METHODOLOGICAL RECOMMENDATIONS FOR PRACTICAL LESSONS

Discipline: Structural organization of human physiological processes

Discipline code: SOFPCh 1203

Title of EP: 6B10115 “Medicine”

Volume of teaching hours/credits: 30 hours (1 credits)

Course – I, **semester of study** – I

Length of lectures: 8 hours

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Methodological recommendations for practical classes were developed in accordance with the work program of the discipline (syllabus) "Microbiology" and discussed at a department meeting.

Protocol № 10 of "05" 06 2024 y.

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Lesson №1

1. Topic: General microbiology and virology. Morphology of bacteria. Microscopic research method.
2. Purpose: To familiarize students with the morphology and structure of a bacterial cell. To study the morphology and structure of bacteria, master the technique of preparing smears and microscopy techniques.
3. Learning objectives: To teach microscopy methods, techniques for preparing microspecimens, and simple staining methods.
4. Main questions of the topic:
1. Morphological features of bacteria.
2. Basic principles of classification of microorganisms.
3. Basic forms of bacteria.
4. Morphological features of prokaryotes.
5. Technique for preparing a smear..
6. Painting technique (simple painting method).
7. Microscopy technique.
5. Basic forms/methods/technologies of training to achieve the final RO of the discipline: Checking conversation, performing laboratory work
6. Types of control for assessing the level of achievement of the final RO of the discipline: checklist.
7. Literature:
Appendix No. 1
8. Control:
Tests:
1.. Prokaryotic cells
A) bacteria
B) protozoa
C) mushrooms
D) plant cells
E) animal cells
2. According to the new classification, gram-positive bacteria belong to the division of the prokaryotic kingdom
A) gracilicutes
B) tenericutes
C) firmicutes
D) mendozicutes
E) molicutes
3. Work with OI cultures in special laboratories is carried out with the permission of the Ministry of Health of the Republic of Kazakhstan
A) Groups I and II

B) Group III
C) IY groups
D) II and II groups
E) I and IY groups
4. Discoverer of living microorganisms
A) D. Ivanovsky
B) L. Pasteur
C) I. Mechnikov
D) R. Koch
E) A. Levenguk
5. Device designed for steam sterilization under pressure
A) Pasteur oven
B) autoclave
C) Koch apparatus
D) water bath
E) centrifuge
6. Diplococci are located in the smear
A) single
B) with the formation of packages, bales
C) in the form of a chain
D) in the form of bunches of grapes
E) in pairs
7. Pasteur oven is used to sterilize
A) saline solution
B) rubber objects
C) glassware
D) culture media
E) synthetic materials
8. Today, microbiological laboratories operate in accordance with sanitary rules approved by order of the Minister of National Economy of the Republic of Kazakhstan dated April 15, 2015 No. ....
A) 338
B) 15
C) 552
D) 10
E) 125
9. Microorganisms that have a round, rod-shaped, convoluted and curved shape include....
A) bacteria
B) mushrooms
C) yeast

D) protozoa
E) Viruses
10. To study the morphology of microorganisms, ... a research method is used.
A) microscopic
B) microbiological
C) biological
D) serological
E) genetic
11.The convoluted shape of bacteria is characteristic of.…
A) spirochete
B) staphylococci
C) bacilli
D) streptococci
E) Sarcin
12. Microorganisms that have different shapes depending on the intracellular development cycle include....
A) chlamydia
B) mycoplasma
C) viruses
D) mushrooms
E) Actinomycytes
13. The smallest polymorphic microorganisms that do not have a rigid cell wall:
A) mycoplasma
B) rickettsia
C) viruses
D) chlamydia
E) bacteria

Lesson №2

1. Topic: Structure of a bacterial cell.
2. Purpose: To study the morphology and structure of bacteria, master the Gram staining technique.
3. Learning Objectives: Teach complex staining techniques (Gram).
4. Main questions of the topic:
1. The structure of a bacterial cell.
2. Features of the cell wall (CW) of gram-positive bacteria.
3. Features of the cell wall (CW) of gram-negative bacteria.
4. L-transformation of bacteria - as the most important adaptive form of bacteria to unfavorable conditions.
5. Cytoplasm, main structural elements and macromolecules of the cytoplasm.

6. Periplasmic space - its role in the functioning of the cell.
7. Capsules of bacteria, their most important properties, methods of detecting them under microscopy.
8. Flagella, donor villi, fimbriae, or cilia - their chemical structure, biological significance for the bacterial cell.
9. Endospores and sporulation - as a protective form of bacteria under unfavorable living conditions.
10. Uncultivated forms of bacteria (NFB) in non-spore-forming microorganisms.
11. Order Spirochaetalis, their morphological features. Intraspecific differentiation based on morphological characteristics.
12. The device of a light microscope.
13. Immersion microscopy.
14. Dark-field microscopy.
15. Phase contrast microscopy.
16. Luminescence microscopy.
17. Electron microscopy.
18. Morphology of bacteria.
19. Preparation of fixed smear preparations.
20. Stages and mechanisms of Gram staining.
21. Features of staining using the methods of Ozheshka, Neisser, Burri-Gins, Ziehl-Neelsen, Romanovsky-Giemsa.

5. Basic forms/methods/technologies of training to achieve the final RO of the discipline: Checking conversation, performing laboratory work

6. Types of control for assessing the level of achievement of the final RO of the discipline: checklist.

7. Literature:

Appendix №1

8. Control:

Tests:

1. Biological microscopes with immersion objective have extreme resolution
A) 200 nm
B) 0.2 μm
C) 0.1 nm
D) 100 nm
E) 10 nm
2. Dark-field microscopy is based on the phenomenon of light diffraction, which can be achieved using
A) electron microscope
B) ordinary condenser
C) fluorescent microscope
D) paraboloid or cardioid condenser

E) immersion microscope
3. Preparations are examined in the immersion microscope system
A) hanging drop
B) crushed drop
C) unfixed smear
D) fixed colored smear
E) fixed stroke
4. The scientist who proposed the use of aniline dyes in studying the morphology of bacteria
A) D. Ivanovsky
B) L. Pasteur
C) I. Mechnikov
D) R. Koch
E) A. Levenguk
5. Dyeing method using ingredients: gentian violet, lugol's solution, 96% ethanol and water fuchsin
A) according to Ozheshko
B) according to Zdrodovsky
C) according to Ziehl-Neelsen
D) according to Romanovsky-Giemsa
E) according to Gram
6. Organelle of bacteria that prevents phagocytosis
A) capsule
B) dispute
C) cell wall
D) flagella
E) cytoplasm
7. Mesosoma is involved in
A) cell nutrition
B) cell division
C) capsule formation
D) cell movement
E) in cell transformation
8. The rigid structure of a microbial cell, which has a complex chemical composition and determines the constancy of its shape
A) capsule
B) membrane
C) cell wall
D) dispute
E) volutin
9. Microbial cells completely devoid of a cell wall

A) spore-forming
B) spheroplasts
C) protoplasts
D) capsule-forming
E) stable
10. A cell with one flagellum
A) monotrich
B) peritrich
C) amphitrichus
D) lophotrichus
E) L-shape
11. Structure of a microbial cell that does not perceive dyes
A) membrane
B) cell wall
C) dispute
D) capsule
E) mitochondria
12. Substances that perform a reserve function (sulfur, oxalates, volutin granules, fat and glycogen)
A) disputes
B) inclusion
C) capsules
D) cytoplasmic membrane
E) mitochondria
13. Structural component of a bacterial cell
A) lysosome
B) mitochondria
C) nucleus with nucleolus
D) nucleoid
E) endoplasmic reticulum

Lesson №3

1. Topic: Physiology and biochemistry of bacteria. Microbiological research method.
2. Goal: To master the vital activity of microbial cells, the processes of their nutrition, respiration, growth, reproduction, patterns of interaction with the environment. Master the technique of preparing nutrient media for the cultivation of microorganisms, methods for isolating pure cultures of aerobic and anaerobic bacteria and methods for identifying pure cultures of bacteria used in the bacteriological diagnosis of infectious diseases.

3. Learning objectives: Master the technique of sowing with a bacterial loop, needle, pipette, spatula. Inoculate the test material on artificial nutrient media. To teach methods of preparing nutrient media, sowing isolated colonies of microorganisms on nutrient media in order to obtain a pure culture.

4. Main questions of the topic:

1. Metabolism – as a set of biochemical reactions, occurring in a bacterial cell, two sides of metabolism.
2. Nutrition of bacteria.
3. Classification of bacteria by type of nutrition and energy sources.
4. Basic mechanisms of bacterial nutrition.
5. Classification of bacteria by type of respiration.
6. Growth and reproduction of bacteria.
7. Phases of reproduction of the bacterial population in a liquid nutrient medium.
8. The main groups of bacterial enzymes and their classification.
9. Growth factors.
10. The first stage of isolating a pure culture of bacteria.
11. Define specific microbiological terms: “species”, “strain”, “clone”, “colony”, “pure culture”.
12. Strains of bacteria within one species, subdivided according to one characteristic (morphological, biological, pathogenic, antigenic, etc.).
13. Classification of nutrient media.
14. Requirements for nutrient media.
15. Universal nutrient media.
16. Elective (selective) nutrient media.
17. Differential diagnostic environments.
18. Methods of sterilization of culture media.
19. Methods for cultivating bacteria.
20. The second stage of isolating pure culture.

5. Basic forms/methods/technologies of training to achieve the final RO of the discipline: Work in small groups, performing laboratory work.

6. Types of control for assessing the level of achievement of the final RO of the discipline: Checklist

7. Literature:

1. Appendix No. 1

8. Control:

Tests:

1. Lag phase is

A) phase of the beginning of intensive growth
B) intensive division phase
C) phase in which the number of bacterial cells does not increase
D) the phase in which the number of viable cells is constant and at its maximum level

E) phase of bacterial death
2. Enzymes that catalyze reactions of transfer of groups of atoms
A) hydrolases
B) transferases
C) lyases
D) isomerases
E) ligases
3. Enzymes that catalyze the reactions of elimination of a particular chemical group from the substrate by non-hydrolytic pathways
A) ligases
B) hydrolases
C) transferases
D) isomerases
E) lyases
4. Saccharolytic enzymes of a bacterial cell are detected by decomposition
A) proteins
B) fats
C) carbohydrates
D) lipoproteins
E) gelatin
5. At the first stage of isolating a pure culture of bacteria, the following activities are carried out
A) study of proteolytic properties
B) smear microscopy
C) plating on nutrient agar slant
D) study of isolated colonies
E) sowing on Hiss media
6. Apparatus used for growing microorganisms using the aeration submerged cultivation method
A) microanaerostat
B) thermostat
C) turbidostat
D) special reactor
E) chemostat
7. Bacterial metabolism consists of
A) energy and transcription
B) constructive and translation
C) energetic and constructive
D) transcription and translation
E) replication and transduction
8. Logarithmic growth phase

A) the beginning of intensive cell growth
B) the number of bacterial cells does not increase
C) the number of living cells at the maximum level
D) intensive cell division
E) death of bacteria

9. For growing anaerobes in bacteriological laboratories, they use
A) distillers
B) anaerostats
C) Koch apparatus
D) Pasteur oven
E) autoclave

10. Based on the source of carbon and type of nutrition, bacteria are divided into
A) autotrophs and heterotrophs
B) metatrophs and aminoautotrophs
C) organotrophs and aminoheterotrophs
D) phototrophs and saprophytes
E) heterotrophs and parasites

11. Media used to accelerate the detection and identification of bacteria belonging to a wide range of Enterobacteriaceae and Pseudomonas species
A) differential selective
B) special
C) synthetic
D) selective
E) semi-synthetic

12. Method based on the joint cultivation of anaerobes with strict aerobes, when cultivating anaerobic bacteria
A) chemical
B) physical
C) combined
D) biological
E) mechanical

13. When protein decomposes, some bacteria may release hydrogen sulfide, and the indicator paper becomes colored
A) pink color
B) black color
C) blue color
D) yellow color
E) color does not change

14. At the second stage of isolating a pure culture, the following activities are carried out
A) determination of sensitivity to phages

B) study of isolated colonies
C) study of antigenic properties
D) determination of sensitivity to antibiotics
E) infection of laboratory animals
15. Separation of aerobes by uniform distribution of a bacterial loop over the surface of a dense nutrient medium
A) biological method
B) physical method
C) chemical method
D) mechanical method
E) biochemical method
16. Selective environment
A) Saburo
B) Levin
C) alkaline agar
D) Endo
E) Kitta-Tarozzi
17. Medium for the cultivation of anaerobes
A) Ploskireva
B) Levin
C) Endo
D) Kitta-Tarozzi
E) Muller
18. Nutrient media are divided into
A) bulk
B) liquid
C) dry
D) dense
E) natural
19. Nutrient media are liquid, semi-liquid, dense, loose and dry, they are divided according to
A) difficulties
B) appointment
C) composition
D) consistency
E) quantity
20. Nutrient media intended for selective isolation and accumulation of microorganisms of a certain type from materials
A) enrichment
B) basic
C) special

D) differential diagnostic
E) elective

Lesson №4

1. Topic: Physiology of viruses. Virological research methods.
2. Goal: To master methods of cultivating obligate parasites and viruses.
3. Learning objectives: To provide an idea of the stages of preparing a single-layer cell culture. To study the technique of virus infection and dissection of a chicken embryo, methods of isolating phages from environmental objects and their identification.
4. Main questions of the topic:
1. Types of virus-cell interaction.
2. Stages of interaction between the virus and the cell.
3. Integrative form of viral infection.
4. Methods for cultivating viruses.
5. Cultivation of viruses in the body of sensitive animals.
6. Cultivation of viruses in a chicken embryo.
7. Classification of tissue cultures and the main stages of their production.
8. Reproduction of viruses in cell culture, methods of their detection (cytopathic action, plaque method, color test, intracellular viral inclusions, hemagglutination and hemadsorption reactions).
9. Methods for identifying (typing) viruses.
10. Biological features of bacteriophages (phages), their forms.
11. Infectious phages, resting, virulent and temperate phages.
12. Life cycle of a phage, accompanied by a productive infection.
13. Life cycle of a phage, accompanied by reductive infection.
14. Differentiation of phages according to the spectrum of action on bacteria, their practical application in medicine.
15. Isolation of phages from environmental objects.
16. Quantitative and qualitative methods for determining phages.
17. Determination of the spectrum of lytic action of the phage.
18. Definition of lysogeny.
5. Basic forms/methods/technologies of teaching to achieve the final RO of the discipline: detailed conversation.
6. Types of control for assessing the level of achievement of the final RO of the discipline: Checklist.
7. Literature:
Appendix No. 1
8. Control:
Tests:

1. Interaction of the virus with the host cell, during which the viral NK is integrated into the cellular genome
A) integrative form
B) abortive form
C) phagocytosis
D) productive form
E) pinocytosis
2. Submission of cellular, matrix-genetic mechanisms to one's own information is a unique form of expression of foreign information
A) rickettsia and mycoplasma
B) chlamydia and viruses
C) only for viruses
D) mycoplasmas and viruses
E) only for rickettsia
3. The nonspecific stage of virus adsorption on a sensitive cell occurs due to
A) membrane fusion
B) receptor complementarity
C) lysogeny
D) virus proteins
E) intermolecular attraction
4. The path of penetration of the internal structure of the virion into the cytoplasm or nucleus of the host cell
A) phagocytosis
B) membrane fusion
C) invasion
D) conversion
E) endocytosis
5. Replication of DNA viral genomes is the synthesis of DNA molecules, occurs with the participation of cellular
A) endonucleases
B) DNA polymerases
C) transcriptases
D) reversetase
E) RNA polymerases
6. The exit of complex virions from the cell occurs by
A) adsorption
B) penetration
C) "explosion", destruction
D) budding
E) penetration

7. Contamination with foreign microorganisms, the need for additional research to obtain a pure line of isolated virus - disadvantages when cultivating in
A) chicken embryo
B) transplanted culture
C) semi-transplantable culture
D) laboratory animals
E) non-transplantable culture
8. Method not used for identifying viruses
A) neutralization of the cytopathic effect
B) neutralization of the hemadsorption reaction
C) change in the development of the color sample
D) delay in hemagglutination reaction
E) immobilization of viruses
9. The hemadsorption reaction is used in practice for
A) virus indications
B) differentiation of viruses
C) quantification
D) virus identification
E) qualitative definition

Lesson №5

1. Topic: Genetics of bacteria and viruses. Genotypic and phenotypic variability of microorganisms.
2. Goal: To master methods for selecting mutants and recombinants in a bacterial population and methods for identifying bacterial plasmids.
3. Learning objectives: To form an idea of genetic recombination in bacteria in experiments of transformation, transduction and conjugation.
4. Main questions of the topic:
1. Features of the genetics of bacteria - as one of the main conditions for their preservation as a species in nature.
2. Features of bacterial DNA replication and their types.
3. Features of the regulation of the expression of genetic information in bacteria.
4. Transformation and transfection.
5. Transduction and sexduction.
6. Conjugation.
7. Transformable genetic elements and their classes.
8. Chromosomal map of bacteria, study of genome organization.
9. Plasmids of bacteria, as the simplest microorganisms.
10. Mutations and their classification.

11. Characteristics of modification variability in bacteria, characteristics that undergo changes.
12. Reparation processes in a bacterial cell.
13. Dissociations of bacteria, their biological meaning.
14. Genetic engineering in medical microbiology.

5. Basic forms/methods/technologies of training to achieve the final RO of the discipline: detailed conversation

6. Types of control for assessing the level of achievement of the final RO of the discipline: Checklist.

7. Literature:

Appendix No. 1

8. Control:

Tests:

1. The process of restoring the cellular genome
A) modification
B) reparation
C) mutation
D) dissociation
E) recombination

2. Direct transfer of genetic material from the donor to the recipient cell
A) transformation
B) transduction
C) conjugation
D) dissociation
E) reparation

3. Plasmids
A) have a protein shell
B) parasitize all living cells
C) participate in the transduction process
D) have their own set of genetic information
E) reproduce both inside and outside the cell

4. Plasmids that control the synthesis of enzymes that inactivate antibiotics determine the mechanisms
A) physiological
B) secondary
C) biological
D) genetic
E) biochemical

5. Antibiotic resistance is acquired with resistance genes obtained from other cells, and the genes are passed on
A) with mutations

B) Is-sequences
C) plasmids and transposons
D) with deletions
E) during inversions
6. Bacterial resistance to antibiotics due to changes in genes occurs
A) during conjugation
B) with modifications
C) during transformation
D) with mutations
E) during recombination
7. The fundamental difference between plasmids and viruses
A) parasites of eukaryotes
B) found only in bacteria
C) the genome consists only of single-stranded RNA
D) has a shell
E) the main goal is to kill the cell
8. Extrachromosomal factors of heredity are molecules
A) DNA
B) RNA
C) polypeptide
D) enzyme
E) squirrel
9. F-plasmid controls synthesis
A) squirrel
B) enzyme
C) bacterial toxins
D) genital villi
E) nucleic acids
10.R-plasmid controls synthesis
A) bacterial toxins
B) genital villi
C) enzymes
D) protein
E) nucleic acids
11. Bacterial viruses that can specifically penetrate bacterial cells, reproduce in them and cause their lysis
A) spheroplasts
B) bacteriophages
C) mycoplasma
D) Rickettsia
E) phagocytes

Lesson №6

1. Topic: Drug resistance of bacteria. Determination of bacterial sensitivity to antibiotics.
2. Goal: To master methods of the effectiveness of antibiotic therapy, determining the sensitivity of bacteria to antibiotics.
3. Learning objectives: To provide an understanding of the mechanisms of antibacterial action of the most important groups of antibiotics, of qualitative and quantitative methods for determining the sensitivity of bacteria to antibiotics.
4. Main questions of the topic:
1. Define the concept of chemotherapeutic drugs and general signs characteristic of CTP.
2. Main groups of CTP.
3. Define the term "antibiotic". Classification of antibiotics by origin, chemical composition, and mechanism of antimicrobial action.
4. Classification of antibiotics according to the spectrum of action on microorganisms.
5. Drug resistance of bacteria and ways to overcome it.
6. Primary causes of viral resistance to antibiotics. Justify the reason for the small choice of CTP for the treatment of viral infections.
7. Complications that develop during antibiotic therapy for infectious diseases.
8. Methods for determining the sensitivity of bacteria to antibiotics.
9. Practical use of various temperature parameters in microbiological medicine.
5. Basic forms/methods/technologies of training to achieve the final RO of the discipline: Checking conversation, performing laboratory work
6. Types of control for assessing the level of achievement of the final RO of the discipline: Checklist.
7. Literature:
Appendix No. 1
8. Control
Tests:

1. A combined drug consisting of a mixture of sulfamethoxazole and trimethoprim, which has a bactericidal effect on gram "-" and gram "+" bacteria
A) furagin
B) biseptol
C) sulfapyridazine
D) norsulfazole
E) sulfamonomethoxine
2. For polyene antibiotics, the “target” of inhibitory action is
A) capsule
B) nucleoid

C) CPM
D) cell wall
E) ribosomes
3. Antimicrobial drugs nitroxoline, enteroseptol, intestopan are derivatives
A) hydroxyquinoline
B) nitrofuran
C) thiosemicarbozone
D) naphthyridine
E) sulfonamide groups
4. Antibiotics that suppress the synthesis of microbial cell wall components
A) quinolines
B) macrolides
C) tetracyclines
D) penicillins
E) aminoglycosides
5. Exposure to antibiotics, which results in complete or partial suppression of bacterial growth and reproduction
A) bactericidal effect
B) bacteriostatic effect
C) microbial number
D) chemotherapy index
E) antimicrobial spectrum
6. To have medicinal properties, an antibiotic must
A) at low concentrations should not kill pathogens
B) the activity of the antibiotic must be inhibited by body fluids
C) must act quickly on the microorganism
D) must not harm the microorganism
E) must suppress the immunological response
7. Antibacterial drug
A) interferon
B) azidothymidine
C) rubomycin
D) rifampicin
E) levorin

Lesson №7

1. Topic: Ecology of microorganisms. Microflora of various organs and systems of the human body.

2. Purpose: To study the distribution of microorganisms in the environment, their relationships with the macroorganism; normal human microflora, factors leading to dysbiosis.

3. Learning objectives: To master methods of studying the microflora of the human body.

4. Main questions of the topic:

1. The concept of microbial ecology.
2. Microflora of water.
3. Soil microflora.
4. Air microflora.
5. The concept of normal microflora of the human body.
6. Microflora of human skin.
7. Microflora of the oral cavity.
8. Microflora of the gastrointestinal tract.
9. Microflora of the human genitourinary tract.
10. Dysbacteriosis (dysbiosis) and the causes of its occurrence.
11. Laboratory diagnostics, correction and prevention of dysbiosis.

5. Basic forms/methods/technologies of teaching to achieve the final RO of the discipline: Discussion, essay.

6. Types of control for assessing the level of achievement of the final RO of the discipline: Checklist

7. Literature:

Appendix No. 1

8. Control

Tests:

1. Cohabitation of individuals of different species, in which one species benefits from symbiosis without causing harm to the other:
A) commensalism
B) metabiosis
C) mutualism
D) satelliteism
E) parasitism

2. Intestinal microflora, participating in water-salt, protein, carbohydrate, cholesterol metabolism, performs the function:
A) antagonistic
B) detoxification
C) antimutagenic
D) digestive
E) protective

3. Microorganisms constantly present in the macroorganism:
A) obligate

B) optional
C) transient
D) optional
E) resident
4. With a decrease in the body's resistance, representatives of normal microflora are capable of causing purulent-inflammatory processes called:
A) reinfection
B) exogenous infection
C) autoinfection
D) superinfection
E) mixed infection
5. The production of intestinal microflora - lactic, acetic acids, antibiotics, is a function of:
A) protective
B) antimutagenic
C) detoxification
D) digestive
E) antagonistic
6. Normally, a healthy person is sterile:
A) uterus
B) conjunctiva of the eyes
C) oral cavity
D) stomach
E) cecum
7. Conditions that develop as a result of the loss of normal microflora functions:
A) superinfection
B) eubiosis
C) reinfection
D) dysbiosis
E) relapse
8. Microorganisms of normal microflora that can cause diseases:
A) opportunistic
B) pathogenic
C) conditionally saprophytic
D) optional
E) obligate
9. Mutually beneficial relationships between different organisms:
A) mutualism
B) metabiosis
C) commensalism
D) satelliteism

E) parasitism

10. Microorganisms contained in the environment that can have an adverse effect on human health are studied by....

A) sanitary microbiology
B) immunology
C) veterinary microbiology
D) clinical microbiology
E) biotechnology

Lesson №8

1. Topic: Infection, infectious process. Biological research method.

2. Goal: To master the methods of biological research, widely used in the diagnosis of infectious diseases and scientific experiments.

3. Learning objectives: To study methods of experimental infection and immunization of animals, bacteriological examination of the corpses of dead animals. Give an idea of the biological method for studying pathogenicity and virulence factors, as well as methods for determining the virulence of bacteria and the activity of bacterial toxins.

4. Main questions of the topic:

1. Define the terms “infection”, “infectious process”, “infectious disease”.
2. Forms of manifest infection.
3. Forms of asymptomatic infection.
4. Pathogenicity of microorganisms as a polydeterminate trait.
5. Virulence, units of its measurement.
6. Pathogenicity properties.
7. List the pathogenicity factors of bacteria and describe them.
8. Chemical nature, main properties of exotoxins.
9. Methods for obtaining toxoids, their practical significance and application.
10. Basic properties and chemical nature of endotoxins.
11. Forms of infection and their characteristics.
12. Periods of infectious disease.
13. Main sources of infection.
14. Routes and methods of infection.
15. List and characterize the infectious properties of viruses, features of viral infections.
16. Methods, methods and purposes of experimental infection of laboratory animals.

5. Basic forms/methods/technologies of training to achieve the final RO of the discipline: Discussion

6. Types of control for assessing the level of achievement of the final RO of the discipline: Checklist.

7. Literature:

Appendix No. 1

8. Control:

Essay on the topic (a brief statement of your point of view on the topic of the lesson, based on facts and giving arguments)

Appendix No. 1

Recommended literature

Basic literature

1. Murray P. R., Rosenthal K. S., Pfaller M. A.Medical Microbiology. - Mosby, 2015
2. W. Levinson McGraw-Hill. Review of Medical Microbiology and Immunology, 2014

Additional literature

1. Saparbekova A.A. Microbiology and virology : educ. manual. - Second Edition. - Almaty : ЭСПИ, 2023. - 188 с
2. Gladwin Mark T. Clinical microbiology made ridiculously simple / Mark T. Gladwin, William Trattler, Scott C. Mahan . - 7th ed. - Miami :MedMaster, Ins, 2016. - 413 p.
3. Usmle Step 1. Immunology and microbiology : Lecturer notes / Alley Tiffany L. [et. al.]. - New York, 2019. - 511 p. - (Kaplan Medical)

Electronic textbooks

1. B. T. Seytkhanova, Sh. Zh. Kurmanbekova, Sh.T. Polatbekova, Sh.Zh. Gabdrakhmanova, A.N. Tolegen. CAUSATIVE AGENTS OF ACUTE RESPIRATORY VIRAL INFECTIOUS DISEASES (influenza virus, adenovirus, coronavirus) (I part) http://lib.ukma.kz/wp-content/uploads/2022/10/Illustrated-teach.-material-eng-2.pdf

2. B.T. Seytkhanova, Sh. Zh. Kurmanbekova, Sh.T. Polatbekova, Sh.Zh. Gabdrakhmanova, A.N. Tolegen. Pathogens of children's viral infections (measles, rubella, chickenpox and mumps virus) (Part II) http://lib.ukma.kz/wp-content/uploads/2022/10/illustrated-textbook.pdf

3. B.T. Seytkhanova, A.A. Abdramanova, A.N. Tolegen, P. Vinoth kumar Lecture compolex on the subject "Microbiology and immunology " (General Microbiology) http://lib.ukma.kz/wp-content/uploads/2022/10/Lecture-complex-General-Microbiology-2022.pdf

4. B.T. Seytkhanova, A.A. Abdramanova, A.N. Tolegen, P. Vinoth kumar LECTURE COMPLEX ON THE SUBJECT "MICROBIOLOGY AND IMMUNOLOGY"(Private Microbiology) http://lib.ukma.kz/wp-content/uploads/2022/10/Lecture-complex-Private-Microbiology-2022.pdf

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