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## GUIDELINES FOR THE INDEPENDENT WORK OF STUDENTS

**Discipline:** Microbiology and Immunology

**Code of Discipline:** MI 2219


**OP Name:** «Medicine»

**Training hours (credits):** 150 hours (5 credits)

**Independent work:** 100 hours

**Course and semester of study:** 2, IV

Shymkent 2023 y.

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Methodological recommendations for independent work of the student were developed in accordance with the working program of the discipline (syllabus) «Microbiology and Immunology» and discussed at the meeting of the department.

Protocol No. 105 of " 23 " 05 2023y.

Head of microbiology department  
 Doctor of medical sciences, prof.




Seitkhanova B.T.

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### №1

1. Topic: The concept of intercellular cooperation in immunogenesis.
  2. Purpose: To consider the immunocompetent cells of the human body.
  3. Tasks:
    - 1) Formulate the concept of "immunity", the main functions of immunity.
    - 2) Types of immunity.
    - 3) The human immune system as a diffuse organ.
    - 4) Cells of the immune system.
  4. Form of implementation: Abstracts, glossary on the topic, presentation, test tasks, crossword puzzles, essays on the topic.
  5. Criteria for implementation: Coverage of the main points of the material on the topic, the competent writing of the essay, the compilation of tests and tasks.
  6. Terms of delivery: 1 week
  7. Literature:
- Appendix No.1
8. Control:
    1. Cytocidal cells that destroy target cells
      - A) T-helpers
      - B) T-killers
      - C) T-effectors
      - D) T-suppressors
      - E) B-lymphocytes
    2. Large granulosoderzhaschie lymphocytes, which have a cytotoxic effect against foreign cells
      - A) monocytes
      - B) leukocytes
      - C) natural killers
      - D) T-killers
      - E) platelets
    3. Cells of mesoderm origin, absorbing and digesting microorganisms
      - A) phagocytes
      - B) red blood cells
      - C) platelets
      - D) T-suppressors
      - E) T-helpers
    4. The humoral factor of nonspecific resistance of the organism
      - A) microphages
      - B) Properdin protein
      - C) T-killers
      - D) Hydrochloric acid of gastric juice
      - E) macrophages
    5. The ratio of phagocytic parameters obtained with immune and non-immune serum is called the index
      - A) leukocyte
      - B) phagocytic
      - C) opsonic
      - D) opsonophagocytic
      - E) lymphocytic

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## №2

1. Theme: General characteristics of antigens. The role of immunoglobulin classes in immunity.
2. Objective: To consider classes of immunoglobulins in the immunity of newborns due to their accumulation in the mother and fetus. Consider the pathology of the immune system.
3. Assignments:
  1. Give the definition of "antibody", their functions.
  2. The chemical nature and structure of antibodies or immunoglobulins.
  3. Classes of immunoglobulins, their main characteristics, differences and features.
  4. Antiglobulin antibodies.
  5. Anti-idiotypic antibodies.
  6. The role of immunoglobulins in the immunity of newborns.
  7. Immunodeficiencies.
  8. Autoimmune diseases.
  9. Allergic diseases.
  10. Immunoproliferative diseases.
4. Form of implementation: Abstracts, glossary on the topic, presentation, test tasks, crossword puzzles, essays on the topic.
5. Criteria for implementation: Coverage of the main points of the material on the topic, the competent writing of the essay, the compilation of tests and tasks.
6. Terms of delivery: 2 week
7. Literature:
- Appendix No.1
8. Control:
  1. Immunoglobulins found in serum and in secrets on the surface of the mucous membranes belong to the classes
    - A) Ig G
    - B) Ig A
    - C) IgM
    - D) Ig D
    - E) Ig E
  2. Common antigens that occur in different animal species
    - A) half-haptens
    - B) haptens
    - C) heteroantigens
    - D) propagens
    - E) alloantigens
  3. Various antigens that occur within one species
    - A) proantigens
    - B) half-haptens
    - C) alloantigens
    - D) heteroantigens
    - E) haptens
  4. The blood group in the ABO system and the resusantigen
    - A) alloantigens
    - B) half-haptens
    - C) proantigens
    - D) heteroantigens

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E) haptens

5. Immunological reaction of a local nature, associated with prolonged exposure to haptens

A) Immunological tolerance

B) Immunological memory

C) secondary response

D) atopy

E) primary response

### №3

1. Topic: Applied Immunology. Molecular biological methods: NK hybridization, PCR, DNA sequencing.

2. Purpose: To master the methods of serological diagnosis of infectious diseases.

3. Tasks:

1) Agglutination reaction.

2) The reaction of indirect, or passive, agglutination (RPA).

3) Precipitation reaction.

4) Immunodiffusion.

5) Immunoelectrophoresis (IEF).

6) Immunoblotting.

7) Coombs reaction (antiglobulin test).

8) Neutralization and flocculation reactions.

9) Hemagglutination inhibition reaction (RTHA).

10) complement binding reaction (CSC).

11) The reaction of immune lysis, hemolysis and immobilization.

12) Opsonophagocytic reaction.

13) Reactions proceeding with the participation of labeled antigens or antibodies.

14) The method of hybridization of nucleic acids.

15) Polymerase chain reaction.

16) DNA sequencing method.

4. Implementation form: Abstracts, presentation.

5. Performance criteria: Coverage of the main points of the material on the topic, competent writing of the abstract, reasonable content of the presentations.

6. Delivery time: 3 week

7. Literature:

Appendix No.1

8. Control:

1. Neutralization of antigens occurs in the reaction

A) RTGA


B) RSK

C) Koons

D) RIA

E) ELISA

2. Bonding of corpuscular antigens and their precipitation occurs in the reaction

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- A) Koons
  - B) neutralization
  - C) RSK
  - D) precipitation
  - E) immunofluorescence
3. Precipitation of an antigen in a dispersed, colloidal state occurs in the reaction
- A) precipitation
  - B) agglutination
  - C) flocculation
  - D) immune lysis
  - E) complement fixation
4. The interaction of antiserum with an antigen solution occurs in the reaction
- A) immunodiffusion
  - B) neutralization
  - C) immobilization
  - D) RSC
  - E) immunofluorescence
5. Antitoxic immunity against diphtheria or scarlet fever is determined by Schick or Dick reactions, which refer to reactions
- A) agglutination
  - B) precipitation
  - C) immune lysis
  - D) RNGA
  - E) Neutralization


#### №4

**1. Topic:** Causative agents of sexually transmitted diseases.

**2. Purpose:** To master the microbiological diagnosis of sexually transmitted diseases (syphilis, gonorrhea, urogenital chlamydia), their biological properties.

**3. Tasks:**

1. Biological features of spirochaetes.
2. Morphology and cultural properties of the causative agent of syphilis.
3. Biochemical properties, antigenic structure, resistance and epidemiology of the causative agent of syphilis.
4. Pathogenesis, clinic and features of immunity in syphilis.
5. Microbiological diagnosis of syphilis.
6. Treatment and prevention of syphilis.
7. Morphological and cultural characteristics of gonococci.
8. Biochemical properties and antigenic structure of gonococci.
9. Resistance and epidemiology of gonococci.
10. Pathogenicity factors, pathogenesis, clinic and post-infectious immunity of gonorrhea.
11. Laboratory diagnostics of gonorrhea.
12. Specific prevention and treatment of gonorrhea and blenorrhea of newborns.
13. Features and MBD, treatment and prevention of urogenital chlamydia.

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**4. Form of implementation:** analysis of scientific articles in the form of a presentation, compilation and solution of situational problems

**5. Criteria for fulfillment:** Appendix No. 1

**6. Deadlines:** 4 week

**7. Literature:** Appendix No. 2

**8. Control:**

1. The urologist received a patient N. 22 years old, with complaints of painful urination, purulent discharge from the genital tract. Ill for about 10 days, took penicillin for the last week. What disease can be suspected? What research methods can you suggest? In what case can microscopy give a reliable answer? What material is taken for research? Why is fast delivery of the material to the laboratory important? Why do we often have to use bacteriological research in recent years? What preventive measures are necessary skin and venereal dispensary addressed the patient. Objectively: rash on the body, genitals. The patient leads a disorderly lifestyle, has many sexual partners. Your preliminary diagnosis. What material will you take for laboratory testing? Name the basic scheme of the study, taking into account the patient's lifestyle.

2. A 35-year-old patient came to the doctor with complaints of pain during urination, the formation of ulcers on the genitals. Ill for about three weeks. From anamnesis it is established: two months ago I was on a business trip, had sexual relations with unknown women. During the examination, it was found: on the head of the penis, an ulcer with sucrovichnye separable on a dense base. The inguinal lymph nodes are palpated. A preliminary clinical diagnosis was made: syphilis. No spirochete ulcers were detected by microscopy of the discharge. Is this enough to rule out a diagnosis of syphilis? In addition to the microscopic examination, the Wasserman reaction with the patient's serum was used, which gave a positive result. Justify the obtained laboratory data. What other signs are used in medical practice for laboratory diagnosis of syphilis? Justify the feasibility of a bacteriological method for syphilis. The results of the Wasserman reaction depending on the periods of the disease. CTP used to treat syphilis.

3. Microscopic examination of a smear from the vagina of patient A. revealed fungi of the genus Candida. Is it possible to make a final diagnosis based on this method? Justify the need for additional research.

4. A patient complained about the appearance of brown spots on the skin in a skin-venereal dispensary. Shortly before the treatment, the patient suffered from severe pneumonia, received gentamicin, penicillin and sulfonamides for treatment. Smear microscopy allowed us to make a preliminary diagnosis of "Dysbacteriosis, superficial candidiasis". Justify additional research methods to confirm the diagnosis. Justify the purpose of the CTP.


**Tests:**

1. Venereal disease of a person, expressed in a purulent lesion of the mucous membranes of the genitourinary system

- A) trichomoniasis
- B) syphilis
- C) venereal granuloma
- D) soft chancre
- E) gonorrhea


2. Gram-negative cocci that enter the urogenital tract and have the appearance of coffee beans arranged in pairs, concave surfaces to each other are pathogens

- A) gonorrhea
- B) soft chancre
- C) venereal granuloma
- (D) Syphilis

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- E) Trichomoniasis
3. Eukaryotic microorganisms
- A) bacteria
- B) mushrooms
- C) viruses
- (D) Phages
- E) Plasmids
4. List the group of lower fungi
- A) Ascomycetes
- B) Basidiomycetes
- C) Deuteromycetes
- D) Oomycetes
- E) Candida
5. The main host of the causative agent of toxoplasmosis
- A) dogs
- B) rodents
- C) rabbits
- D) birds
- E) cats
6. Pathogen with a large number of cilia
- A) Balantidia
- B) toxoplasma
- C) trypanosoma
- D) Amoeba
- E) Giardia
7. Mycoses, the first to appear in immunodeficiency states
- A) favus
- B) candidiasis
- C) trichomoniasis
- D) trichophytosis
- E) Coccidiosis
8. A pear-shaped pathogen
- A) Balantidia
- B) amoeba
- C) Trichomonas
- (D) Leishmania
- (E) Trypanosoma
9. The pathogen, one of the stages of which has the shape of a crescent
- A) trypanosoma
- B) amoeba
- C) toxoplasma
- (D) Leishmania
- E) Trichomonas
10. A disease characterized by inflammation of the urethra and prostate
- A) toxoplasmosis
- B) amoebiasis
- C) Leishmaniasis
- D) trichomoniasis



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E) Balantidiosis

11.. A disease whose causative agent is transmitted through the bite of the tsetse fly

A) toxoplasmosis

B) amoebiasis

C) Leishmaniasis

D) Balantidiosis

E) trypanosomiasis

### №5

**1. Topic:** Biological features of *Pseudomonas aeruginosa* and *Haemophilus influenzae*.

**2. Purpose:** To master the microbiological diagnosis of diseases caused by *Pseudomonas aeruginosa* and *Haemophilus influenzae*.

**3. Tasks:**

1) Biological properties of *Pseudomonas aeruginosa*.

2) Laboratory diagnosis of diseases caused by *Pseudomonas aeruginosa*.

3) Biological properties of *Haemophilus influenzae*.

4) Laboratory diagnosis of diseases caused by *Haemophilus influenzae*.

**4. Form of implementation:** analysis of scientific articles in the form of a presentation, compilation and solution of situational problems

**5. Criteria for fulfillment:** Appendix No. 1

**6. Deadlines:** 5 week

**7. Literature:** Appendix No. 2

**8. Control:**

1. What provokes / Causes of *Pseudomonas aeruginosa* infection?

2. Pathogenesis (what happens?) during *Pseudomonas aeruginosa* infection?

3. Treatment of *Pseudomonas* infection.

4. Types of hemophilic infection

5. Symptoms of hemophilic infection.

### №6

**1. Topic:** Pathogens of acute diarrheal infections. Cholera.

**2. Purpose:** To master the microbiological diagnosis of diarrheal infections and cholera.

**3. Tasks:**

1. Biological properties of *Yersinia*, *Campylobacteria* and *Vibrio cholerae*.

2. Laboratory diagnostics and treatment of diseases caused by proteus.

3. Laboratory diagnostics of food toxicoinfections.

4. Treatment and prevention of food toxicoinfections.

5. Classification, morphology and cultural properties of *Campylobacteria*.

6. Biochemical properties and antigenic structure of *Campylobacteria*.

7. Resistance and epidemiology of *Campylobacter*.

8. Pathogenicity factors, pathogenesis, clinic and immunity in campylobacteriosis.

9. Laboratory diagnostics of campylobacterioses.

10. Prevention and treatment of campylobacteriosis.


11. Biological properties of *Yersinia enterocolitica*.

12. Pathogenicity factors, pathogenesis, clinic and immunity in yersiniosis.

13. Laboratory diagnostics of yersiniosis.

14. Prevention and treatment of yersiniosis.

15. Classification, morphology and cultural properties of the genus – *Vibrio*.

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16. Biochemical properties of vibrios.
  17. Antigenic structure of *Vibrio cholerae*.
  18. Pathogenicity factors of *V. cholerae*.
  19. Resistance and epidemiology of *vibrio cholerae*.
  20. Pathogenesis, clinic and immunity in cholera.
  21. Features of collecting, preserving and transporting the test material in cholera to the laboratory.
  22. Bacterioscopic, bacteriological examination of the material in cholera.
  23. Methods used for rapid diagnosis of cholera and detection of *vibrionositelstva*.
  24. Drugs used for the prevention, diagnosis and treatment of cholera.
- 4. Form of implementation:** analysis of scientific articles in the form of a presentation, compilation and solution of situational problems
- 5. Criteria for fulfillment:** Appendix No. 1
- 6. Deadlines:** 6 week
- 7. Literature:** Appendix No. 2
- 8. Control:** (questions, tests, tasks, etc.)

#### Task

1. A culture with suspected *Vibrio cholerae* has been isolated. The colonies are transparent, with a film on the peptone water. The culture is agglutinated with O-cholera serum. What additional properties should be determined in the isolated culture for laboratory confirmation of *Vibrio cholerae*?

#### Tests

1. For the identification of *vibrio cholerae*, the following serums are used, except
  - A) H-serum
  - B) O-serum
  - C) OR-serum
  - D) Inaba type-specific serum
  - E) Type-specific Ogawa serum
2. *Vibrio cholerae* on a liquid medium forms
  - A) thin film
  - B) Opacity
  - C) solid sediment on the bottom
  - D) film with downward-descending threads
  - E) Flake sediment
3. A gram-negative wand with four biovars
  - A) *E. coli*
  - B) *Vibrio cholerae*
  - C) *shigella*
  - D) *Yersinia*
  - E) *Campylobacter*
4. Specify the factors that cause the development of diarrhea in cholera
  - A) the effect of exotoxin
  - B) invasion of the intestinal epithelium
  - C) circulation in the bloodstream
  - D) formation of intestinal wall defects
  - E) the effect of endotoxin
5. Optimal conditions for the cultivation of *Campylobacter*
  - A) Microaerophilic conditions, temperature 42°C
  - B) Aerobic conditions; temperature 37°C
  - C) Anaerobic conditions; temperature 37°C

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- D) Aerobic conditions; temperature 20°C  
E) Anaerobic conditions; temperature 20°C
6. Pathogens that cause cholera  
A) *V. fluvialis*  
B) *V. proteus*  
C) *V. eltor*  
D) *V. alginolyticus*  
E) *V. albensis*
7. Gram-negative bacillus, which has three serovars for O1-antigen: Ogawa, Inaba, Gikoshima, is the causative agent  
A) Typhoid and paratyphoid fever  
B) dysentery  
C) yersiniosis  
D) Cholera  
E) *Escherichia coli*
8. Gram-negative bacillus, which synthesizes a toxin that causes hypersecretion of water and chlorides into the intestinal lumen, diarrhea, dehydration of the body  
A) shigella  
B) *E. coli*  
C) *Salmonella*  
D) *Yersinia*  
E) *Vibrio*
9. Biovars of the pathogen, differentiated by sensitivity to phage, polymyxin, agglutination of chicken red blood cells, is the pathogen  
A) Cholera  
B) *Escherichia coli*  
C) Typhoid and paratyphoid fever  
D) Yersiniosis  
E) Dysentery
10. Disease prevented by a combined vaccine consisting of O1-antigen and toxoid  
A) Cholera  
B) dysentery  
C) *Escherichia coli*  
D) Yersiniosis  
E) Typhoid and paratyphoid fever


## №7

### 1. Topic: MID-TERM №1

**2. Purpose:** To assess the level of students' residual knowledge of the material covered.

### 3. Tasks:

1. The concept of “immunity”, types of immunity, main functions of immunity.
2. The human immune system as a diffuse organ. Immune system cells
3. Define the concept of “antibody” and their functions.
4. Classes of immunoglobulins, their main characteristics, differences and features.
5. Agglutination reaction. Indirect or passive agglutination reaction (IPA).
6. Precipitation reaction. Immunodiffusion.
7. Immuno-electrophoresis (IEF). Immunoblotting.
8. Coombs reaction (antiglobulin test).

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9. Neutralization and flocculation reactions.
10. Hemagglutination inhibition reaction (HAI). Complement fixation reaction (CFR).
11. Reaction of immune lysis, hemolysis and immobilization.
12. Reactions involving labeled antigens or antibodies.
13. Nucleic acid hybridization method.
14. Polymerase chain reaction.
15. DNA sequencing method.
16. Morphology, cultural properties, pathogenesis of staphylococci.
17. Microbiological diagnosis, prevention and treatment of staphylococcal infection.
18. Morphology, cultural properties, pathogenesis of streptococci.
19. Microbiological diagnosis, prevention and treatment of streptococcal infection.
20. Morphology, cultural properties, pathogenesis of the causative agent of syphilis.
21. Morphology, cultural properties, pathogenesis of the causative agent of gonorrhea.
22. Morphology, cultural properties, pathogenesis of the causative agent of urogenital chlamydia.
23. Microbiological diagnosis, prevention and treatment of sexually transmitted diseases (syphilis, gonorrhea, urogenital chlamydia).
24. Morphology, cultural properties and pathogenesis of gas gangrene.
25. Morphology, cultural properties and pathogenesis of tetanus.
26. Morphology, cultural properties and pathogenesis of botulism.
27. Microbiological diagnosis of clostridia (inoculation on Kitta-Tarotsi medium). specific prevention.
28. Morphology, cultural properties, pathogenesis of Salmonella.
29. Morphology, cultural properties, pathogenesis of Escherichia.
30. Morphology, cultural properties, pathogenesis of Shigella.
31. Microbiological diagnosis, prevention and treatment of Escherichia, Shigella, Salmonella.
32. Morphology, cultural properties, pathogenesis of Vibrio cholerae.
33. Microbiological diagnosis, prevention and treatment of campylobacter and vibrio cholera.
34. General characteristics and microbiological methods for diagnosing meningococcal infection.
35. Morphology, cultural properties, pathogenesis of Mycobacterium tuberculosis.
36. Microbiological diagnosis, prevention and treatment of tuberculosis.
37. Morphology, cultural properties, pathogenesis of the causative agent of whooping cough.
38. Microbiological diagnosis, prevention and treatment of whooping cough pathogens.
39. Morphology, cultural properties, pathogenesis of the causative agent of diphtheria.
40. Microbiological diagnosis, prevention and treatment of diphtheria pathogens.
41. Biological properties, laboratory diagnostics of Pseudomonas aeruginosa.
42. Biological properties, laboratory diagnostics of Haemophilus influenzae.
- 4. Form of execution:** oral survey
- 5. Criteria for fulfillment:** Appendix No. 1
- 6. Deadlines:** 7 week
- 7. Literature:** Appendix No. 2

## №8

- 1. Topic:** West Nile fever, Zoonotic cutaneous leishmaniasis.
- 2. Purpose:** To master modern clinical and epidemic aspects of WNV, zoonotic cutaneous leishmaniasis.
- 3. Tasks:**
  1. Etiology of West Nile fever.
  2. West Nile Clinic.
  3. Diagnosis of West Nile fever.

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4. Treatment of West Nile fever.
5. Preventive measures for West Nile fever.
6. Characteristics of the causative agent of zoonotic cutaneous leishmaniasis
7. Symptoms of leishmaniasis
8. Diagnosis of leishmaniasis
9. Treatment of leishmaniasis
10. Forecast and prevention of leishmaniasis
- 4. Form of implementation:** analysis of scientific articles in the form of a presentation, compilation and solution of situational problems
- 5. Criteria for fulfillment:** Appendix No. 1
- 6. Deadlines:** 6 weeks
- 7. Literature:** Appendix No. 2
- 8. Control :**

**Task:**


Patient R., aged 42, lives in Moscow for a year, before that he lived in Tajikistan. He was admitted to the hospital by ambulance, with suspicion of sepsis. Complaints of weakness, sweating, chills. He fell ill 4 months ago, when chilling, fatigue, subfebrile temperature gradually appeared, which reached 39°C, appetite worsened, the patient lost a lot of weight. Repeatedly consulted a doctor - a blood disease was suspected, but the diagnosis was not confirmed. On examination, the state of moderate severity. Pale. The earthy-gray color of the skin attracts attention. Cachexia. In the lungs - no pathology. Heart sounds are muffled, the rhythm is correct. Pulse 84 beats / min. BP 100/60 mmHg Coated tongue. On the tonsils, in the region of the palatine arches, there are erosions and ulcers, covered with a dirty gray coating. The abdomen is drawn in, painful. The liver is enlarged by 20 cm, dense, the spleen protrudes from the hypochondrium by 5.0 cm, dense. There are no dysuric phenomena. From the side of the central nervous system, there is no pathology.

Blood test: Hb-96g / l, erythrits -  $3.2 \cdot 10^{12}$  / l, thrombosis - 156 thousand, leukocytes -  $3.4 \cdot 10^9$  / l, e.-0, p / i - 1%, s / i -28%, lymph-59%, mon-12%, ESR-54 mm/hour.

1. Put and justify a preliminary diagnosis.
2. Conduct a differential diagnosis.
3. Make an examination plan.

**№9**

- 1. Topic: Mycoses and pathogenic protozoa.**
- 2. Purpose:** To master the microbiological diagnosis of mycoses and protozoal infections.
- 3. Tasks:**
  - 1) Biological features and laboratory diagnosis of keratomycosis.
  - 2) Biological features and laboratory diagnosis of trichomycosis.
  - 3) Biological features and laboratory diagnosis of candidiasis.
  - 4) Biological features and laboratory diagnosis of sporotrichosis.
  - 5) Biological features and laboratory diagnosis of histoplasmosis.
  - 6) Biological features and laboratory diagnosis of leishmaniasis.
- 4. Form of implementation:** analysis of scientific articles in the form of a presentation, compilation and solution of situational problems
- 5. Criteria for fulfillment:** Appendix No. 1
- 6. Deadlines:** 8 weeks
- 7. Literature:** Appendix No. 2
- 8. Security questions:**
  1. Biological features and laboratory diagnosis of candidiasis.

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2. Biological features and laboratory diagnostics of sporotrichosis.
3. Biological features and laboratory diagnosis of balantidiasis.
4. Biological features and laboratory diagnosis of giardiasis.


### №10

- 1. Topic: Herpesviruses (alpha, beta, gamma-herpesviruses).**
- 2. Purpose:** To master the laboratory diagnosis of neuroviral infections.
- 3. Tasks:**
  1. General characteristics of herpesviruses, their classification and taxonomy.
  2. Pathogenesis, clinic and immunity of diseases caused by herpes viruses.
  3. Morphological and antigenic features of herpes viruses.
  4. Laboratory diagnostics, treatment and prevention of herpes viruses.
  5. Treatment and prevention of herpes viruses.
- 4. Form of implementation:** analysis of scientific articles in the form of a presentation, compilation and solution of situational problems
- 5. Criteria for fulfillment:** Appendix No. 1
- 6. Deadlines:** 13 weeks
- 7. Literature:** Appendix No. 2
- 8. Control:**
  1. DNA containing viruses:
    - 1) retroviruses
    - 2) rhabdoviruses
    - 3) herpesviruses
    - 4) orthomyxoviruses
    - 5) paramyxoviruses
  2. Herpesviruses cause diseases, indicate the wrong answer:
    - 1) Chickenpox
    - 2) Shingles
    - 3) Berkit's lymphoma
    - 4) Infectious mononucleosis
    - 5) Aplastic crisis in children

### №11

1. Topic: Pathogens of neuroviral infections.
2. Purpose: To study the virological and serological diagnosis of neuroviruses (rabies, tick-borne encephalitis, cytomegaly, herpes).
3. Tasks:
  1. General characteristics, epidemiology, clinical picture and laboratory diagnosis of tick-borne encephalitis
  2. General characteristics, epidemiology, clinical picture and laboratory diagnosis of cytomegaly.
  3. General characteristics of the herpesvirus family and their subfamilies.
  4. Properties and epidemiology of herpes simplex viruses.
  5. Pathogenesis, clinical picture and immunity of diseases caused by various types of herpes simplex virus.



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6. Laboratory diagnosis, treatment and prevention of diseases caused by herpes simplex viruses.
7. Taxonomy, morphology and cultivation of the rabies virus.
8. Antigenic structure and resistance of the rabies virus.
9. Epidemiology of the rabies virus.
10. Pathogenesis, clinical picture and immunity of rabies.
11. Laboratory diagnosis of rabies.
12. Specific prevention and treatment of rabies.
4. Form of implementation: analysis of scientific articles in the form of a presentation, preparation and solution of situational problems
5. Performance criteria: Appendix No. 1
6. Due date: week 11
7. Literature: Appendix No. 2
8. Control:

#### Tasks

1. A 5-year-old boy was admitted to the infectious diseases hospital with complaints of a rash spreading from top to bottom and fever. From the anamnesis: he attends a kindergarten where a patient with measles was identified. Justify the laboratory diagnostics of the study, taking into account epidemiological data and the clinic. Your tactics for carrying out treatment and preventive measures.
2. A group of children with similar clinical signs were admitted to the infectious diseases department, characterized by a papular rash all over the body, temperature, some had symptoms of conjunctivitis, pharyngitis, rhinitis before the appearance of the rash. When examined in an immunofluorescence reaction with a set of various labeled sera, a positive result was obtained - the presence of measles antigen in the affected cells. Justify the results of the laboratory tests obtained. Your clinical and laboratory diagnosis. Justify your tactics for carrying out treatment and preventive measures in this case.
3. When examining a stillborn child from a woman who suffered an infectious disease of unknown etiology during pregnancy, it was established through serological studies that the presence of IgM antibodies to the rubella virus was present in both the mother and the deceased fetus. Justify your laboratory and retrospective diagnosis of the mother and the dead fetus.
4. A state of emergency has been declared in one of the regions of the republic, where an outbreak of rabies has been noted among dogs, cats, camels and other animals. You urgently need to provide the treatment and prophylactic network with appropriate biological drugs. What medications should be provided first? Justify the use of rabies vaccine (planned, for epidemiological indications, etc.) based on the mechanism of human infection with rabies. It is necessary to take into account complications when using rabies vaccine, and what drugs should be provided to treat them?

#### Tests:

1. A virus transmitted through the saliva of sick animals or through their bite
  - A) HIV
  - B) rabies virus

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- C) ECHO
- D) Coxsackie
- E) herpes virus
- 2. A family of viruses with a diploid genome
  - A) orthomyxoviruses
  - B) hepadnoviruses
  - C) rhabdoviruses
  - D) herpes viruses
  - E) retroviruses
- 3. A virus that is cultivated in the brain tissue of white mice, Syrian hamsters, rabbits, rats, guinea pigs
  - A) ECHO
  - B) Coxsackie
  - C) adenovirus
  - D) HIV
  - E) rabies
- 4. A virus with unique antigenic variability, which is 100-1000 times greater than the variability of the influenza virus, is the causative agent
  - A) rabies
  - B) herpes
  - C) polio
  - D) AIDS
  - E) hepatitis
- 5. The genome of the herpes virus is presented
  - A) double-stranded linear DNA
  - B) circular DNA
  - C) single-stranded (+)RNA
  - D) single-stranded (-)RNA
  - E) double-stranded RNA

## №12

### 1. Topic: HIV (AIDS). Oncogenic viruses.

**2. Purpose:** To master the virological and serological diagnosis of HIV.


**3. Learning objectives:** To study the methods of laboratory diagnosis of HIV.

### 4. Main questions of the topic:

1. A brief history of the discovery of HIV.
2. The structure of the HIV virion.
3. Cultivation, resistance and pathogenicity factors of HIV.
4. Epidemiology, pathogenesis and clinic of AIDS.
5. Laboratory diagnostics, treatment and prevention of AIDS.
6. General characteristics, epidemiology, laboratory diagnostics of oncoviruses.

**5. The main forms/methods/technologies of training for achieving the final goals of the discipline:**  
Discussion



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## 6. Types of control for assessing the level of achievement of the final results of the discipline:

Checklist

## 7. Literature:

Appendix No. 1

## 8. Control :

### Tests:

1. The drug that is most effective in the treatment of HIV infection

- A) Acyclovir
- B) Interferon
- C) Immunoglobulin
- D) Azidothymidine
- E) Remantadine

2. The number of genes in HIV

- A) 5
- B) 9
- C) 11
- D) 13
- E) 15

3. A virus with a unique antigenic variability, which is 100-1000 times greater than the variability of the influenza virus, is the causative agent ... .

- A. AIDS
- B. Rabies
- C. Herpes virus
- D. Polio
- E. Hepatitis

4. Special prophylaxis ... is difficult due to the rapid variability of the antigenic structure.

- A. AIDS
- B. Hepatitis
- C. Herpes virus
- D. Polio
- E. rabies

5. Have a lymphotropy to T-helper cells, has an antigenic similarity to the receptors of these cells ...


- A. HIV
- B. adenoviruses
- C. herpes viruses
- D. rabies viruses
- E. hepatitis viruses

6. Virus that causes an anthroponous infection transmitted by sexual, parenteral, intrauterine routes:

- A. HIV
- B. poliovirus
- C. herpes virus
- D. adenovirus
- E. rabies virus

7. AIDS can lead to....

- A. HIV
- B. adenovirus
- C. herpes virus
- D. poliovirus

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E. rabies virus

### № 13

1. Topic: Modern diagnostic methods in microbiology.
2. Goal: To become familiar with modern diagnostic methods in microbiology
3. Tasks:
  1. The importance of microbiology in diagnosis.
  2. Microbiological diagnostics: main aspects and methods.
  3. Possibilities of microbiological diagnostics.
  4. Automated microbiology.
  5. Prospects for the development of microbiological diagnostics.
4. Form of implementation: analysis of scientific articles in the form of a presentation, preparation and solution of situational problems
5. Performance criteria: Appendix No. 1
6. Due date: 13 week
7. Literature: Appendix No. 2
8. Control:
- Questions:
  1. What is the importance of microbiology in the diagnosis of diseases?
  2. Modern methods of microscopic examination.
  3. Modernized stages of the bacteriological method.
  4. Features of the virological diagnostic method.
  5. Features of biological diagnostic methods at the present stage.
  6. Current problems of the biological method for diagnosing infectious diseases at the present stage.
  7. Immunological methods for diagnosing microbial diseases.
  8. Modern serological methods of microbiological diagnostics.
  9. Immunogenetic methods.
  10. Molecular biological methods of microbiological diagnostics.
  11. Features of express diagnostics of microbial diseases.

### № 14

1. Topic: MID-TERM №2
2. Purpose: To check and evaluate the level of residual knowledge of students.
3. Learning objectives: Testing students ' practical skills.
4. Main issues of the topic:
  1. Morphology of the plague pathogen, sowing properties.
  2. Pathogenesis, microbiological diagnosis, prevention of plague.
  3. Morphology, cultural properties of the anthrax pathogen.
  4. Pathogenesis, microbiological diagnostics, prevention of anthrax.
  5. Morphology of the causative agent of brucellosis, cultural properties.
  6. Pathogenesis, microbiological diagnosis, prevention of brucellosis.
  7. Etiology, pathogenesis, microbiological diagnosis, prevention of West Nile fever.
  8. Characteristics, pathogenesis, microbiological diagnosis, prevention of the causative agent of zoonotic cutaneous leishmaniasis.
  9. Biological features and laboratory diagnosis of keratomycosis.
  10. Biological features and laboratory diagnosis of trichomycosis.
  11. Biological features and laboratory diagnosis of histoplasmosis.
  12. Biological features and laboratory diagnosis of leishmaniasis.

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13. Biological features and laboratory diagnosis of balantidiasis.
14. Biological features and laboratory diagnosis of giardiasis.
15. Biological features and laboratory diagnosis of reversible typhus
16. Biological features and laboratory diagnosis of epidemic typhus.
17. Biological features and laboratory diagnostics of Q fever.
18. General characteristics of the Federal State Educational Standard, Laboratory diagnostics.
19. General characteristics, Laboratory diagnostics, prevention of coronavirus infection.
20. Structure and antigenic properties of adenoviruses, Laboratory diagnostics.
21. Pathogenesis, clinical picture, prevention and treatment of adenovirus infection.
22. Morphology and chemical composition of the influenza virus, resistance to the external environment and epidemiology.
23. Pathogenesis, clinical picture and laboratory diagnosis of influenza.
24. Morphological and antigenic features of hepatitis A, Laboratory diagnostics.
25. Pathogenesis, clinical picture, epidemiology and immunity of hepatitis B.
26. Laboratory diagnosis of hepatitis B.
27. Morphological and biological features, Laboratory diagnosis of hepatitis D.
28. General characteristics, clinical epidemiology and laboratory diagnosis of hepatitis C.
29. General characteristics of enteroviruses, their classification and taxonomy.
30. Morphological and antigenic features of poliovirus, Laboratory diagnostics.
31. Features of epidemiology, pathogenesis and clinical picture of polio.
32. Advantages and disadvantages of vaccines used to prevent polio. Treatment of polio.
33. General characteristics, epidemiology, clinical picture and laboratory diagnosis of rotavirus infection,
34. General characteristics of the human immunodeficiency virus.
35. Pathogenesis, clinic, Laboratory diagnosis of HIV infection.
36. General characteristics of oncogenic viruses.
37. Morphology of measles virus, properties of culture.
38. Pathogenesis, microbiological diagnosis and prevention of measles virus.
39. Morphology of the rubella virus, properties of the culture.
40. Pathogenesis, microbiological diagnosis and prevention of rubella virus.
41. Pathogenesis, microbiological diagnosis, prevention of varicella zoster virus.
42. Morphology of mumps, sowing properties.
43. Pathogenesis, microbiological diagnosis, prevention of mumps.
44. General characteristics of herpes viruses, their classification and taxonomy.
45. Pathogenesis, microbiological diagnosis and prevention of diseases caused by herpes viruses.
46. Morphology of tick-borne encephalitis, cultural properties.
47. Pathogenesis, microbiological diagnosis, prevention of tick-borne encephalitis.
48. General characteristics, clinic, Laboratory diagnosis of cytomegalovirus infection.
49. Morphology of rabies, properties of culture.
50. Pathogenesis, microbiological diagnosis, prevention of rabies.
5. Teaching and learning methods: oral survey
6. Delivery time: 14 week
7. Literature: Appendix No.2

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## EVALUATION CRITERIA FOR INDEPENDENT WORK OF STUDENTS UNDER THE LEADING OF THE TEACHER

### Preparation and defense of the abstract

Form control	Grade	Criteria for evaluation
Preparation and defense of the abstract	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	The abstract is made accurately and delivered on time, written independently on at least 15 typewritten pages, using at least 7 literary sources. Schemes, tables and figures corresponding to the topic of the abstract are given. When defending an abstract, the text does not read, but tells. Confidently and accurately answers all questions asked.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	The abstract was done accurately and delivered on time, written independently on at least 13 typewritten pages, using at least 6 literary sources. Schemes, tables and figures corresponding to the topic of the abstract are given. When defending an abstract, the text does not read, but tells. When answering questions, he makes minor mistakes.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д (1,0; 50-54%)	The abstract is made accurately and delivered on time, written independently on at least 10 typewritten pages, using at least 5 literary sources. When protecting the abstract, the text reads. Uncertainty answers questions, makes fundamental mistakes.
	<b>Unsatisfactory</b> FX (0,5; 25-49%) F (0; 0-24%)	The abstract was made inaccurately and was not submitted on time, written independently on less than 10 pages of typewritten text, using less than 5 literary sources. When protecting the abstract, the text reads. When answering questions, he makes gross mistakes, does not orient himself in the material.

### Topic presentation

Form control	Grade	Criteria for evaluation
Topic presentation	<b>Excellent</b> A + (4,0; 95-100%) A-(3,76; 90-94%)	The presentation was made independently, on time, with a volume of at least 25 slides. At least 7 literary sources were used. The slides are informative and concise. During the defense, the author demonstrates deep knowledge on the topic. Does not make mistakes when answering questions during the discussion.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	The presentation was made independently, on time, with a volume of at least 23 slides. At least 6 literary sources were used. The slides are informative and concise. During the defense, the author demonstrates good knowledge on the topic. Makes minor mistakes when answering questions that he corrects.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д(1,0; 50-54%)	The presentation was made independently, on time, with a volume of at least 20 slides. At least 5 literary sources were used. The slides are not meaningful. When defending, the author makes fundamental mistakes when answering questions.
	<b>Unsatisfactory</b> FX (0,5; 25-49%)	The presentation was not delivered on time, the volume is less than 5-10 slides. Less than 5 literary sources were used. The

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	F (0; 0-24%)	slides are not meaningful. When defending, the author makes gross mistakes when answering questions. Does not focus on own material.
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### Glossary

Form control	Grade	Criteria for evaluation
Preparing a glossary	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	It is set if the student has compiled a glossary on his own; the volume is at least 20 terms. The terms correspond to the protected topic; the wording of the term is literate, corresponds to the biological meaning, complete. The terms are arranged alphabetically, the etymology of the term is given.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	It is set if the student has compiled a glossary on his own; the volume is at least 20 terms. The terms correspond to the protected topic; the wording of the term is literate, corresponds to the biological meaning, there is no etymology. There is no alphabetical order. There are some inaccuracies.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д(1,0; 50-54%)	It is set if the student has compiled a glossary on his own; the volume is at least 20 terms. The wording of the term corresponds to the biological meaning, but is not complete. No alphabetical order; etymology is missing.
	<b>Unsatisfactory</b> FX (0,5; 25-49%) F (0; 0-24%)	It is set if the student has compiled a glossary on his own; the volume is at least 10 terms. The terms are off topic; serious biological errors are allowed. No alphabetical order; etymology is missing.

### Preparation of test tasks

Form control	Grade	Criteria for evaluation
Preparation of test tasks	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	Test tasks contain at least 10 questions. Delivered on time. The basis of the test is informative. Test tasks are formulated clearly, correctly, specifically. Similar and adequate answers. There is an algorithm of answers. The correct answers are marked correctly.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	Test tasks contain at least 10 questions. Delivered on time. The basis of the test is informative. Test tasks are formulated clearly, correctly, specifically. Inconsistent response options. There is an algorithm of answers. The correct answers are marked correctly.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д(1,0; 50-54%)	Test tasks contain at least 10 questions. Delivered on time. The basis of the test is inconsistent. There are test tasks formulated indistinctly, incorrectly, vaguely. Inconsistent response options. There is an algorithm of answers. Not all correct answers are marked correctly.
	<b>Unsatisfactory</b> FX (0,5; 25-49%) F (0; 0-24%)	Test tasks contain less than 5-6 questions. Inconsistent basis of the test, fuzzy statement of the question. Inconsistent response options. There is no answer algorithm. More than 50% of correct answers are marked incorrectly.

### Preparation of written creative work (essay)

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Form control	Grade	Criteria for evaluation
Preparation of written creative work (essay)	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	The content of the work is fully consistent with the topic; the topic is covered in depth and reasoned. Slender in composition, logical and consistent presentation of thoughts. The problem of the essay is clearly formulated. There are no actual errors. The conclusion contains conclusions that logically follow from the content of the main part.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	The theme is sufficiently fully and convincingly revealed with minor deviations from it. The thesis corresponding to the topic of the essay is clearly formulated. In the main part, it is logical, connected, but the thesis put forward is not fully proved, there are single factual inaccuracies.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д(1,0; 50-54%)	A correct, but one-sided or insufficiently complete answer to the topic is given. Deviations from it or individual errors in the presentation of the factual material were made. The material is presented quite logically, but there are some violations of the sequence of expression of thoughts. Conclusions do not fully correspond to the content of the main part
	<b>Unsatisfactory</b> FX (0,5; 25-49%) F (0; 0-24%)	the topic is completely unrevealed, which indicates superficial knowledge. It is characterized by a random arrangement of the material, the lack of communication between the parts. Differs in the presence of gross speech errors.

#### Drawing up situational tasks

Form control	Grade	Criteria for evaluation
Drawing up situational tasks	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	The student showed original thinking, showed a deep knowledge of the material, interdisciplinary connections were used in the preparation of the situational task. Used scientific terminology. Identified the main symptoms of the disease, microbiological laboratory data are correct.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	The student, when compiling the task, made unprincipled inaccuracies, corrected by the student himself during the analysis of the task. Used scientific terminology. Identified the main symptoms of the disease, microbiological laboratory data are correct.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д(1,0; 50-54%)	The student, when compiling a situational task, made inaccuracies and unprincipled mistakes, used scientific terminology. Experienced great difficulties in organizing the material. I was able to identify the main symptoms of the disease, microbiological laboratory data are indicated with slight inaccuracies.
	<b>Unsatisfactory</b> FX (0,5; 25-49%) F (0; 0-24%)	The student made a situational task, made fundamental mistakes and inaccuracies. When compiling the task, he could not identify the main symptoms of the disease, and



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also indicated incorrect microbiological laboratory data.

#### Analysis of scientific articles

Form control	Grade	Criteria for evaluation
Analysis of scientific articles	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	The work was done neatly and delivered on time, written independently on at least 5 pages of printed text. Thoughts on the problem are presented in the form of brief theses, giving arguments. In the text of the work references to the authors are indicated everywhere. When protecting the text does not read, but tells. Confidently and accurately answers all questions asked. For work, I used articles no more than 5 years old and with a high Impact factor.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	The work was done neatly and delivered on time, written independently on at least 4 pages of printed text. Thoughts on the problem are presented in the form of brief theses, but without giving arguments. In the text of the work references to the authors are indicated everywhere. When protecting the text does not read, but tells. When answering questions, he makes minor mistakes. For work, I used articles no more than 5 years old and with a high Impact factor.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д(1,0; 50-54%))	The work was done neatly and delivered on time, written independently on at least 3 pages of printed text. Thoughts on the problem are presented scattered, without giving arguments. In the text of the work references to the authors are not indicated everywhere. When protected, the text reads. Uncertainty answers questions, makes fundamental mistakes. For work, I used articles more than 5 years old and with an average Impact Factor.
	<b>Unsatisfactory</b> FX (0,5; 25-49%) F (0; 0-24%)	The work is written on less than 3 printed sheets. Thoughts are scattered. There are no references to the authors in the text of the work. There are no arguments. When protected, the text reads. When answering questions, he makes gross mistakes, does not orient himself in the material. For work, I used articles more than 5 years old and with a low Impact factor.


#### Intermediate certification

### MID-TERM

Mid-term is carried out in the form of an oral answer to the questions of the ticket. Each ticket consists of 3 theoretical questions. In total, 90-100 points are given as a maximum.

Form control	Grade	Criteria for evaluation
Assessment of boundary control (oral answer to ticket questions)	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	1) the content of the ticket material is disclosed in full; 2) the material is presented correctly, in a certain logical sequence, terminology is accurately used; 3) the ability to illustrate theoretical positions with concrete examples, to apply them in a new situation is shown; 4) the answer is independent, without leading questions; 5) one or two inaccuracies were made when covering minor issues, which are corrected after comments or leading questions.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	The answer mostly satisfies the requirements for an “excellent” rating, but at the same time has one of the drawbacks: 1) there are small gaps in the presentation that do not distort the essence of the content of the answer; 2) one or two shortcomings were made when covering the main content of the answer, corrected after the examiner's remark; 3) an error was made or more than two shortcomings in the coverage of secondary issues, which are corrected after the examiner's remark.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) D+ (1,33;55-59%) D(1,0; 50-54%)	1) the content of the material is incompletely or inconsistently disclosed, but a general understanding of the issue and skills sufficient for further assimilation of the material are demonstrated; 2) there were difficulties or mistakes were made in the definition of concepts, the use of terminology, corrected after several leading questions; 3) with incomplete knowledge of the theoretical material, insufficient formation of competencies, skills and abilities was revealed, the student cannot apply the theory in a new situation
	<b>Unsatisfactory</b> FX (0,5; 25-49%) F (0; 0-24%)	1) the main content of the educational material is not disclosed; 2) ignorance or misunderstanding of the most or most important part of the educational material is revealed; 3) errors were made in the definition of concepts, when using terminology, which were not corrected after several leading questions. 4) the answer to the question is completely absent. 5) refusal to answer.



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## CRITERIA FOR EVALUATION OF THE QUALITY OF THE ANSWER OF THE TEACHER ON THE TICKET AT THE BORDER CONTROL

The ticket consists of 3 questions. Questions 1 and 2 have a maximum of 30 points, and Question 3 has a maximum of 40 points. The maximum total is 100 points.

Criteria for evaluating student responses	Number of points for each question		
	1 question	2 question	3 question
The student did not answer the question	0	0	0
The student did not show even a superficial knowledge of the essence of the question posed, giving an answer in relation to any term and general concept due to the examiner's leading question	7	7	10
The student, answering the question of the ticket, is poorly oriented in the compulsory literature, makes gross mistakes in covering fundamental, key issues.	15	15	20
When answering, the student needs additional questions, makes mistakes in the interpretation of individual, non-key points.	20	20	25
The student correctly answers the question posed within the framework of the compulsory literature, minor single inaccuracies are possible.	25	25	30
The student answers the question correctly, fully, uses additional literature.	30	30	40
<b>TOTAL max for each question:</b>	<b>30</b>	<b>30</b>	<b>40</b>
<b>TOTAL max per ticket:</b>	<b>100</b>		

### Multi-point system of knowledge assessment

Score letter system	Digital equivalent of points	Percentage	Assessment according to the traditional system
A	4,0	95-100	<b>Excellent</b>
A -	3,67	90-94	
B +	3,33	85-89	<b>Good</b>
B	3,0	80-84	
B -	2,67	75-79	
C +	2,33	70-74	
C	2,0	65-69	<b>Satisfactorily</b>
C -	1,67	60-64	
D+	1,33	55-59	
D-	1,0	50-54	
FX	0,5	25-49	<b>Unsatisfactory</b>

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Appendix №1


## EVALUATION CRITERIA FOR INDEPENDENT WORK OF STUDENTS UNDER THE LEADING OF THE TEACHER

### Preparation and defense of the abstract

Form control	Grade	Criteria for evaluation
Preparation and defense of the abstract	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	The abstract is made accurately and delivered on time, written independently on at least 15 typewritten pages, using at least 7 literary sources. Schemes, tables and figures corresponding to the topic of the abstract are given. When defending an abstract, the text does not read, but tells. Confidently and accurately answers all questions asked.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	The abstract was done accurately and delivered on time, written independently on at least 13 typewritten pages, using at least 6 literary sources. Schemes, tables and figures corresponding to the topic of the abstract are given. When defending an abstract, the text does not read, but tells. When answering questions, he makes minor mistakes.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д (1,0; 50-54%)	The abstract is made accurately and delivered on time, written independently on at least 10 typewritten pages, using at least 5 literary sources. When protecting the abstract, the text reads. Uncertainty answers questions, makes fundamental mistakes.
	<b>Unsatisfactory</b> FX (0,5; 25-49%) F (0; 0-24%)	The abstract was made inaccurately and was not submitted on time, written independently on less than 10 pages of typewritten text, using less than 5 literary sources. When protecting the abstract, the text reads. When answering questions, he makes gross mistakes, does not orient himself in the material.

### Topic presentation

Form control	Grade	Criteria for evaluation
Topic presentation	<b>Excellent</b> A + (4,0; 95-100%) A-(3,76; 90-94%)	The presentation was made independently, on time, with a volume of at least 25 slides. At least 7 literary sources were used. The slides are informative and concise. During the defense, the author demonstrates deep knowledge on the topic. Does not make mistakes when answering questions during the discussion.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	The presentation was made independently, on time, with a volume of at least 23 slides. At least 6 literary sources were used. The slides are informative and concise. During the defense, the author demonstrates good knowledge on the topic. Makes minor mistakes when answering questions that he corrects.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д(1,0; 50-54%)	The presentation was made independently, on time, with a volume of at least 20 slides. At least 5 literary sources were used. The slides are not meaningful. When defending, the author makes fundamental mistakes when answering questions.
	<b>Unsatisfactory</b>	The presentation was not delivered on time, the volume is less

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	FX (0,5; 25-49%) F (0; 0-24%)	than 5-10 slides. Less than 5 literary sources were used. The slides are not meaningful. When defending, the author makes gross mistakes when answering questions. Does not focus on own material.
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## Glossary

Form control	Grade	Criteria for evaluation
Preparing a glossary	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	It is set if the student has compiled a glossary on his own; the volume is at least 20 terms. The terms correspond to the protected topic; the wording of the term is literate, corresponds to the biological meaning, complete. The terms are arranged alphabetically, the etymology of the term is given.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	It is set if the student has compiled a glossary on his own; the volume is at least 20 terms. The terms correspond to the protected topic; the wording of the term is literate, corresponds to the biological meaning, there is no etymology. There is no alphabetical order. There are some inaccuracies.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д(1,0; 50-54%))	It is set if the student has compiled a glossary on his own; the volume is at least 20 terms. The wording of the term corresponds to the biological meaning, but is not complete. No alphabetical order; etymology is missing.
	<b>Unsatisfactory</b> FX (0,5; 25-49%) F (0; 0-24%)	It is set if the student has compiled a glossary on his own; the volume is at least 10 terms. The terms are off topic; serious biological errors are allowed. No alphabetical order; etymology is missing.

## Preparation of test tasks

Form control	Grade	Criteria for evaluation
Preparation of test tasks	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	Test tasks contain at least 10 questions. Delivered on time. The basis of the test is informative. Test tasks are formulated clearly, correctly, specifically. Similar and adequate answers. There is an algorithm of answers. The correct answers are marked correctly.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	Test tasks contain at least 10 questions. Delivered on time. The basis of the test is informative. Test tasks are formulated clearly, correctly, specifically. Inconsistent response options. There is an algorithm of answers. The correct answers are marked correctly.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д(1,0; 50-54%))	Test tasks contain at least 10 questions. Delivered on time. The basis of the test is inconsistent. There are test tasks formulated indistinctly, incorrectly, vaguely. Inconsistent response options. There is an algorithm of answers. Not all correct answers are marked correctly.
	<b>Unsatisfactory</b> FX (0,5; 25-49%) F (0; 0-24%)	Test tasks contain less than 5-6 questions. Inconsistent basis of the test, fuzzy statement of the question. Inconsistent response options. There is no answer algorithm. More than 50% of correct answers are marked incorrectly.

### Preparation of written creative work (essay)

Form control	Grade	Criteria for evaluation
Preparation of written creative work (essay)	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	The content of the work is fully consistent with the topic; the topic is covered in depth and reasoned. Slender in composition, logical and consistent presentation of thoughts. The problem of the essay is clearly formulated. There are no actual errors. The conclusion contains conclusions that logically follow from the content of the main part.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	The theme is sufficiently fully and convincingly revealed with minor deviations from it. The thesis corresponding to the topic of the essay is clearly formulated. In the main part, it is logical, connected, but the thesis put forward is not fully proved, there are single factual inaccuracies.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д(1,0; 50-54%))	A correct, but one-sided or insufficiently complete answer to the topic is given. Deviations from it or individual errors in the presentation of the factual material were made. The material is presented quite logically, but there are some violations of the sequence of expression of thoughts. Conclusions do not fully correspond to the content of the main part
	<b>Unsatisfactory</b> FX (0,5; 25-49%) F (0; 0-24%)	the topic is completely unrevealed, which indicates superficial knowledge. It is characterized by a random arrangement of the material, the lack of communication between the parts. Differs in the presence of gross speech errors.

### Drawing up situational tasks

Form control	Grade	Criteria for evaluation
Drawing up situational tasks	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	The student showed original thinking, showed a deep knowledge of the material, interdisciplinary connections were used in the preparation of the situational task. Used scientific terminology. Identified the main symptoms of the disease, microbiological laboratory data are correct.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	The student, when compiling the task, made unprincipled inaccuracies, corrected by the student himself during the analysis of the task. Used scientific terminology. Identified the main symptoms of the disease, microbiological laboratory data are correct.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д(1,0; 50-54%))	The student, when compiling a situational task, made inaccuracies and unprincipled mistakes, used scientific terminology. Experienced great difficulties in organizing the material. I was able to identify the main symptoms of the disease, microbiological laboratory data are indicated with slight inaccuracies.
	<b>Unsatisfactory</b> FX (0,5; 25-49%)	The student made a situational task, made fundamental mistakes and inaccuracies. When compiling the task, he

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	F (0; 0-24%)	could not identify the main symptoms of the disease, and also indicated incorrect microbiological laboratory data.
<b>Analysis of scientific articles</b>		
<b>Form control</b>	<b>Grade</b>	<b>Criteria for evaluation</b>
Analysis of scientific articles	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	The work was done neatly and delivered on time, written independently on at least 5 pages of printed text. Thoughts on the problem are presented in the form of brief theses, giving arguments. In the text of the work references to the authors are indicated everywhere. When protecting the text does not read, but tells. Confidently and accurately answers all questions asked. For work, I used articles no more than 5 years old and with a high Impact factor.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	The work was done neatly and delivered on time, written independently on at least 4 pages of printed text. Thoughts on the problem are presented in the form of brief theses, but without giving arguments. In the text of the work references to the authors are indicated everywhere. When protecting the text does not read, but tells. When answering questions, he makes minor mistakes. For work, I used articles no more than 5 years old and with a high Impact factor.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д(1,0; 50-54%)	The work was done neatly and delivered on time, written independently on at least 3 pages of printed text. Thoughts on the problem are presented scattered, without giving arguments. In the text of the work references to the authors are not indicated everywhere. When protected, the text reads. Uncertainty answers questions, makes fundamental mistakes. For work, I used articles more than 5 years old and with an average Impact Factor.
	<b>Unsatisfactory</b> FX (0,5; 25-49%) F (0; 0-24%)	The work is written on less than 3 printed sheets. Thoughts are scattered. There are no references to the authors in the text of the work. There are no arguments. When protected, the text reads. When answering questions, he makes gross mistakes, does not orient himself in the material. For work, I used articles more than 5 years old and with a low Impact factor.
<b>Intermediate certification</b>		



### MID-TERM

Mid-term is carried out in the form of an oral answer to the questions of the ticket. Each ticket consists of 3 theoretical questions. In total, 90-100 points are given as a maximum.

Form control	Grade	Criteria for evaluation
Assessment of boundary control (oral answer to ticket questions)	<b>Excellent</b> A + (4,0; 95-100%) A- (3,76; 90-94%)	1) the content of the ticket material is disclosed in full; 2) the material is presented correctly, in a certain logical sequence, terminology is accurately used; 3) the ability to illustrate theoretical positions with concrete examples, to apply them in a new situation is shown; 4) the answer is independent, without leading questions; 5) one or two inaccuracies were made when covering minor issues, which are corrected after comments or leading questions.
	<b>Good</b> B+ (3,33;85-89%) B- (2,67; 75-79%) C+ (2,33;70-74%)	The answer mostly satisfies the requirements for an “excellent” rating, but at the same time has one of the drawbacks: 1) there are small gaps in the presentation that do not distort the essence of the content of the answer; 2) one or two shortcomings were made when covering the main content of the answer, corrected after the examiner's remark; 2) 3) an error was made or more than two shortcomings in the coverage of secondary issues, which are corrected after the examiner's remark.
	<b>Satisfactorily</b> C (2,0;65-69%) C- (1,67;60-64%) Д+ (1,33;55-59%) Д(1,0; 50-54%)	1) the content of the material is incompletely or inconsistently disclosed, but a general understanding of the issue and skills sufficient for further assimilation of the material are demonstrated; 2) there were difficulties or mistakes were made in the definition of concepts, the use of terminology, corrected after several leading questions; 3) with incomplete knowledge of the theoretical material, insufficient formation of competencies, skills and abilities was revealed, the student cannot apply the theory in a new situation
	<b>Unsatisfactory</b> FX (0,5; 25-49%) F (0; 0-24%)	1) the main content of the educational material is not disclosed; 2) ignorance or misunderstanding of the most or most important part of the educational material is revealed; 3) errors were made in the definition of concepts, when using terminology, which were not corrected after several leading questions. 4) the answer to the question is completely absent. 5) refusal to answer.

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The ticket consists of 3 questions. Questions 1 and 2 have a maximum of 30 points, and Question 3 has a maximum of 40 points. The maximum total is 100 points.

Criteria for evaluating student responses	Number of points for each question		
	1 question	2 question	3 question
The student did not answer the question	0	0	0
The student did not show even a superficial knowledge of the essence of the question posed, giving an answer in relation to any term and general concept due to the examiner's leading question	7	7	10
The student, answering the question of the ticket, is poorly oriented in the compulsory literature, makes gross mistakes in covering fundamental, key issues.	15	15	20
When answering, the student needs additional questions, makes mistakes in the interpretation of individual, non-key points.	20	20	25
The student correctly answers the question posed within the framework of the compulsory literature, minor single inaccuracies are possible.	25	25	30
The student answers the question correctly, fully, uses additional literature.	30	30	40
<b>TOTAL max for each question:</b>	<b>30</b>	<b>30</b>	<b>40</b>
<b>TOTAL max per ticket:</b>	<b>100</b>		

### Multi-point system of knowledge assessment

Score letter system	Digital equivalent of points	Percentage	Assessment according to the traditional system
A	4,0	95-100	<b>Excellent</b>
A -	3,67	90-94	
B +	3,33	85-89	<b>Good</b>
B	3,0	80-84	
B -	2,67	75-79	
C +	2,33	70-74	
C	2,0	65-69	<b>Satisfactorily</b>
C -	1,67	60-64	
D+	1,33	55-59	
D-	1,0	50-54	
FX	0,5	25-49	<b>Unsatisfactory</b>

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## Appendix No.2

### Recommended Reading

#### In Russian

##### Primary:

1. Microbiology: textbook / ed. V.V. Zvereva, M.N. Boychenko. - M.: GEOTAR - Media, 2012. -- 608 p. : ill.
2. Microbiology, virology: a guide to practical exercises: a training manual / ed. V.V. Zvereva. -; Min education and science of the Russian Federation. Recommended by SBEE DPO "Russian Medical Acad. Postgraduate Education" Min. health care of the Russian Federation. - M.: GEOTAR - Media, 2015. -- 360 p.
3. Seytkhanova B.T. Textbook for laboratory studies in private microbiology (intestinal infections): textbook. Allowance. - Shymkent, 2012
4. Tlepov, A. A. Microbiology: a manual for higher education. textbook. institutions / A. A. Tlepov. - Almaty: Evero, 2011. -- 314

#### In Kazakh

##### Primary:

1. Zheke microbiology. 1 bul. Medicalsk bacteriology: Оқу қралы / F. T. Alimzhanova [reinforced concrete]. - Almaty: Evero, 2016. -- 380 bet. with.
2. Zheke microbiology. 2 bul. Medicalsk protozoology, mycology, female virology: Оқу құралы / F. T. Alimzhanova [reinforced concrete]. - Almaty: Evero, 2016. -- 272 bet. with.
3. Medicalsk microbiology, virology and immunology: оқулы. 2 томдық. 1 volume / Kazakh language aud. Қ. Құдайбергены; ed. V.V. Zverev. - M.: GEOTAR - Media, 2016. -- 416bet.
4. Medicalsk microbiology, virology, immunology: оқулы. 2 томдық. 2 volume / Kazakh. til. aud. Қ. Құдайбергены. - M.: GEOTAR - Media, 2016. -- 480 bet. with.
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