INTERNATIONAL HIGHER SCHOOL OF MEDICINE

Department of Public Health

SYLLABUS
Microbiology, Virology and Immunology

2026-2027 academic year
for students of medical faculty
2 course 4 semester
5 credits (150h, including auditirial-90h, independent work-60h)

Central campus **Lecturer:** **4th semester, all groups**	
Central campus **Practical classes:** 4th semester, groups #1,2,3,4,7,8	**Derbishalieva K. Zhyparkul** +996 700 444 672 (WhatsApp) Email: j.derbishalieva@gmail.com
4th semester, groups #5,6,9,10,11,12,19	**Duishenkulova K. Marina** +996 777 111 373 (WhatsApp) Email: marinaduishen@gmail.com
4th semesters, groups #13,14,15,16,20,21,27	**Sataeva U. Nargiza** +996 773 931 391 (WhatsApp) Email: nargiza-87@mail.ru
4th semesters, groups #17,18,22,23,24,25,26	**Sulaimanova T. Cholpon,** MD, PhD, Associate Professor +996 553 409 666 (WhatsApp) Email: cholponsul@mail.ru
4th semester, groups #28,30,31,32,33,34,35	**Tumonbaeva S. Zharkynai** +996 509 007 848 (WhatsApp) Email: tumonbaevazs@gmail.com
4th semester, groups #29,36,37,38,39,40,41,42	**Zhaparova T. Asel** +996 700 800 752 (WhatsApp) Email: japarova_93@mail.ru

Venue: Central campus:114/1 Lev Tolstoy st. the first and second floor, room numbers: 201, 202, 203, 208 and 209

The Syllabus is considered
at the meeting of the department of Public Health
Protocol №1 dated 27.08.2026

Head of the department _____ K.O. Dzhusupov

Course objective: to expand understanding of the interaction between microorganisms and the body, master laboratory diagnosis of infectious diseases, and integrate modern microbiological knowledge to develop clinical thinking skills in future physicians.

After study of the discipline the student must:
Knowledge: to impart knowledge of the structure and form of bacterial cells with the function of various formations, their chemical composition, physiology, bacterial biochemistry, characteristics of nutrition, respiration, growth, and reproduction.
Skill: Acquire requisite skill in observing sanitary-hygienic and epidemiological rules and safety techniques in bacteriological laboratories. Have skills in differentiating microorganisms based on morphological characteristics under microscopy and skills in the differential diagnosis of pathogens based on morphological characteristics.
Attitude:
Prerequisites: Medical Biology, Macro- and Microanatomy, Normal Physiology, Pathology (Pathological Anatomy and Physiology), Propedotherapy, Propaedpediatrics.
Post-requisites: Clinical Modules, Operative Surgery, Ophthalmology, Oncology, Dermatovenerology, Dentistry, Phthisiopulmonology, Otorhinolaryngology, Traumatology, Orthopedics, Extreme Surgery, Public Health and Health, Family Medicine, Pediatric Infectious Diseases, Infectious Diseases, Epidemiology, Polyclinic Therapy, Clinical Allergology and Immunology, Resuscitation and Intensive Care Medicine, Polyclinic Obstetrics and Gynecology, Polyclinic Pediatrics, Polyclinic Surgery.

THEMATIC PLAN OF LECTURES

№	Topic of lecture for 4th semester	Hs	Date
1	Overview and components of the immune system: structure and functions of immune organs, cells, and immunoglobulins	2	26.09.2026
2	Humoral and cellular immune responses: mechanisms, hypersensitivity, antigen–antibody interactions, and serological reactions	2	31.08.2026
3	Chemotherapy and chemoprophylaxis of infectious diseases: antimicrobial drugs, immunoprophylaxis, and mechanisms of microbial drug resistance	2	07.09.2026
4	Gram-positive and gram-negative cocci: staphylococci, streptococci, meningococci, gonococci — pathogens of purulent infections and bacteremia	2	14.09.2026
5	Pathogens of diphtheria, pertussis, and tuberculosis: microbiological characteristics, pathogenesis, and clinical relevance	2	21.09.2026
6	Pathogens of gas gangrene, tetanus, and botulism: *Clostridium* spp., their toxins, pathogenicity, and prevention	2	28.09.2026
7	Pathogens of intestinal infections: Enterobacteriaceae family — *E. coli, Salmonella, Shigella, Proteus* and others	2	05.10.2026
8	Zoonotic pathogens: plague (*Yersinia pestis*), tularemia, anthrax, brucellosis, typhus, Q fever, spirochetes (*Treponema, Borrelia, Leptospira*)	2	12.10.2026
9	Basics of medical virology: virus morphology, structure, replication, and classification	2	19.10.2026
10	DNA viruses: morphology, pathogenesis, and diseases caused	2	26.10.2026
11	RNA viruses: morphology, pathogenesis, and diseases caused	2	02.11.2026
12	Microbiological diagnosis of tropical viral infections: epidemiology, clinical features, and laboratory diagnosis	2	09.11.2026
13	Morphology and structure of fungi: general characteristics of molds and yeasts	2	16.11.2026
14	Microbiological diagnosis of molds: laboratory methods, pathogenic species, and clinical importance	2	23.11.2026
15	Microbiological diagnosis of yeasts and yeast-like fungi: *Candida, Cryptococcus* and others	2	30.11.2026
16	Morphology and structure of parasites: helminths and protozoa	2	07.12.2026
17	Morphology and structure of intestinal and urogenital protozoa: *Entamoeba, Giardia, Trichomonas, Cryptosporidium* and others	2	14.12.2026
18	Morphology and structure of blood protozoa: *Plasmodium, Leishmania, Trypanosoma, Toxoplasma* and others	2	21.12.2026
	Total	**36**	

THEMATIC PLAN OF PRACTICAL CLASSES

Unit	Topic of the practical class for 4 semester	Hs	Date
Unit 4 — Immunology: Immunity, Antigens, Hypersensitivity, Vaccination, and Chemoprophylaxis	Types of immunity: specific and non-specific defense factors, phagocytosis, antibodies, immunodeficiency, humoral and cellular immune responses; immune response in bacterial, mycobacterial, viral, fungal, and parasitic infections	2	26.08.2026-05.09.2026
	Antigens and immune response: structure and functions of antigens, antibodies, and complement; serological methods (bacteriolysis, hemolysis, complement fixation, enzyme immunoassays); principles and applications of diagnostic immunological tests	2	
	Hypersensitivity and allergy: immunological mechanisms in hypersensitivity, autoimmune disorders, and immunodeficiency states; laboratory methods for detection and diagnosis	2	
	Chemotherapy, chemoprophylaxis, and immunoprophylaxis: antimicrobial therapy, drug resistance, vaccines and immunization schedules, herd immunity, BCG vaccine (origin, technique, efficacy, complications), and indications for vaccination including in obstructive airway disease	2	07.09.2026-19.09.2026
	Unit 4 test	2	
Unit 5 — Medical Bacteriology: Bacterial Pathogens, Diagnosis, and Prevention	Medical bacteriology: microbiological diagnosis of gram-positive and gram-negative cocci and chlamydia; etiopathogenesis, diagnosis and prevention of respiratory, skin, soft tissue, bone, joint, CNS, and genitourinary infections; rheumatic fever; meningitis and encephalitis; laboratory identification of causative agents; diagnosis and prevention of sexually transmitted and urinary tract infections	2	
	Medical bacteriology: diagnosis of gram-positive and gram-negative bacilli (Corynebacterium, Bordetella, Enterobacteriaceae, Vibrio, Shigella, Campylobacter, Proteus), mycobacteria (tuberculosis, leprosy), and actinomycetes; diarrheal diseases, dysentery, food poisoning, acid peptic disease, *Helicobacter pylori* infections, pseudomonal infections, typhoid fever, diphtheria, pertussis, tetanus; laboratory diagnostics including Mantoux test, sputum and AFB smears, PCR and drug sensitivity testing	2	21.09.2026-03.10.2026
	Anaerobic infections: microbiological diagnosis of *Clostridium perfringens* (gas gangrene), *C. tetani* (tetanus), and *C. botulinum* (botulism); pathogenesis, clinical features, laboratory diagnosis, and management of clostridial diseases	2	
	Zoonotic infections: microbiological diagnosis of plague, tularemia, anthrax, brucellosis, listeriosis; etiology, epidemiology, clinical features, laboratory diagnosis, and preventive and control strategies of bacterial, viral, fungal, and parasitic zoonoses	2	
	Intracellular parasites: pathogenic spirochetes, leptospira, rickettsiae, and mycoplasmas; rickettsial diseases (scrub typhus, epidemic typhus, endemic typhus); clinical features, laboratory diagnosis, and management; dark-field microscopy for spirochetes; etiology, diagnosis, and management of vaginal discharge	2	05.10.2026-17.10.2026
	Unit 5 test	2	
Unit 6 — Medical Virology: Respiratory, Intestinal, Childhood Viral Infections, Encephalitis, and Hemorrhagic Fevers	Medical virology: microbiological diagnosis of acute viral respiratory infections (Orthomyxoviridae, Paramyxoviridae, Coronaviridae, Adenoviridae — influenza, parainfluenza, adenoviruses, SARS, COVID-19); structure and replication of viruses; etiopathogenesis, clinical features, complications, and management	2	
	Medical virology: microbiological diagnosis of intestinal viral infections (enteroviruses, poliovirus, coxsackievirus, echoviruses); viral hepatitis (A–E) and HIV/AIDS; epidemiology, pathogenesis, complications, opportunistic infections, diagnosis, prevention, and management	2	19.10.2026-31.10.2026
	Medical virology: microbiological diagnosis of childhood viral infections (measles, mumps, rubella, varicella, herpesviruses including HSV, CMV, EBV); etiopathogenesis, clinical features, complications, and management of herpes simplex and varicella-zoster infections	2	
	Medical virology: microbiological diagnosis of viral encephalitis and hemorrhagic fevers (tick-borne encephalitis, Japanese encephalitis, Omsk	2	

	hemorrhagic fever, Congo–Crimean hemorrhagic fever, bunyaviruses, flaviviruses, arboviruses)		
	Medical virology: microbiological diagnosis of variola, rabies, yellow fever, Ebola, Zika, dengue, chikungunya, and other vector-borne viral diseases; etiopathogenesis, clinical features, complications, prevention and management of rabies and dengue	2	02.11.2026-14.11.2026
	Unit 6 test	2	
Unit 7 — Medical Mycology: Molds, Dermatophytes, Dimorphic and Yeast-like Fungi	Medical mycology: classification, structure, and morphology of fungi; microbiological diagnosis of molds (Aspergillus, Penicillium)	2	
	Medical mycology: microbiological diagnosis of dermatophytes (Trichophyton, Microsporum, Achorion) and mucormycosis; discussion of actinomycosis and nocardiosis	2	16.11.2026-28.11.2026
	Medical mycology: microbiological diagnosis of dimorphic fungi (Histoplasma, Coccidioides, Blastomyces) and related systemic mycoses	2	
	Medical mycology: microbiological diagnosis of yeasts and yeast-like fungi (Candida, Cryptococcus, Pneumocystis, Madurella); antifungal therapy; etiopathogenesis, clinical features, and management of candidiasis	2	
	Unit 7 test	2	30.11.2026-12.12.2026
Unit 8 — Medical Parasitology: Intestinal and Blood Protozoa, Nematodes, and Cestodes	Medical parasitology: microbiological diagnosis of intestinal and urogenital protozoa (Entamoeba, Balantidium, Giardia, Trichomonas, Cryptosporidium, Isospora); etiopathogenesis, clinical features, complications, and management of amebiasis	2	
	Medical parasitology: microbiological diagnosis of blood protozoa (Trypanosoma, Leishmania, Plasmodium, Toxoplasma, Babesia); morphology, life cycle, pathogenesis, laboratory diagnosis, prevention, and management of malaria, leishmaniasis, filariasis, and toxoplasmosis	2	
	Medical parasitology: microbiological diagnosis of nematodes (Ascaris, Enterobius, Trichinella, Loa loa); clinical features, diagnosis, and management	2	14.12.2026-26.12.2026
	Medical parasitology: microbiological diagnosis of cestodes (Taenia, Hymenolepis, Diphyllobothrium, Echinococcus); etiopathogenesis, clinical features, complications, and management of cysticercosis	2	
	Unit 8 test	2	
	Total	**54**	

THEMATIC PLAN OF INDEPENDENT WORK OF STUDENTS

№	Unit №	1. Theme of independent work	Hours	Dates
4	4. Immunology and Immunity	1. Compilation of 10 test tasks on the subject of the block. 2. Compiling a glossary on the topic of the block. 3. Applying a crossword puzzle to a unit. 4. Compiling a brief overview of the subject of the block. 5. Preparation of slide presentations on the topic of the block. 6. Draw a poster on one of the following topics: a. Phagocytosis. b. Immunoglobulins, structure, functions. c. The immune system of the human body. d. Allergic reactions, types. e. Immunoprophylaxis. Vaccines.	18	12.09.2026
5	5. Medical Bacteriology	1. Compilation of 10 test tasks on the unit topic. 2. Compiling a glossary on the topic of unit. 3. Compiling a crossword puzzle on the topic of a unit. 4. Drawing up notes on the unit topic. 5. Preparation of slide presentations on the topic of the unit. 6. Draw a poster on one of the topics below: a. Clinical and laboratory diagnosis of pathogens of purulent inflammation. b. Clinical and laboratory diagnosis of intestinal infections. c. Clinical - laboratory diagnostics diseases caused _ spore-forming with chopsticks.	18	10.10.2026

6	6. Medical Virology	1. Compilation of 10 test tasks on the unit topic. 2. Compiling a glossary on the topic of unit. 3. Compiling a crossword puzzle on the topic of a unit. 4. Drawing up notes on the unit topic. Preparation of slide presentations on the topic of the unit "Medical Virology". 5. Draw a poster on one of the topics below: a) Microbiological diagnosis of acute viral respiratory diseases. Virus structure. Reproduction of the virus b) Microbiological diagnosis of intestinal viral infections. Enteroviruses - polio virus. Coxsackie. ECHO Hepatitis A and E. c) Microbiological diagnosis of viral hepatitis - hepatitis B, C, D. – d) Microbiological diagnosis Immunodeficiency virus - HIV / AIDS e) microbiological diagnosis of viral encephalitis and hemorrhagic fever f) microbiological diagnosis of childhood infection viruses - measles and mumps virus, rubella virus, chickenpox virus, herpes virus g) Microbiological diagnosis of smallpox virus, yellow fever, rabies virus, Ebola virus, Zika virus	18	07.11.2026
7	7. Medical Mycology	1. Compilation of 10 test tasks for the block 2. Compilation of a glossary on the topic “Medical mycology”. 3. Compose a crossword puzzle on the topic of the lesson. 4. Preparation of slide presentations on the topic of the block. 5. Draw a poster on one of the following topics: A. Clinical and laboratory diagnostics of diseases, caused by yeast-like fungi. B. Clinical and laboratory diagnosis of fungal diseases of the skin and skin appendages. C. clinical and laboratory diagnosis of systemic fungal diseases	18	28.11.2026
8	8. Medical Parasitology	1. Compilation of 10 test tasks on the topic of the block. 2. Compiling a glossary on the topic of the section. 3. Compiling a crossword puzzle on the topic of the section. 4. Compiling a summary of the vertices of the apparatus. 5. Preparation of slide presentations or posters on one of the following topics: a) microbiological diagnosis of intestinal protozoa b) microbiological diagnosis of urogenital protozoa c) pathogens of blood-borne protozoal infections and their diagnosis. d) helminthic infestations.	18	26.12.2026
	Total:		144	

Recommended reading for the discipline:

Basic: 1. Ananthanarayan and Panikers “Textbook of Microbiology” 7-th (2008), 9-th (2016), 10-th (2018) editions,
2. James G. Cappuccino, Natale Sherman “Microbiology: a laboratory manual” 10-th edition (2014) (https://themodern.farm/studies/Microbiology-Laboratory-Manual.pdf),
3. Arvind Arora “General Microbiology” Pulse Publications (2010) (https://context4book.com/download/4705487-arvind-arora-microbiology).
Additional: 1. Warren Levinson Ernest Jawetz **“**Medical Microbiology and Immunology**”** 6-th edition (2000),
2. Abilo Tadesse, Meseret Alem “Medical Bacteriology” Ethiopia Public Health Training Initiative (2006), (https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/env_occupational_health_students/medicalbacteriology.pdf),
3. F.H. Kayser, K.A. Bienz, J.Eclert, R.M.Zinkernagel “Medical Microbiology” Thieme (2005), (https://repository.poltekkes-kaltim.ac.id/1153/1/medical%20microbiology.pdf),
4.Keith Struthers “Clinical Microbiology” 2-nd edition (2017), (http://repository.stikesrspadgs.ac.id/25/1/Clinical%20Microbiology%20Struthers-299hlm.pdf)

Grading policy and procedures for all types of work

For the period of studying the discipline, the student gains points for the relevant parameters (per unit):
current score - 40 points
independent work - 20 points
control score (final assessment of knowledge per unit) - 40 points
Maximum score - 100 (40+20+40)

Grading system for student's achievements

Grading criteria per discipline				
Maximum score	Intervals			
	«unsatisfactory»	«satisfactory»	«good»	«excellent»
Current control - 40	0-23	24-30	31-35	36-40
Interval description	Doesn't do homework; Does not answer 3 questions asked, has difficulty working with situational tasks, lacks knowledge and practical skills when working in a microbiological laboratory	Does not complete homework in full : answers one question out of three ; has gaps in mastering the material; has difficulty applying knowledge in practice ; partially understands the text, but incompletely and inaccurately answers the teacher's questions when solving situational problems	Completes homework in full : answers two or more questions ; material, but sometimes experiences difficulties and makes mistakes when performing practical procedures ;	Completes homework in full , answers three or more questions ; easily applies knowledge and skills when solving problems of various types, can sometimes make mistakes , clearly follows practical procedures (1.2);
Independent work - 20	0-11	12-15	16-17	18-20
Interval description	There is no IW or the content does not correspond to the stated topic, but the sequence of presentation is broken; the material used is of low quality, sources are not indicated	The content partially corresponds to the stated topic; the sequence of presentation is broken; Low quality material, no sources indicated. Less than three tasks out of five were completed incompletely	The content of the presentation, assignments, tasks correspond to the stated topic; clearly, clearly and consistently presented; good quality material, more than four tasks completed	The content of the presentation, confederates, corresponds to the stated topic; clearly, clearly and consistently presented; good quality material, presented in full: sources indicated, all stated tasks completed
Control work (module) - 40	0-23	24-30	31-35	36-40
Interval description	The student has gaps in knowledge, correctly answering less than 23 out of 40 questions during testing.	The student has a basic understanding of the study material within the program, correctly answering questions 24 to 30 out of 40 (answering correctly less than 60%).	The student fully comprehends the study material provided by the program, correctly answering questions 31 to 35 out of 40 (answering correctly less than 77%).	The student demonstrates a deep, substantive, and comprehensive understanding of the program material at a high scientific level, correctly answering questions 36 to 40 out of 40 (answering correctly more than 90%).

Conduct Policy: (lateness, absence, behavior in the auditorium, late submission of work).

- Punctuality and completion of tasks.
- Mandatory attendance of classes.
- Attending class in a clean medical uniform.
- Eliminating conversations on a cell phone in the classroom.
- Active participation in the learning process.

- Doing homework on time.
- Academic detention at the time specified by the teacher.
For violations of the Conduct Policy, the total points for discipline might be reduced to 1-10 points.

Academic Ethics Policy.
- Be tolerant, respect the opinions of others.
- Formulate objections in the correct form.
- Constructively support feedback in all classes.
- Plagiarism and other forms of dishonest work are unacceptable. Plagiarism includes the following: the absence of references when using printed and electronic materials, quotes, thoughts and works of other authors or students.
- Prompting and cheating during tests, exams, classes is unacceptable as well as passing an exam for another student, unauthorized copying of materials.
For violations of the Academic Ethics Policy, the total points for the discipline may be reduced to 1-10 points.

Guidelines for the lessons of the discipline

Unit 4

Key questions covered in lesson 19.
1. Types of immunity. Specific and non-specific factors of host defense.
2. Phagocytosis.
3. Antibodies. Classes of antibodies and their functions.
4. Immunodeficiency
5. Humoral and cell-mediated immune response
6. Primary and secondary response

Recommended reading for the lesson:
1. Subhash Chandra Pariga «Textbook of Microbiology & Immunology»2nd edition, 2012/pages 85-89, 94-99, 122-124, 143-148.
2. Hawley, Louise. Microbiology and Immunology, 6th ed. / pages 238-257.
3. Anantharayan and Paniker's «Textbook of Microbiology» 7th ed. / pages 71-80, 152-158.
4. Medical Microbiology. 26th.edition, 2013, Jawetz, Melnick, & Adelberg's. - LANGE medical book.- p.123-124, 124-140, 142-143.
5. Kim Moscatello, Immunology and Microbiology, Kaplan Medical USMLE Step1, lecture notes,2013/ pages 2-22, 117-131.

Key questions covered in lesson 20.
1. Antigens.
2. Immune response
3. Antigen-Antibody reactions. Serological reactions
4. Serological methods of diagnosis immunological processes.
5. Bacteriolysis reaction
6. Hemolysis reaction
7. Complement fixation
8. Immune enzyme reactions

Recommended reading for the lesson:
1. Subhash Chandra Pariga «Textbook of Microbiology&Immunology»2nd edition, 2012/pages 90-93, 101-115
2. Hawley, Louise. Microbiology and Immunology, 6th ed. / pages 238-251, 252-254.
3. Anantharayan and Paniker's «Textbook of Microbiology»7th ed. / pages 92-110.
4. Medical Microbiology. 26th.edition, 2013, Jawetz, Melnick, & Adelberg's. - LANGE medical book. - p.143-144.
5. Kim Moscatello, Immunoogy and Microbiology, Kaplan Medical USMLE Step1, lecture notes, 2013/ pages 171-184.

Key questions covered in lesson 21.
1. Hypersensitivity reactions
2. Type I (immediate) hypersensitivity
3. Type II hypersensitivity
4. Type III hypersensitivity
5. Type IV (delayed-type) hypersensitivity
6. The pathogenesis of autoimmunity
7. Strategies for the therapy of hypersensitivity and autoimmune diseases
8. Allergy skin test

Recommended reading for the lesson:
1. Subhash Chandra Pariga «Textbook of Microbiology&Immunology»2nd edition, 2012/pages 149-155.

2. Hawley, Louise. Microbiology and Immunology, 6th ed. / pages 277-284
3. Anantharayan and Paniker's «Textbook of Microbiology» 7th ed. / pages 159-169.
4. Medical Microbiology. 26thedition, 2013, Jawetz, Melnick, & Adelberg's.- LANGE medical book.- p.141-142.
5. Kim Moscatello, Immunoogy and Microbiology, Kaplan Medical USMLE Step1, lecture notes, 2013/ pages 141-159.

Key questions covered in lesson 22.

1. What is chemotherapy?
2. What are antibiotics?
3. Sources of antibiotics
4. Chemical classifications
5. Mechanism of action
6. What is antimicrobial resistance?
7. Mechanism of antibiotic resistance
8. Antibiotic sensitivity test. Disc diffusion method
9. Vaccination and immunotherapy
10. Immunoprophylaxis

Recommended reading for the lesson:

1. Subhash Chandra Pariga «Textbook of Microbiology & Immunology»2nd edition, 2012/pages 637-640.
2. Hawley, Louise. Microbiology and Immunology, 6th ed. / pages 287-288.
3. Microbiology Bio 204 Laboratory manual, Morgan Community college, Fort Morgan, page 74-76.
4. Anantharayan and Paniker's «Textbook of Microbiology»7th ed. / pages 631-633.
5. Medical Microbiology. 26th.edition, 2013, Jawetz, Melnick, & Adelberg's.- LANGE medical book.- p.371-378, 379-384.
6. Kim Moscatello, Immunology and Microbiology, Kaplan Medical USMLE Step1, lecture notes, 2013/ pages 107-116.

Key questions covered in lesson 23.

1. Types of immunity. Specific and nonspecific host defense factors. Phagocytosis.
2. Antibodies. Classes of antibodies and their functions.
3. Immunodeficiency
4. Antigens. Immune response.
5. Antigen-antibody reactions. Serological reactions.
6. Serologic methods for diagnosis of immunological processes.
7. Humoral and cellular immune response
8. Primary and secondary response
9. Hypersensitivity reactions
10. Type I (immediate) hypersensitivity
11. Type II hypersensitivity
12. Type III hypersensitivity
13. Type IV (delayed-type hypersensitivity).
14. Pathogenesis of autoimmunity
15. Therapy strategies for hypersensitivity and autoimmune diseases
16. Antibiotic sensitivity test. Disk diffusion method
17. Vaccination and immunotherapy
18. Immunoprophylaxis

Recommended reading for the lesson:

1. Subhash Chandra Pariga «Textbook of Microbiology & Immunology»2nd edition, 2012/pages 637-640.
2. Hawley, Louise. Microbiology and Immunology, 6th ed. / pages 287-288.
3. Microbiology Bio 204 Laboratory manual, Morgan Community college, Fort Morgan, page 74-76.
4. Anantharayan and Paniker's «Textbook of Microbiology»7th ed. / pages 631-633.
5. Medical Microbiology. 26th.edition, 2013, Jawetz, Melnick, & Adelberg's.- LANGE medical book.- p.371-378, 379-384.
6. Kim Moscatello, Immunology and Microbiology, Kaplan Medical USMLE Step1, lecture notes, 2013/ pages 107-116.
7. Иммунология [Электронный ресурс] / Ярилин А.А. - М. : ГЭОТАР-Медиа, 2010. - http://www.studmedlib.ru/book/ISBN9785970413197.html

Unit 5

Key questions covered in lesson 24.

1. Genus: Planococcus, Micrococcus, Stomatococcus, Staphylococcus

2. Genus Staphylococcus: 33 species - S.aureus, S. epidermitidis, S. hemolyticus,
3. S. saprophyticus, S. cohnii, S. xylosis, S.capitis, S. hominis, S. sacchorolyticus, S.auricularis, S.simulans, S.lugdunensis - known human pathogen
4. Natural Habitat Widespread - normal flora of skin, glands, upper respiratory tract
5. S.aureus colonizes the nasal passage and axillae. S.epidermidis is a common human skin commensal. S.capitis - head, abudant in glands. S.auricularis - external ear. S.hominis - axillar pubic area.
6. Morphology: Shape – spherical - Arranged in grape-like irregular clusters, pairs and occasionally in short chains. The clusters arise because staphylococci divide in three planes.
7. Gram +,- Nonmotile, nonsporeforming, Some strains are capsulated
8. Catalase positive
9. Facultative anaerob
10. *Pathogenesis* S. aureus expresses many potential virulence factors:
(1) Surface proteins that promote colonization of host tissues.
(2) Factors that probably inhibit phagocytosis (capsule, immunoglobulin binding protein A).
(3) Toxins that damage host tissues and cause disease symptoms.
11. Coagulase-negative staphylococci are normally less virulent and express fewer virulence factors
12. Staphylococcus aureus - Major human pathogen
13. Habitat - part of normal flora in some humans and animals
14. Source of organism - can be infected human host, carrier, fomite or environment
15. *Catalase Test*
16. *Coagulase test*
17. *Dnase test*
18. Genus streptococcus: pyogenic streptococci (e.g. gr. A,B,C,G), viridans, pneumococci
19. Genus Enterococcus: group D enterococcus
20. Genus Lactococcus: lactic acid streptococci

Recommended reading for the lesson:

1. Medical Microbiology and Immunology 6th.Warren Levinson, Ernest Jawetz Med. Books 2000, c. 68-75.
2. Medical Microbiology.4th ed.BaronS,Galveston (TX):University of Texas;1996. ISBN-10:0-9631172-1-1
3. Textbook of Microbiology. Third ed. By prof. C.P.Baveja/ Arya Publications.-2010.- 618 p.) chapter 12, 13.
1. Textbook of Microbiology. Seven edition. By Ananthanarayan and Paniker`s/ Orient Longman Private Limited. - India, 2006.- c. 195-217.

Additional:

1. Microbiology and Immunology /Rjnald B. Luftig. –Lippincott-Raven - c. 71-74.
2. Microbiology /Tamil NaduText Book Corporation, 1-st Ed.- 2004.- c. 145-148.
3. http://rx.osumc.edu/asp2/microbiology/gramNegOrganisms.pdf333

Key questions covered in lesson 25.

Corynebacterium diphthetiae: Genus: Corynebacterium, Species: Corynebacteria diphtheriae - cause diphtheria

Morphology: gram-positive, aerobic rods, frequently club-shaped, size: 0,5-1 nm.

- characteristic arrangements resembling Chinese letters, nonmotile, some of them have microcapsule, not form spores
- contain volutin (methachromatic granules)
- Lipid-rich cell wall contains meso-diaminopimelic acid, arabino-galactan polymers, and short-chain mycolic acids
- Pathogenicity (enzymes -hyaluronidase, neuraminidase, fibrinolysin; toxins)
- Exotoxin consists of two fragments A & B - necrotic and neurotoxic effects
- Lysogenic bacteriophage encodes for potent exotoxin in virulent strains.

Cultural characteristics. Media – enrichment with blood, serum or egg, agar containing potassium tellurite

Disease. Diphtheria is acute contagious upper respiratory tract illness characterized by sore throat, low-grade fever, and an adherent membrane of the tonsil(s), pharynx, and/or nose".

- Diphtheria is a rapidly developing, acute, febrile infection which involves both local and systemic pathology.
- In parts of the world where diphtheria still occurs, it is primarily a disease of children, and most individuals who survive infancy and childhood have acquired immunity to diphtheria.
- Cervical edema and cervical lymphadenopathy from diphtheria infection produce a bullneck appearance in this child.

Pathogenesis

- Invasion of the local tissues of the throat, which requires colonization and subsequent bacterial proliferation.
- A local lesion develops in the upper respiratory tract and involves necrotic injury to epithelial cells. As a result of this injury – necrotic epithelium plus exuding fibrin a greyish "pseudomembrane".

Pathogenesis

- Toxigenesis: bacterial production of the toxin, which causes the death eukaryotic cells and tissues by inhibition protein synthesis in the cells. Although the toxin is responsible for the lethal symptoms of the disease, since a distinct invasive phase apparently precedes toxigenesis.
- The toxin that is absorbed and disseminated through lymph channels and blood to the susceptible tissues of the body: heart, muscle, peripheral nerves, adrenals, kidneys, liver and spleen.

Clinical findings

- Bleeding
- Enlargement of regional lymph nodes
- Edema of entire neck
- Sore throat & fever
- Prostration, dyspnea
- Airway obstruction, myocarditis, nerveparalysis

Recommended reading for the lesson:

1. MedicalMicrobiologyandImmunology 6th.WarrenLevinson, ErnestJawetzMed. Books 2000, c. 114-119.
2. Microbiology for the Health Sciences. Fifth edition. By prof. Gwendolyn R.W. Burton, Paul.G.Endelkirk.-Lippincott.- Philadephia, NewYork, 1996, c. 224-241.

Additional:

1. Microbiology and Immunology /Rjnald B. Luftig .–Lippincott-Raven - c. 39-40, 48-50, 75-78.
2. Mycobacterium: General Characteristics, Laboratory Detection, and Staining Procedures.

Manual of Clinical Microbiology (9th ed., pp. 543-572). Washington D.C.: ASM Press

Key questions covered in lesson 26.

1. Mycobacterium tuberculosis
2. Mycobacterium leprae

Mycobacterium tuberculosis

The Latin prefix "myco—" means both fungus and wax; its use here relates to the "waxy" compounds in the cell wall

Morphology: gram-positive, acid-fast, aerobic rods, size: 3-0,3 μm, nonmotile, non-capsulated, not form spores.

Eight Week Growth of Mycobacterium tuberculosis on Lowenstein-Jensen

Typical progression in pulmonary TB involves caseation, calcification and cavity formation.

Mycobacterium tuberculosis - Acid-fast rod; transmitted from human to human by airborne droplets

Typical Progression of Pulmonary Tuberculosis

Recommended reading for the lesson:

1. MedicalMicrobiologyandImmunology 6th.WarrenLevinson, ErnestJawetzMed. Books 2000, c. 114-119.
2. Microbiology for the Health Sciences. Fifth edition. By prof. Gwendolyn R.W. Burton, Paul.G.Endelkirk.-Lippincott.- Philadephia, NewYork, 1996, c. 224-241.

Additional:

3. Microbiology and Immunology /Rjnald B. Luftig .–Lippincott-Raven - c. 39-40, 48-50, 75-78.
4. Mycobacterium: General Characteristics, Laboratory Detection, and Staining Procedures.
5. Manual of Clinical Microbiology (9th ed., pp. 543-572). Washington D.C.: ASM Press.

Key questions covered in lesson 27.

General characteristic of spore-forming microorganisms

2. Cl. perfringens
3. Cl. tetani
4. Cl. botulinum

Microbiological diagnostics of anaerobic infections

Microbiological diagnostics of gas gangrene, tetanus, botulism

Recommended reading for the lesson:

1. Medical Microbiology and Immunology 6th.Warren Levinson,Ernest Jawetz Med. Books 2000c. 28, 29, 30, 60, 63, 82, 83.
2. Medical Microbiology.4th ed.BaronS,Galveston(TX):University of Texas;1996. ISBN-10:0-9631172-1-1
3. (Textbook of Microbiology. 3rd edition. By prof. C.P.Baveja/Arya Publications.-2010.- 618 p.)chapter 15,18.
4. Textbook of Microbiology. Seven edition. By Ananthanarayan and Paniker`s/ Orient Longman Private Limited. - India, 2006.-c. 231-265.

Key questions covered in lesson 28.

General characteristic of anaerobic infections.

2. Yersinia pestis
3. Francisella tularensis
4. Bacillus anthracis
5. Brucella spp

cultivation from a wound on sugar medium, agar Kitta-Tarozzi, milk (thioglycolic, Hottinger)

b) determination of the sterility of the dressing material.

c) demonstration of anaerostat, gas bags, etc. for growing anaerobic microflora

d) demonstration of smears by spore-forming microbes

e) demonstration of the growth of anaerobic microorganisms in columns with sugar agar

f) demonstration of the biochemical activity of anaerobic microflora

Recommended reading for the lesson:

1. Medical Microbiology and Immunology 6th.Warren Levinson,Ernest Jawetz Med. Books 2000, 550p.
2. Medical Microbiology.4th ed.BaronS,Galveston(TX):University of Texas;1996.ISBN-10:0-9631172-1-1
3. Microbiology Laboratory Manual/ Cain et al.- Collin County Community College District, McKinney, TX.-2 Revised Spring, 2013 - 117 p.
4. Review Med.Microbiology and Immunology.10th ed.Genetics /Warren Levinson.-LANGE med.book.-525 p.
5. Textbook of Microbiology. Seven edition. By Ananthanarayan and Paniker`s/ Orient Longman Private Limited.-India, 2006.-657 p.
6. Video films (ссылка на облако) https://cloud.mail.ru/public/vjiH/Arzg78A89

Key questions covered in lesson 29.

1. Yersinia pestis cause of plague.
2. Francisella tularensis cause of tularemia.
3. Bacillus anthracis cause of anthrax.
4. Brucella spp. cause of brucellosis.
5. Listeria spp. cause of listeriosis

a) rules for working with especially dangerous biomaterials;

b) rules for the use of protective suits for working with especially dangerous biomaterials;

c) growth on nutrient media and microscopy of colonies of vaccine strains of EV and STI (B. subtilis);

d) demonstration of smears of plague microbe, anthrax, brucellosis;

e) the effect of bacteriophage on the growth of plague microbe, anthrax and others;

f) serological tests

Recommended reading for the lesson:

1. Medical Microbiology and Immunology 6th.Warren Levinson,Ernest Jawetz Med. Books 2000, 550p.
2. Medical Microbiology.4th ed.BaronS,Galveston(TX):University of Texas;1996.ISBN-10:0-9631172-1-1
3. Microbiology Laboratory Manual/Cain et al.-Collin County Community College District, McKinney, TX-2 Revised Spring, 2013-117 p.
4. Review Med.Microbiology and Immunology.10th ed.Genetics /Warren Levinson.-LANGE med.book.- 525 p.
5. Textbook of Microbiology. 7th ed. Ananthanarayan & Paniker`s/Orient Longman Private Ltd-Ind, 2006-657 p.
6. Textbook of Microbiology. 10th ed. By Ananthanarayan and Paniker`s/Universities Press (India) Private Ltd 2017.- 377-430 p.
7. Video films (ссылка на облако) https://cloud.mail.ru/public/vjiH/Arzg78A89

Key questions covered in lesson 30.

Control questions:

1. Staphylococci. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
2. Streptococci. Enterococcus. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment. Prevention.
3. Pneumococci. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
4. Gonococci. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
5. Meningococci. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
6. Main characteristics of the families-Enterobacteria. Classification.

7. Escherichia. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
8. Shigella. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
9. Salmonella. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
10. Klebsiella. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance.
11. Proteus. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
12. Yersinia (except causative agent of the plague). Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
13. Pseudomonas aeruginosa. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
14. Campylobacteria. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxinformation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
15. Helicobacter. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
16. The main characteristics of especially dangerous bacterial infections (pathogens of quarantine infections). Vibrio. Classification.
17. Brucella. Pathogens that cause tularemia. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
18. Pathogen of theplague. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxinformation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
19. Bacillus. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
20. Actinomycetes. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
21. Mycobacterium. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
22. Listeria. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance.
23. Ecological groups of anaerobic bacteria. Classification.
24. Corynebacteria. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
25. Bordetella. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
26. Hemophilic bacteria. Legionella. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
27. The main characteristics of pathogenic spirochetes and spirochetosis.
28. Treponema. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
29. Borrelia. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
30. Leptospira. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
31. The main characteristics of intracellular parasites. Classification.
32. Rickettsia. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
33. Chlamydia. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
34. Mycoplasma. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.
35. Pathogens of human mycoses. Morphology, antigenic structure. Cultivation. Properties: enzymatic, toxin formation, resistance. Immunity. Clinical and laboratory diagnostics. Principles of treatment and prevention.

Unit 6

Key questions covered in lesson 31.

1. Morphology and physiology of the virus.
2. Pathogenesis of the virus.
3. Influenza A, B, C viruses (Orthomyxoviridae family)
4. Parainfluenza virus (Paramyxoviridae family)

5. Coronavirus “Respiratory Syndrome” (Family Coronaviridae)
6. Adenovirus (Family Adenoviridae)
7. Laboratory diagnosis
8. Prevention

Recommended reading for the lesson:

1. General Microbiology/ Arvind Arora.- Pulse Publications.- 2010.- 513 p.
2. 2.Medical Microbiology.4th ed.BaronS,Galveston(TX):University of Texas;1996. ISBN-10:0-9631172-1-1
3. 3.Textbook of Microbiology. Third edition. By prof. C.P.Baveja/ Arya Publications.-2010.-618 p.
4. Microbiology and Immunology /Rjnald B. Luftig (Rypins` intensive reviews).–Lippincott-Raven.- c. 124.

Additional:

5. Lecture notes on Infections Diseases. Sixth edition. By B.K.Mandal and all./ Blackwell Publishing Ltd, 2005.- 267 p.
6. Report of the Committee on Infections Diseases. Twenty-second Edition 1991. By Committee on Infections Diseases American Academy of Pediatrics.- 670 p.
7. Video films (ссылка на облако) https://cloud.mail.ru/public/vjiH/Arzg78A89

Key questions covered in lesson 32.

1. Enteroviruses A, B, C, D, Polio virus (Family Picornaviridae)
2. Human Coxsackieviruses. ECHO virus (Family Picornaviridae)
3. Hepatitis A (Family Picornaviridae, genus Hepatovirus)
4. Hepatitis E (Family Hepeviridae, genus Orthohepevirus)
5. Laboratory work: Chart / Video demonstration.
6. Methods of laboratory diagnosis of viral infections:
7. Virological.
8. Serological.
9. Molecular genetics.

Recommended reading for the lesson:

1. General Microbiology/ Arvind Arora.- Pulse Publications.- 2010.- 513 p.
2. Medical Microbiology and Immunology 6th.Warren Levinson,Ernest Jawetz Med. Books 2000, 550p.
3. Medical Microbiology.4th ed.BaronS,Galveston(TX):University of Texas;1996. ISBN-10:0-9631172-1-1
4. Textbook of Microbiology. Third edition. By prof. C.P.Baveja/ Arya Publications.-2010.- 618 p.
5. Microbiology Laboratory Manual/ Cain et al.- Collin County Community College District, McKinney, TX.- 2 Revised Spring, 2013 - 117 p.
6. Review Med.Microbiology and Immunology.10th ed. Genetics /Warren Lewinson.- LANGE med.book.- 525 p.

1. Textbook of Microbiology. Third edition. By prof. C.P.Baveja/ Arya Publications.-2010.- 618 p.
2. Textbook of Microbiology. Seven edition. By Ananthanarayan and Paniker`s/ Orient Longman Private Limited.-India, 2006.-657 p.
3. Internet references:

- http://gsbs.utmb.edu/microbook.
- http://www. jmicrobiol.com
- http://www. escmid.org/sites/index.asp
- virologyhighlights.com

Key questions covered in lesson 33.

1. Measles and rubella virus
2. Mumps virus
3. varicella-zoster virus
4. Herpes virus
5. Laboratory diagnosis
6. Prevention
7. Laboratory work: Chart / Video demonstration.
8. Methods of laboratory diagnosis of viral infections:
9. Virological.
10. Serological.
11. Molecular genetics

Recommended reading for the lesson:

1. General Microbiology/ Arvind Arora.- Pulse Publications.- 2010.- 513 p.
2. 2.Medical Microbiology.4th ed.BaronS,Galveston(TX):University of Texas;1996. ISBN-10:0-9631172-1-1
3. 3.Textbook of Microbiology. Third edition. By prof. C.P.Baveja/ Arya Publications.-2010.-618 p.
4. Microbiology and Immunology /Rjnald B. Luftig (Rypins` intensive reviews).–Lippincott-Raven.- c. 124.

Additional:

1. Lecture notes on Infections Diseases. Sixth edition. By B.K.Mandal and all./ Blackwell Publishing Ltd, 2005.- 267 p.
2. Report of the Committee on Infections Diseases. Twenty-second Edition 1991. By Committee on Infections Diseases American Academy of Pediatrics.- 670 p.

Key questions covered in lesson 34.

Viral encephalitis
2. Hemorrhagic fever viruses
3. Laboratory diagnosis
4. Prevention

Laboratory work: Chart / Video demonstration.

Methods of laboratory diagnosis of viral infections:

- Virological.
- Serological.
- Molecular genetics.

Recommended reading for the lesson:

General Microbiology/ Arvind Arora.- Pulse Publications.- 2010.- 513 p.
2. Medical Microbiology and Immunology 6th.Warren Levinson,Ernest Jawetz Med. Books 2000, 550p.
3. Medical Microbiology.4th ed.BaronS,Galveston(TX):University of Texas;1996. ISBN-10:0-9631172-1-1
4.Textbook of Microbiology. Third edition. By prof. C.P.Baveja/ Arya Publications.-2010.- 618 p.
5. Microbiology Laboratory Manual/ Cain et al.- Collin County Community College District, McKinney, TX.- 2 Revised Spring, 2013 - 117 p.
6. Review Med.Microbiology and Immunology.10th ed. Genetics /Warren Lewinson.- LANGE med.book.- 525 p.
7.Textbook of Microbiology. Third edition. By prof. C.P.Baveja/ Arya Publications.-2010.- 618 p.
8.Textbook of Microbiology. Seven edition. By Ananthanarayan and Paniker`s/ Orient Longman Private Limited.-India, 2006.-657 p.

Internet references:

- http://gsbs.utmb.edu/microbook.
- http://www. jmicrobiol.com
- http://www. escmid.org/sites/index.asp
- virologyhighlights.com

Key questions covered in lesson 35.

1. Variola virus
2. Rabies virus
3. Yellow fever virus
4. Ebola and Zika virus
5. Laboratory diagnosis
6. Prevention

Laboratory work: Chart / Video demonstration.

Methods of laboratory diagnosis of viral infections:

- Virological.
- Serological.
- Molecular genetics.\

Recommended reading for the lesson:

General Microbiology/ Arvind Arora.- Pulse Publications.- 2010.- 513 p.
2. Medical Microbiology and Immunology 6th.Warren Levinson,Ernest Jawetz Med. Books 2000, 550p.
3. Medical Microbiology.4th ed.BaronS,Galveston(TX):University of Texas;1996. ISBN-10:0-9631172-1-1
4.Textbook of Microbiology. Third edition. By prof. C.P.Baveja/ Arya Publications.-2010.- 618 p.
5. Microbiology Laboratory Manual/ Cain et al.- Collin County Community College District, McKinney, TX.- 2 Revised Spring, 2013 - 117 p.
6. Review Med.Microbiology and Immunology.10th ed. Genetics /Warren Lewinson.- LANGE med.book.-525 p.

7.Textbook of Microbiology. Third edition. By prof. C.P.Baveja/ Arya Publications.-2010.- 618 p.
8. Textbook of Microbiology. Seven edition. By Ananthanarayan and Paniker`s/ Orient Longman Private Limited.-India, 2006.-657 p.

Internet references:

- http://gsbs.utmb.edu/microbook.
- http://www. jmicrobiol.com
- http://www. escmid.org/sites/index.asp
- virologyhighlights.com

Key questions covered in lesson 36.

Microbiological diagnosis of acute viral respiratory diseases. Structure of the virus. Reproduction of the virus

2. Microbiological diagnosis of intestinal viral infections. Enteroviruses - Polio virus. KOKSAKI. ESNO. Hepatitis A and E.
3. Microbiological diagnosis of viral hepatitis - Hepatitis B, C, D virus. Immuno-
4. deficiency Virus - HIV / AIDS
5. Microbiological diagnosis of viral encephalitis and hemorrhagic fevers
6. Microbiological diagnosis of childhood infections viruses - measles and mumps virus, rubella virus, chicken pox, herpes virus
7. Microbiological diagnosis of variola virus, yellow fever, rabies viruses, Ebola, Zika

Recommended reading for the lesson:

1. General Microbiology/ Arvind Arora.- Pulse Publications.- 2010.- 513 p.
2. Medical Microbiology and Immunology 6th.Warren Levinson,Ernest Jawetz Med. Books 2000, 550p.
3. Medical Microbiology.4th ed.BaronS,Galveston(TX):University of Texas;1996. ISBN-10:0-9631172-1-1
4.Textbook of Microbiology. Third edition. By prof. C.P.Baveja/ Arya Publications.-2010.- 618 p.
5. Microbiology Laboratory Manual/ Cain et al.- Collin County Community College District, McKinney, TX.- 2 Revised Spring, 2013 - 117 p.
6. Review Med.Microbiology and Immunology.10th ed. Genetics /Warren Lewinson.- LANGE med.book.- 525 p.
7.Textbook of Microbiology. Third edition. By prof. C.P.Baveja/ Arya Publications.-2010.- 618 p.
8. Textbook of Microbiology. Seven edition. By Ananthanarayan and Paniker`s/ Orient Longman Private Limited.-India, 2006.-657 p.

Internet references:

- http://gsbs.utmb.edu/microbook.
- http://www. jmicrobiol.com
- http://www. escmid.org/sites/index.asp
- virologyhighlights.com

Unit 7

Key questions covered in lesson 37.

1. Fungi: classification, structure
2. Morphological properties
3. Cultivation, microscoping

Laboratory work: Chart / Video demonstration.

Methods of laboratory diagnosis of fungal infections:

- bacteriological;
- Serological;
- Molecular genetics.

Recommended reading for the lesson:

1. Textbook of Microbiology Ananthanarayan and Panikers 10-th edition.- 2018
2. Microbiology: a laboratory manual. James G. Cappuccino, Natale Sherman. 10-th ed.-2014 https://themoder n.farm/studies/Microbiology-Laboratory-Manual.pdf
3. General Microbiology. Pulse Publications.- 2010 https://context4book.com/download/4705487-arvind-arora-microbiology

Additional

1. Medical Microbiology and Immunology Warren Levinson Ernest Jawetz 6-th edition 2000
2. Medical Microbiology F.H. Kayser, K.A. Bienz, J.Eclert, R.M.Zinkernagel Thieme 2005
https://repository.poltekkes-kaltim.ac.id/1153/1/medical%20microbiology.pdf
3. Clinical Microbiology Keith Struthers 2-nd edition 2017
http://repository.stikesrspadgs.ac.id/25/1/Clinical%20Microbiology%20Struthers-299hlm.pdf
4. Video films (ссылка на облако) https://cloud.mail.ru/public/vjiH/Arzg78A89

Key questions covered in lesson 38.
Trichophyton, Microsporum, Acharion (the cause of dermatophytes); Mucormycetes: structure
2. Morphological properties
3. Cultivation, microscoping
Laboratory work: Chart / Video demonstration.
Methods of laboratory diagnosis of fungal infections:
- bacteriological;
- Serological;
-Molecular genetics
Recommended reading for the lesson:
1. Textbook of Microbiology Ananthanarayan and Panikers 10-th edition.- 2018
2. Microbiology: a laboratory manual. James G. Cappuccino, Natale Sherman. 10-th ed.-2014 https://themoder n.farm/studies/Microbiology-Laboratory-Manual.pdf
3. General Microbiology. Pulse Publications.- 2010 https://context4book.com/download/4705487-arvind-arora-microbiology
Additional
1. Medical Microbiology and Immunology Warren Levinson Ernest Jawetz 6-th edition 2000
2. Medical Microbiology F.H. Kayser, K.A. Bienz, J.Eclert, R.M.Zinkernagel Thieme 2005
https://repository.poltekkes-kaltim.ac.id/1153/1/medical%20microbiology.pdf
3. Clinical Microbiology Keith Struthers 2-nd edition 2017
http://repository.stikesrspadgs.ac.id/25/1/Clinical%20Microbiology%20Struthers-299hlm.pdf

Key questions covered in lesson 39.
Dimorphic fungi Eg: structure
2. Morphological properties
3. Cultivation, microscoping
Laboratory work: Chart / Video demonstration.
Methods of laboratory diagnosis of fungal infections:
- bacteriological;
- Serological;
-Molecular genetics
Recommended reading for the lesson:
1. Textbook of Microbiology Ananthanarayan and Panikers 10-th edition.- 2018
2. Microbiology: a laboratory manual. James G. Cappuccino, Natale Sherman. 10-th ed.-2014 https://themoder n.farm/studies/Microbiology-Laboratory-Manual.pdf
3. General Microbiology. Pulse Publications.- 2010 https://context4book.com/download/4705487-arvind-arora-microbiology
Additional

1. Medical Microbiology and Immunology Warren Levinson Ernest Jawetz 6-th edition 2000
2. Medical Microbiology F.H. Kayser, K.A. Bienz, J.Eclert, R.M.Zinkernagel Thieme 2005
https://repository.poltekkes-kaltim.ac.id/1153/1/medical%20microbiology.pdf
3. Clinical Microbiology Keith Struthers 2-nd edition 2017
http://repository.stikesrspadgs.ac.id/25/1/Clinical%20Microbiology%20Struthers-299hlm.pdf

Key questions covered in lesson 40.
Yeasts and yeast-like fungi: structure
2. Morphological properties
3. Cultivation, microscoping
Laboratory work: Chart / Video demonstration.
Methods of laboratory diagnosis of fungal infections:
- bacteriological;
- Serological.
Recommended reading for the lesson:
1. Textbook of Microbiology Ananthanarayan and Panikers 10-th edition. - 2018
2. Microbiology: a laboratory manual. James G. Cappuccino, Natale Sherman. 10-th ed.-2014 https://themoder n.farm/studies/Microbiology-Laboratory-Manual.pdf
3. General Microbiology. Pulse Publications. - 2010 https://context4book.com/download/4705487-arvind-arora-microbiology
Additional

1. Medical Microbiology and Immunology Warren Levinson Ernest Jawetz 6-th edition 2000
2. Medical Microbiology F.H. Kayser, K.A. Bienz, J.Eclert, R.M.Zinkernagel Thieme 2005
https://repository.poltekkes-kaltim.ac.id/1153/1/medical%20microbiology.pdf
3. Clinical Microbiology Keith Struthers 2-nd edition 2017
http://repository.stikesrspadgs.ac.id/25/1/Clinical%20Microbiology%20Struthers-299hlm.pdf

Key questions covered in lesson 41.
Microbiology diagnosis of Dimorphic fungi eg: Histoplasma capsulatum, Coccidioides immitis, Blastomyces dermatitidis (the cause of histoplasmosis, coccidioidomycosis, blastomycosis).
2. Microbiology diagnosis of Yeasts and yeast-like fungi. Cryptococcus neoformans, Candida spp. (the cause of cryptococcosis, candidiasis).
3. Microbiology diagnosis of Madurella mycetomatis (cause of mycetoma), Pneumocystis carinii (cause of pneumocystosis).
4. Antifungal drugs.
5. Molecular genetics
Recommended reading for the lesson:
1. Textbook of Microbiology Ananthanarayan and Panikers 10-th edition.- 2018
2. Microbiology: a laboratory manual. James G. Cappuccino, Natale Sherman. 10-th ed.-2014 https://themodern.farm/studies/Microbiology-Laboratory-Manual.pdf
3. General Microbiology. Pulse Publications.- 2010 https://context4book.com/download/4705487-arvind-arora-microbiology
Aditional
1. Medical Microbiology and Immunology Warren Levinson Ernest Jawetz 6-th edition 2000
2. Medical Microbiology F.H. Kayser, K.A. Bienz, J.Eclert, R.M.Zinkernagel Thieme 2005
https://repository.poltekkes-kaltim.ac.id/1153/1/medical%20microbiology.pdf
3. Clinical Microbiology Keith Struthers 2-nd edition 2017
http://repository.stikesrspadgs.ac.id/25/1/Clinical%20Microbiology%20Struthers-299hlm.pdf

Unit 8

Key questions covered in lesson 42.
Intestinal protozoa
Urogenital protozoa
Microbiology diagnosis protozoan infections
Laboratory work: Chart / Video demonstration.
Methods of laboratory diagnosis of protozoan infections:
- bacteriological;
- Serological;
- Molecular genetics.
Recommended reading for the lesson:
1. Textbook of Microbiology Ananthanarayan and Panikers 10-th edition 2018
2. Microbiology: a laboratory manual James G. Cappuccino, Natale Sherman 10-th edition 2014 https://themodern.farm/studies/Microbiology-Laboratory-Manual.pdf
3. General Microbiology Pulse Publications 2010 https://context4book.com/download/4705487-arvind-arora-microbiology
4. Medical Bacteriology. Abilo Tadesse, Meseret Alem.-Ethiopia Public Health Training Initiative.-2006. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/env_occupational_health_students/medicalbacteriology.pdf
Additional
1. Medical Microbiology and Immunology Warren Levinson Ernest Jawetz 6-th edition 2000
2. Medical Microbiology F.H. Kayser, K.A. Bienz, J.Eclert, R.M.Zinkernagel Thieme 2005
https://repository.poltekkes-kaltim.ac.id/1153/1/medical%20microbiology.pdf
3. Clinical Microbiology Keith Struthers 2-nd edition 2017
http://repository.stikesrspadgs.ac.id/25/1/Clinical%20Microbiology%20Struthers-299hlm.pdf

Key questions covered in lesson 43.
1. Microbiology diagnosis Trypanosoma spp.
2. Microbiology diagnosis Leishmania spp.
3. Microbiology diagnosis Plasmodium spp.

4. Microbiology diagnosis Toxoplasma, Babesia.
Laboratory work: Chart / Video demonstration.
Methods of laboratory diagnosis of blood protozoan infections:
- bacteriological;
- Serological;
- Molecular genetics.

Recommended reading for the lesson:

1. Medical Bacteriology. Abilo Tadesse, Meseret Alem.-Ethiopia Public Health Training Initiative.-2006. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/env_occupational_health_students/medicalbacteriology.pdf

Additional

1. Medical Microbiology and Immunology Warren Levinson Ernest Jawetz 6-th edition 2000
2. Medical Microbiology F.H. Kayser, K.A. Bienz, J.Eclert, R.M.Zinkernagel Thieme 2005 https://repository.poltekkes-kaltim.ac.id/1153/1/medical%20microbiology.pdf
3. Clinical Microbiology Keith Struthers 2-nd edition 2017 http://repository.stikesrspadgs.ac.id/25/1/Clinical%20Microbiology%20Struthers-299hlm.pdf

Key questions covered in lesson 44.

Microbiology diagnosis of trematodes:
a) Fasciolopsis granulous,
b) Fasciolopsis buski,
c) Fasciolopsis hepatica,
d) Shistosoma spp.
Laboratory work: Chart / Video demonstration

Recommended reading for the lesson:

1. Textbook of Microbiology Ananthanarayan and Panikers 10-th edition 2018
2. Microbiology: a laboratory manual James G. Cappuccino, Natale Sherman 10-th edition 2014 https://themodern.farm/studies/Microbiology-Laboratory-Manual.pdf
3. General Microbiology Pulse Publications 2010 https://context4book.com/download/4705487-arvind-arora-microbiology
4. Medical Bacteriology. Abilo Tadesse, Meseret Alem.-Ethiopia Public Health Training Initiative.-2006. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_ notes/env_ occupationalhealth_students/medicalbacteriology.pdf

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1. Medical Microbiology and Immunology Warren Levinson Ernest Jawetz 6-th edition 2000
2. Medical Microbiology F.H. Kayser, K.A. Bienz, J.Eclert, R.M.Zinkernagel Thieme 2005 https://repository.poltekkes-kaltim.ac.id/1153/1/medical%20microbiology.pdf
3. Clinical Microbiology Keith Struthers 2-nd edition 2017 http://repository.stikesrspadgs.ac.id/25/1/Clinical%20Microbiology%20Struthers-299hlm.pdf

Key questions covered in lesson 45.

5. Microbiology diagnosis Trypanosoma brucei.
6. Microbiology diagnosis T.cruzi
7. Microbiology diagnosis L.tropica
8. Microbiology diagnosis Plasmodium
9. Microbiology diagnosis Babesia

Laboratory work: Chart / Video demonstration.
Methods of laboratory diagnosis of blood protozoan infections:
- bacteriological;
- Serological;
- Molecular genetics.

Recommended reading for the lesson:

1. Textbook of Microbiology Ananthanarayan and Panikers 10-th edition 2018
2. Microbiology: a laboratory manual James G. Cappuccino, Natale Sherman 10-th edition 2014 https://themodern.farm/studies/Microbiology-Laboratory-Manual.pdf
3. General Microbiology Pulse Publications 2010 https://context4book.com/download/4705487-arvind-arora-microbiology
4. Medical Bacteriology. Abilo Tadesse, Meseret Alem.-Ethiopia Public Health Training Initiative.-2006. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/env_occupational_health_students/medicalbacteriology.pdf

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2.Medical Microbiology F.H. Kayser, K.A. Bienz, J.Eclert, R.M.Zinkernagel Thieme 2005 https://repository.poltekkes-kaltim.ac.id/1153/1/medical%20microbiology.pdf
3. Clinical Microbiology Keith Struthers 2-nd edition 2017
http://repository.stikesrspadgs.ac.id/25/1/Clinical%20Microbiology%20Struthers-299hlm.pdf

Key questions covered in lesson 46.

10. Microbiology diagnosis Ascaris lunbricoides.
11. Microbiology diagnosis Enterobius vermicularis
12. Microbiology diagnosis Trichinella spiralis.
13. Microbiology diagnosis Loa Loa.

Laboratory work: Chart / Video demonstration.

Methods of laboratory diagnosis of blood protozoan infections:

- bacteriological;
- Serological;
- Molecular genetics.

Recommended reading for the lesson:

5. Textbook of Microbiology Ananthanarayan and Panikers 10-th edition 2018
6. Microbiology: a laboratory manual James G. Cappuccino, Natale Sherman 10-th edition 2014 https://themodern.farm/studies/Microbiology-Laboratory-Manual.pdf
7. General Microbiology Pulse Publications 2010 https://context4book.com/download/4705487-arvind-arora-microbiology
8. Medical Bacteriology. Abilo Tadesse, Meseret Alem.-Ethiopia Public Health Training Initiative.-2006. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/env_occupational_health_students/medicalbacteriology.pdf

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3. Clinical Microbiology Keith Struthers 2-nd edition 2017
http://repository.stikesrspadgs.ac.id/25/1/Clinical%20Microbiology%20Struthers-299hlm.pdf

Lectures for 4 semester

Key questions covered in Lecture 10

1. Hypersensitivity. Introduction
2. Classification of Hypersensitivity reactions
3. Allergens
4. Allergy skin test
5. Hypersensitivity reaction

Recommended reading for the lesson:

1. Subhash Chandra Pariga «Textbook of Microbiology & Immunology»2nd edition, 2012/pages 149-155.
2. Hawley, Louise. Microbiology and Immunology, 6th ed. / pages 277-284
3. Anantharayan and Paniker's «Textbook of Microbiology» 7th ed. / pages 159-169.
4. Medical Microbiology. 26th.edition, 2013, Jawetz, Melnick, & Adelberg's.- LANGE medical book.- p.141-142.
5. Kim Moscatello, Immunology and Microbiology, Kaplan Medical USMLE Step1, lecture notes, 2013/ pages 141-159.

Key questions covered in Lecture 11

1. Chemotherapy and antibiotics: antibacterial, antiviral, antifungal chemotherapy
2. Mechanisms of Antimicrobial Action
3. Antimicrobial resistance
4. Antimicrobial susceptibility test

Recommended reading for the lesson:

1. Subhash Chandra Pariga «Textbook of Microbiology & Immunology»2nd edition, 2012/pages 637-640.
2. Hawley, Louise. Microbiology and Immunology, 6th ed. / pages 287-288.
3. Microbiology Bio 204 Laboratory manual, Morgan Community College, Fort Morgan, page 74-76.
4. Anantharayan and Paniker's «Textbook of Microbiology»7th ed. / pages 631-633.

5. Medical Microbiology. 26th.edition, 2013, Jawetz, Melnick, & Adelberg's.- LANGE medical book.- p.371-378, 379-384.
6. Kim Moscatello, Immunology and Microbiology, Kaplan Medical USMLE Step1, lecture notes, 2013/ pages 107-116.

Key questions covered in Lecture 12

Description of microorganism
– Classification
– Morphology
– Culture
– Antigens
– Toxins
– Enzymes
– Habitat & Transmission
– Pathogenesis
– Clinical findings
– Diagnostic laboratory tests
– Immunity
– Treatment
– Prevention and control

Key questions covered in Lecture 13

1. Corynebacterium diphtheriae
2. Bordetella pertussis
3. Mycobacterium tuberculosis
4. Mycobacterium leprae

Recommended reading for the lesson:

1. Clinico-Basic Microbiology. 3rd revised edition. By Dr. Muhammad Shamim.- Publisher Khurram&Brothers, 2004.-187 p.
2. Microbiology for pgmee. By Arvind Arora.- Pulse Publications.- 2010, pp 6-309.
3. Microbiology for the Health Sciences. Fifth edition. By prof. Gwendolyn R.W. Burton, Paul.G.Endelkirk.- Lippincott.-
   Philadephia, New York, 1996, 444 p.
4. Practical Microbiology. D.R. Arora/ CBS Publishers &Distributors/- New Deli. Bangalore, 2007.- 218 p.
5. Review of Medical Microbiology and Immunology. Tenth edition / Warren Levinson. - a LANGE medical book.- pp. 1-101.
6. Textbook of Microbiology. Seven edition. By Ananthanarayan and Paniker`s/ Orient Longman Private Limited.- India, 2006 .-657 p.
7. Textbook of Microbiology. General Microbiology. Third edition. By prof. C.P. Baveja/ Arya Publications.- 2010.- p. 1- 191.

Key questions covered in Lecture 14

1. General characteristic of spore-forming microorganisms
2. Cl. perfringens
3. Cl. tetani
4. Cl. botulinum

Recommended reading for the lesson:

1. Clinico-Basic Microbiology. 3rd revised edition. By Dr. Muhammad Shamim.- Publisher Khurram&Brothers, 2004.-187 p.
2. Microbiology for pgmee. By ArvindArora.- Pulse Publications.- 2010, pp6-309.
3. Microbiology for the Health Sciences. Fifth edition. By prof. Gwendolyn R.W. Burton, Paul.G.Endelkirk.- Lippincott.-
   Philadephia, New York, 1996, 444 p.
4. Practical Microbiology. D.R. Arora/ CBS Publishers &Distributors/- New Deli. Bangalore, 2007.- 218 p.
5. Review of Medical Microbiology and Immunology. Tenth edition / Warren Levinson. - a LANGE medical book.- pp. 1-101.
6. Textbook of Microbiology. Seven edition. By Ananthanarayan and Paniker`s/ Orient Longman Private Limited.- India, 2006 .-657 p.

7. Textbook of Microbiology. General Microbiology. Third edition. By prof. C.P. Baveja/ Arya Publications.- 2010.- p. 1- 191.

Key questions covered in Lecture 15

1. Enterobacteriacea family
2. Vibroinaceae family

Recommended reading for the lesson:

1. Clinico-Basic Microbiology. 3rd revised edition. By Dr. Muhammad Shamim.- Publisher Khurram&Brothers, 2004.-187 p.
2. Microbiology for pgmee. By Arvind Arora.- Pulse Publications.- 2010, pp 6-309.
3. Microbiology for the Health Sciences. Fifth edition. By prof. Gwendolyn R.W. Burton, Paul.G.Endelkirk.- Lippincott.-
   Philadephia, New York, 1996, 444 p.
4. Practical Microbiology. D.R. Arora/ CBS Publishers &Distributors/- New Deli. Bangalore, 2007.- 218 p.
5. Review of Medical Microbiology and Immunology. Tenth edition / Warren Levinson. - a LANGE medical book.- pp. 1-101.
6. Textbook of Microbiology. Seven edition. By Ananthanarayan and Paniker`s/ Orient Longman Private Limited.- India, 2006 .-657 p.
7. Textbook of Microbiology. General Microbiology. Third edition. By prof. C.P. Baveja/ Arya Publications.- 2010.- p. 1- 191.

Key questions covered in Lecture 16

– Yersinia pestis.
– Francisella tularensis.
– Bacillus anthracis.
- Brucella spp.
- Listeria spp.

Recommended reading for the lesson:

1. Textbook of Microbiology. 10-th editions. By Ananthanarayan and Paniker`s. Universities Press Private Limited.-India, 2018.- p. 239-247б 339-344, 398-401.
2. Basic Medical Microbiology / Patrick R. Murray. First edition. | Philadelphia, PA : Elsevier, [2018]- p. 26, 60.
3. Clinical Microbiology Made Ridiculously Simple./ Gladwin M.D., Mark T., Trattler M.D., et all. Edition 7| MedMaster, 2016.- p. 38-39, 45, 73-77.
4. Microbiology. PreTest® Self-Assessment and Review./ Richard C.Tilton. Tenth Edition.- McGraw-Hill Medical Publishing Division.-2002.- p. 55-108

Key questions covered in Lecture 17

Basic virology: definition, classification
Morphology and chemistry
Important human viral diseases

Recommended reading for the lesson:

1. Classification and Nomenclature of Viruses. Ninth Report of the International Committee on Taxonomy of Viruses. King A.M.Q. et al. eds. Elsevier Academic Press, 2012, 1259 pp. Grāmata atrodas LU BF Mikrobiologijas un biotehnoloģijas katedrā.
2. Dimmock N.J., Easton A.J., Leppard K.N. Introduction to Modern Virology (4-th ed.) Blackwell Science, 2001, 407 pp.
3. Cann A.J. Principles of Molecular Virology (2-nd or 3-rd ed.) Acad.Press, 1997/2004
5. Murray P., Rosenthal K., Kobayashi G., Pfaller M. Medical Microbiology, Mosby, 1998, Section V, Virology, pp. 378 – 555.
6. Fields B., et al. eds. Fundamental Virology (3-rd ed.) Lippincot-Raven, 1996, 1294 pp.
7. "Baltimore Classification of Viruses" (Website.) Molecular Biology Web Book - http://web-books.com/. Retrieved on 2008-08-18.

Key questions covered in Lecture 18

1. Viruses with Single-Stranded DNA Genomes
2. Viruses with Double-Stranded DNA Genomes

Recommended reading for the lesson:

1. "Baltimore Classification of Viruses" (Website.) Molecular Biology Web Book - http://web-books.com/. Retrieved on 2008-08-18.
2. Flint, S. Jane, et al., eds. Principles of Virology: Molecular Biology, Pathogenesis, and Control. Washington, DC: ASM Press, 2000.

3. Knipe, David M., and Peter M. Howley, eds. Fields' Virology, 4th ed. Philadelphia, PA: Lippincott Williams & Wilkins, 2001.
4. Krupovic M, Ghabrial SA, Jiang D, Varsani A (September 2016). "Genomoviridae: a new family of widespread single-stranded DNA viruses". Archives of Virology. 161 (9): 2633–43.
5. Cotmore SF, Agbandje-McKenna M, Chiorini JA, Mukha DV, Pintel DJ, Qiu J, Soderlund-Venermo M, Tattersall P, Tijssen P, Gatherer D, Davison AJ (May 2014). "The family Parvoviridae". Archives of Virology. **159** (5): 1239–47.
6. Phan TG, Mori D, Deng X, Rajindrajith S, Ranawaka U, Fan Ng TF, Bucardo-Rivera F, Orlandi P, Ahmed K, Delwart E (August 2015). "Small circular single stranded DNA viral genomes in unexplained cases of human encephalitis, diarrhea, and in untreated sewage". Virology. 482: 98–104.
7. *Iyer LM, Balaji S, Koonin EV, Aravind L (April 2006). "Evolutionary genomics of nucleo-cytoplasmic large DNA viruses". Virus Research. 117 (1): 156–84.*

Methodological instructions for the implementation of independent work on the discipline:

1. Review assigned materials and recommended literature;
2. Read relevant literature and complete tasks and exercises outlined in the thematic plan of independent work;
3. Consult with the teacher in case of questions or for feedback on your work;
4. Reflect on your learning process and outcomes, identifying areas of strength and areas for improvement. This self-reflection can help enhance your understanding of the material and improve your performance in future assignments;
5. Conduct additional research or reading to deepen your understanding of the topic and broaden your knowledge in the subject area.