virology and Immunology
in the direction of training
31.05.01 General Medicine

Discipline – Microbiology, Virology

EXAM CARD NO

1. Historical stages of development of medical microbiology.
2. The causative agents of intestinal yersiniosis, their characteristics, microbiological diagnostics.
3. The causative agent of rabies. Characteristics of the virus. Microbiological diagnostics. Specific prevention.
4. Task.

Approved at the meeting of the department, minutes dated June 29, 2022 No. 18

Head of the Department of Microbiology,
Virology and Immunology
Doctor of Biological Sciences, Professor ____

Compilers:

Aliyeva A.I. Dr. med., Associate Professor, Professor
Department of Microbiology,
Virology and Immunology ____

Tsarueva T.V. Ph.D., Associate Professor, Associate Professor
Department of Microbiology,
Virology and Immunology ____

" ____ " ____

Codes of controlled competencies: ID-1 GPC-5; ID-2 GPC-5

FSBEI HE DGMU

Ministry of Health of Russia

Department of Microbiology,

Virology and Immunology

Specialty (direction) -

31.05.01 General Medicine

Discipline – Microbiology, Virology

EXAM CARD NO

1. Dynamics of the development of the infectious process, periods. Carriage of pathogenic microorganisms.
2. Pathogenic cocci. Staphylococci, morphology, taxonomy, pathogenicity factors. Infectious processes of staphylococcal origin, their microbiological diagnosis.
3. The causative agent of Q fever, characteristics, diagnostic methods. Specific prevention.
4. Task.

Approved by the Department, Minutes dated June 27, 2022 No. 18

Head of the Department of Microbiology,
Virology and Immunology
Doctor of Biological Sciences, Professor ____

Compilers:

Aliyeva A.I. Dr. med., Associate Professor, Professor
Department of Microbiology,
Virology and Immunology ____

Tsarueva T.V. Ph.D., Associate Professor, Associate Professor
Department of Microbiology,
Virology and Immunology ____

" ____ " ____

6.2.5. The system of assessing the results of mastering the discipline, description of the assessment scales , grading

Evaluation criteria	Assessment scale			
	"unsatisfactory" (minimum level not reached)	"satisfactory" (minimum level)	"Good" (intermediate level)	"Excellent" (high level)
ID-1 GPC-5				
To know	The student is not capable of abstract thinking He does not know the basics of systematics, nomenclature, morphology and physiology of microorganisms. He does not know the basic concepts of microbiology.	The student has mastered the main content of the material of the discipline, but has gaps in the assimilation of the material that do not prevent the further assimilation of the educational material. Has unsystematic knowledge of the morphology and physiology of microorganisms	The student is able to independently highlight the main provisions in the studied material.	The student independently identifies the main provisions in the studied material and is able to give a brief description of the main ideas of the developed material on the discipline. Shows a deep knowledge and understanding of all sections.
can	The student does not know how to analyze the basic provisions of microbiology	The student has difficulty determining the role of microbiology among other sciences	The student is able to independently present the material obtained from the educational literature	The student is able to use educational, scientific, popular science literature on the subject.
possess	The student does not know the basic basics of the subject	The student has the basic skills of microscopy The student is basically capable of prepare your own micropreparation	The student has the knowledge of everything studied program material, the material is presented sequentially	The student shows a deep and complete knowledge of all sections of microbiology.
ID-2 GPC-5				
To know	The student is not capable of independently solving standard microbiological problems	The student highlights the basic concepts of microbiology, taking into account the material studied. Able to use special	The student has the knowledge of everything studied program material, the material is presented	The student independently identifies the main tasks of the microbiologist,

		terminology, but has gaps in biomedical terminology	sequentially	taking into account the material studied. Able to freely use special terminology, knows the basic safety requirements when working in specialized laboratories.
can	The student does not know how to microscopy on his own	The student knows, but is hampered by microbiological research methods.	The student has the knowledge of everything studied program material, the material is presented and applied sequentially	The student knows and knows how to apply all microbiological skills. Key research methods.
possess	The student does not know the basics of microbiological diagnosis of infectious diseases	The student shows mastery of the subject and methods of bacteriological diagnosis of infectious diseases.	The student has the knowledge of everything studied material on microbiological diagnostics sets out and applies consistently	The student shows a deep and complete mastery of the subject and methods of bacteriology. Clinical diagnosis of infectious diseases.

VII. EDUCATIONAL - METHODOLOGICAL AND INFORMATION SUPPORT OF DISCIPLINE

7.1. Main literature

Print

№	Name of the publication	Number of instances in a library
1.	Zverev, V.V. Medical Microbiology, Virology and Immunology / Zverev V.V., Boychenko M.N. - M., GEOTAR-Media.-2016.-T.1 - 447p.	250
2.	Medical Microbiology, Virology, Immunology / Ed. by Prof. L. B. Borisova. Textbook. - M.: Meditsina, 2001, 2002, 2005. - 528 p.	650

Electronic publications

№	Name of the publication
1.	Medical Microbiology, Virology and Immunology: in 2 vols. Volume 1. / ed. by V.V. Zverev, M.N. Boychenko. - M. : GEOTAR-Media, 2016. – 447 p. // Student consultant: student electronic library: electronic library system. – Moscow, 2019. – Access by password. - URL: http://www.studmedlib.ru/book/ISBN9785970436417.html

2.	Medical microbiology, virology and immunology. In 2 vols. Volume 2. / ed. by V.V. Zverev, M.N. Boychenko. - M.: GEOTAR-Media, 2016. – 447 p. // Student consultant: student electronic library: electronic library system. – Moscow, 2019. – Access by password. - URL: http://www.studmedlib.ru/book/ISBN9785970436424.html
----	---

7.2. Additional literature

Print

№	Name of the publication	Number of instances in a library
1.	Vorobyov, A.A. Atlas of Microbiology, Immunology and Virology: A Textbook / Vorobyov A.A., Bykov A.S. // UMO – M., MIA. – 2005. – 450s. - Text: Direct.	50
2.	Vorobyov, A.A. Guide to practical exercises in microbiology, immunology and virology with illustrated tasks /Vorobyov A.A., Tsareva V.N.// ed. – M., MIA – 2007. – 470 p.– Text: immediate.	10
3.	Pozdeev, O.K. Medical microbiology / ed. by V.I. Pokrovsky. - M.: GEOTAR – Media, 2006, 2005, 2001. - 768 p. – Text: direct.	30
4.	Practicum on Microbiology: A Textbook Ed. by M.M. Medzhidov / Makhachkala.-2014.-326 p. – Text: Direct.	200
5.	Sboychakov, A.A. Medical microbiology, virology and immunology: textbook / A.A. Sboychakov // -SPb., M.-2008.-532 p. – Text: direct.	60

Electronic publications

№	Name of the publication
1.	Microbiology, Virology and Immunology: A Guide to Laboratory Studies / ed. by V.B. Sboychakov, M.M. Karapats. - M. : GEOTAR-Media, 2015. (Doctor-specialist's library) // Consultant doctor: electronic medical library: electronic library system. – Moscow, 2019. – Access by password. – URL: http://www.studmedlib.ru/book/ISBN9785970435755.html
2.	Microbiology, Virology and Immunology: A Guide to Laboratory Studies / ed. by V.B. Sboychakov, M.M. Karapats. - M. : GEOTAR-Media, 2014. (Doctor-specialist's library) // Consultant doctor: electronic medical library: electronic library system. – Moscow, 2019. – Access by password. – URL: http://www.studmedlib.ru/book/ISBN9785970430668.html
3.	Microbiology, Virology: A Guide to Practical Exercises: Studies. posobie / pod red. V.V. Zvereva, M.N. Boychenko - M. : GEOTAR-Media, 2015. (Specialist Doctor's Department) // Consultant doctor: electronic medical library: electronic library system. – Moscow, 2019. – Access by password. – URL: http://www.studmedlib.ru/book/ISBN9785970434956.html
4.	Fundamentals of Microbiology and Immunology / ed. by V.V. Zverev, M.N. Boychenko - M. : GEOTAR-Media, 2014. (Doctor-specialist's library) // Consultant doctor: electronic medical library: electronic library system. – Moscow, 2019. – Access by password. – URL: http://www.studmedlib.ru/book/ISBN9785970429334.html
5.	Microbiology and immunology. Practicum: study. posobie / R. T. Mannapova - M. : GEOTAR-Media, 2013. (Doctor-specialist's library) // Consultant doctor: electronic medical library: electronic library system. – Moscow, 2019. – Access by password. – URL: http://www.studmedlib.ru/book/ISBN9785970427507.html

7.3 Resources of the information and telecommunication network "Internet"

№	Resource name
	<i>For example:</i>
1.	Electronic Library: Dissertation Library: Website / Russian State Library. – Moscow: RSL, 2003. – URL: http://diss.rsl.ru/?lang=ru
2.	Government of the Russian Federation: official website. – Moscow. – Updated during the day. – URL: http://government.ru
3.	Electronic library system "Student Consultant". Access mode: limited by login and password; http://www.studmedlib.ru
4.	Electronic library system "Doctor's Consultant". Access mode: limited by login and password; http://www.rosmedlib.ru
5.	State Central Scientific Medical Library; http://www.scsml.ru/
6.	Federal Electronic Medical Library
7.	Scientific electronic library "CYBERLENINKA"

7.4. Information technologies:

Software:

1. Microsoft Windows 10 Pro Operating System
2. Application packages:
Microsoft Office Standard 2016
It consists of:
Microsoft Word 2016, Microsoft Excel 2016, Microsoft Power Point 2016
3. Antivirus software – Kaspersky Endpoint Security 10 for Windows.

List of information help systems:

1. **Electronic information and educational environment (LMS) of DSMU.** URL: <https://lms.dgmu.ru/>
2. **Student Advisor:** Electronic Library System. URL: <http://www.studentlibrary.ru>.
Electronic library system "Student Consultant". Access mode: limited by login and password; <http://www.studmedlib.ru>
3. **Physician Consultant:** Electronic Library System. URL: <http://www.rosmedlib.ru>.
Electronic library system "Doctor's Consultant". Access mode: limited by login and password; <http://www.rosmedlib.ru>
4. **Federal Electronic Medical Library (FEMB).** URL: <http://feml.scsml.rssi.ru>
5. **Unscientific electronic library eLibrary.** URL: <https://elibrary.ru/defaultx.asp>
6. **Medical Reference and Information System.** URL: <http://www.medinfo.ru/>
7. **Scientific electronic library KiberLeninka.** URL: <http://cyberleninka.ru>
8. **Electronnaya bibliotek RFBR.** URL: <http://www.rfbr.ru/>
9. **A Serossian Educational Internet Programma for Vachei.** URL: <http://www.internist.ru>
10. State Central Scientific Medical Library; <http://www.scsml.ru/>

VIII. MATERIAL AND TECHNICAL SUPPORT OF DISCIPLINE

№ p/n	View of the room with room (classroom, laboratory,	Name of equipment

	computer class) indicating the address (location) of the building, clinical base, structure, structure, premises, area of the room, its purpose.	
1.	Study room No1 (28 m ²) St. Sh. Aliyev 1, 3rd floor. For practical training, current control	Laboratory tables for microbiological research. Cabinet with microscopes and special tools for practical exercises. Tables, diagrams.
2.	Study room No2 (46,5m ²) St. Sh. Aliyev 1, 3rd floor. For practical exercises, current control. For lectures and conferences.	Laboratory tables for microbiological research. Cabinet with microscopes and special tools for practical exercises. Tables, diagrams. Multimedia complex (laptop, projector, screen)
3.	Study room No3 (49 m ²) St. Sh. Aliyev 1, 3rd floor. For practical exercises, current control.	Laboratory tables for microbiological research. Cabinet with microscopes and special tools for practical exercises. Tables, diagrams. Multimedia complex (laptop, projector, screen).
4.	Study room No4 (49 m ²) St. Sh. Aliyev 1, 3rd floor. For practical training, current control, intermediate certification.	Laboratory tables for microbiological research. Cabinet with microscopes and special tools for practical exercises. Tables, diagrams.
5.	Study room No5 (63m ²) St. Sh. Aliyev 1, 3rd floor. For practical exercises, current control	Laboratory tables for microbiological research. Cabinet with microscopes and special tools for practical exercises. Tables, diagrams. Multimedia complex (laptop, projector, screen).
6.	Study room No6 (28 m ²) St. Sh. Aliyev 1, 3rd floor. For practical exercises, current control	Laboratory tables for microbiological research. Cabinet with microscopes and special tools for practical exercises. Tables, diagrams.
7.	Laboratory (24 m ²) St. Sh. Aliyev 1, 3rd floor. For laboratory work to practical exercises	Laboratory tables for microbiological research. Cabinet with dry nutrient media and reagents.
8.	Reading Room of the Scientific Library of DSMU St. Sh. Aliyev 1, 1st floor. (for independent work) .	Table, chairs, educational and scientific literature, computers with Internet access

IX. USE OF INNOVATIVE (ACTIVE AND INTERACTIVE) TEACHING METHODS

The active teaching methods used in the study of this discipline account for 5.5% of the volume of classroom classes (162 hours).

№	Name of the section (list those sections)	Type, name of the topic of the lesson using the forms of active and interactive teaching	Labor intensity (hour)
---	--	---	---------------------------

	in which active and / or interactive forms (methods) of training are used)	methods	
1.	General Microbiology	L.4. Genetics of microorganisms. Phenotypic and genotypic variability . Mutations. Recombinations. Molecular biological diagnostic metods	2
2.	Private Microbiology	L.9. Microbiological diagnostics of intestinal infections. The causative agents of escherichiasis, typhoid fever and paratyphoid. Causative agents of salmonellosis. Food toxicoinfections.	1,5
		L.10. Causative agents of shigellosis and cholera. Diagnosis of campyl-helicobacteriosis. Yersineosis.	1,5
		L.13. Opportunistic infections. Nosocomial infections (ISMP).	2
		L.16. Human immunodeficiency virus. Microbiological diagnosis of AIDS. Herpesviruses.	2
Total			9

X. METODIC DISCIPLINE ASSURANCE

Methodological support of the discipline is developed in the form of a separate set of documents: "Methodological recommendations for lectures", "Methodological recommendations for practical exercises", "Methodological recommendations for the student" in the form of an annex to the work program of the discipline.

XI.FEATURES OF THE ORGANIZATION OF DISCIPLINE TRAINING FOR PERSONS WITH DISABILITIES AND PERSONS WITH DISABILITIES

11.1. Education of disabled persons and persons with disabilities

If necessary, it is carried out by the department on the basis of an adapted work program using special teaching methods and didactic materials compiled taking into account the characteristics of psychophysical development, individual capabilities and the state of health of such students (students).

11.2. In order to master the curriculum of the discipline for disabled people and persons with disabilities, the department provides:

- 1) for disabled persons and persons with visual disabilities:
 - placement in places accessible to students who are blind or visually impaired and in an adapted form of reference information on the schedule of training sessions;
 - the presence of an assistant who provides the necessary assistance to the student;
 - production of alternative formats of methodological materials (large print or audio files);

- 2) for persons with disabilities and persons with hearing disabilities:
- appropriate sound means of reproducing information;
- 3) for disabled persons and persons with disabilities who have disorders of the opor-motor system:
- the possibility of unhindered access of students to educational premises, toilets and other premises of the department. In case of impossibility of unhindered access to the department, organize the educational process in a specially equipped center for individual and collective use of special technical means of training for disabled people and persons with disabilities (1 A. Aliyev Str., biological building, 1st floor).

11.3. Education of students with disabilities can be organized both jointly with other students and in separate groups.

11.4. The list of educational and methodological support for the independent work of students in the discipline.

Educational and methodological materials for the independent work of students from among the disabled and persons with disabilities are provided in forms adapted to the limitations of their health and perception of information:

Categories of students	Form
hearing impairment	- in printed form; - in the form of an electronic document.
Visually impaired	- in printed form in an enlarged font; - in the form of an electronic document; - in the form of an audio file.
With a violation of the opor-motor apparatus	- printed form; - in the form of an electronic document.

This list can be specified depending on the contingent of students.

11.5. Fund of evaluation funds for intermediate certification of students in the discipline.

11.5.1. List of evaluation funds correlated with the planned results of the development of the educational program.

For students with disabilities

Categories of students	Types of valuation tools	Forms of monitoring and evaluation of learning outcomes
Hearing impaired	test	predominantly written verification
Visually impaired	interview	mainly oral inspection (individually)
With a violation of the opor-motor apparatus	solution of remote tests, control questions	organization of control in LMS DSMU , written verification

Students with disabilities and persons with disabilities increase the time for preparing answers to the test, are allowed to prepare for the test using distance educational technologies.

11.5.2. Methodological materials that discredit the procedures for assessing knowledge, skills, abilities and (or) pollination of activities, characterizing the stages of the formation of

competencies.

In carrying out the procedure for assessing the learning outcomes of persons with disabilities and persons with disabilities, it is envisaged to use the technical means necessary for them in connection with their individual characteristics.

The procedure for assessing the learning outcomes of persons with disabilities and persons with disabilities in the discipline provides for the provision of information in forms adapted to the limitations of their health and perception of information:

For visually impaired persons:

- in printed form in an enlarged font;
- in the form of an electronic document;
- in the form of an audio file.

For people with hearing impairments:

- in printed form;
- in the form of an electronic document.

For persons with disorders of the opor-motor system:

- in printed form;
- in the form of an electronic document;
- in the form of an audio file.

This list can be specified depending on the contingent of students.

When carrying out the procedure for assessing the results of training of disabled persons and persons with disabilities in the discipline, the following additional requirements are met, depending on the individual characteristics of the students:

1. instructions on the procedure for conducting the assessment procedure are provided in an accessible form (orally, in writing, orally using the services of a sign language guide);
2. an accessible form for providing tasks of evaluation tools (in printed form, in printed form in an enlarged font, in the form of an electronic document, tasks are read by an assistant, tasks are provided using a sign language guide);
3. an accessible form for providing answers to tasks (written on paper, a set of answers on a computer, using the services of an assistant, orally).

If necessary, for students with disabilities and people with disabilities, the procedure for assessing the results of training in the discipline can be carried out in several stages.

The procedure for assessing the learning outcomes of persons with disabilities and persons with disabilities is carried out using distance educational technologies.

11.6. List of basic and additional educational literature necessary for the development of the discipline.

For the development of the discipline by persons with disabilities and persons with disabilities, basic and additional educational literature are provided in the form of an electronic document in the library fund and / or in electronic library systems. And special textbooks and teaching aids, other educational literature and special technical means of teaching collective and individual use, as well as the services of sign language guides and typhlosurds are provided free of charge. wholesalers.

11.7. Methodical instructions for students on mastering the discipline

In the development of discipline by disabled people and persons with disabilities, individual work is of great importance. Individual work means two forms of interaction with the teacher: individual educational work (consultations), i.e. additional explanation of the educational material and in-depth study of the material with those students who are interested in it, and individual educational work. Individual consultations on the subject are an important factor contributing to the individualization of training and the establishment of educational contact between the teacher and students with disabilities or students with disabilities.

11.8. Description of the material and technical base necessary for the implementation of the educational process in the discipline

The development of the discipline by disabled persons and persons with disabilities is carried out using the means of general and special purpose training:

- lecture hall - multimedia equipment, mobile radio class (for students with hearing impairments); power supplies for individual technical means;
- classroom for practical classes (seminars), multimedia equipment, mobile radio class (for students with hearing impairments);
- training room for independent work - standard workplaces with personal computers; workplace with a personal computer, with a screen access program, a screen zoom program and a braille display for students with visual impairment.

In each auditorium where disabled persons and persons with disabilities study, an appropriate number of places for students should be provided, taking into account their health limitations.

XII. CHANGE SHEET

List of additional and changes made to the work program of the discipline	RP updated at the meeting of the department		
	Date	Number of minutes of the meeting of the department	Signature of the Head of the Department
<p>the following changes are made to the work program</p> <p>1.;</p> <p>2..... etc.</p> <p>or a note is made that it is not advisable to make any changes for this academic year</p>			