INTERNATIONAL HIGHER SCHOOL OF MEDICINE
Department of Natural Sciences Disciplines

SYLLABUS

Medical Biology
2026-2027 academic year
for students of medical faculty
1st course 1st semester, groups №1-40
4 credits (120 hours, including Auditory 72 hours, independent work: 48 hours)

Lecturer: **Ch. S. Ismailova**
996777395409(Whatsapp)
Email: ichinar@mail.ru
Venue: Zoom

Practical lessons: **Myrzagalieva Elnura Baiterekovna**
+996 702 888354 (Whatsapp)
Email: myrzagalievanura5@gmail.com
Venue: № 411of Administrative building IHSM, 4th floor

Practical lessons: **Berbolot kyzy Gulmairam**
+996 707353866 (Whatsapp)
Email: mgan88@mail.ru
Venue: № 416 of Administrative building IHSM, 4th floor

Practical lessons: **Almanbetova Aiperi**
+996 505 039492 (Whatsapp)
Email: Almambetova12@mail.ru,
Venue: № 417 of Administrative building IHSM, 4th floor

The Syllabus is considered
at the meeting of the department of Natural Sciences Disciplines
Protocol №1 dated 28.08.2026
Head of the department Ch. S. Ismailova

Course Objective: Formation of students' general theoretical systemic knowledge in the field of biology, which is necessary when considering the biological essence and mechanisms of processes occurring at all levels of the organization of living nature: molecular-genetic, cellular, ontogenetic, population, biogeocenotic and biosphere for the development of a natural worldview. Formation of skills to apply theoretical knowledge when studying specific biological structures and processes, to understand the functions of individual systems and the organism as a whole, its interaction with the environment, necessary in the practical activities of a doctor.

After study of the discipline the student must:
Knowledge: the essence and mechanisms of biological processes occurring at all levels of the organization of living nature, affecting the level of maintaining public health.
Skill: apply theoretical, methodological and practical skills in medical biology, genetics and parasitology to study the basic concepts of practical medicine. Apply theoretical knowledge from the field of medical biology for the treatment and implementation of preventive measures among the population.
Attitude: methods of obtaining and researching natural science knowledge for solving standard tasks of professional medical activity.

Pre-requisites: For successful study of this discipline, the student must know the basic disciplines, such as:

- General Biology (Botany, Zoology)
- Statistical mathematics

Post-requisites:

- Biochemistry
- Microbiology, Virology and Immunology
- Epidemiology
- Medical genetics
- Infectious diseases.

THEMATIC PLAN OF LECTURES

№	Themes of lectures	Hours	Date
1.	Structure and functions of cell membrane. Transport of substances through the cell membrane.	2	05.10.26
2.	The historical review of Genetics. Mendel's works. Mendel's laws of inheritance.	2	12.10.26
3.	Gene interactions: epistasis, polygenetic inheritance. Gene expression and environment.	2	19.10.26
4.	Introduction to Parasitology. General and Medical Protozoology. Kingdom Protista: Subkingdom Protozoa. Main principles of classification: Phylum Sarcomastigophora, Phyla Apicomplexa, Ciliophora and Microspora.	2	26.10.26
5.	Representative species of Subphylum Mastigophora. Genus *Leishmania*. Different forms of leishmaniasis Forms of leishmaniasis: Visceral leishmaniasis (black disease, dumdum fever, kala-azar, infantile leishmaniasis), Cutaneous leishmaniasis (oriental sore), Mucocutaneous leishmaniasis (espundia).	2	02.11.26
6.	General review of Phylum Apicomplexa, class Conoidasida (Toxoplasma gondii), class Aconoidasida (*Plasmodium* spp.)	2	09.11.26
7.	Introduction to Medical helminthology. Classification of worms of medical importance: Phylum Platyhelminthes and Phylum Nemathelminthes. Epidemiology and geographic distribution of the human helminthes.	2	16.11.26

8.	Medical Entomology and Medical Arachnology. Classification of Phylum Arthropoda and its epidemiological significance. Classification and medical significance class Arachnida.	2	23.11.26
9.	Medical Entomology Epidemiological characteristics of the class Insecta. The order Diptera. Epidemiology and prevention of insect-related diseases (plague, Dengue fever).	2	30.11.26
	Total	18	

THEMATIC PLAN OF PRACTICAL LESSONS

№	Theme of practical lessons	Hours	Date
1.	Introduction to Cell Biology: the structure of pro- and eukaryotic cells. Methods of biology investigations: main principles of the microscopy.	2	05.10-12.10.26
2.	Types of division of pro- and eukaryotic cells: Binary division, Mitosis, Meiosis. Behavior of chromosomes during meiosis	2	05.10-12.10.26
3.	Final control of the 1st unit: Formative assessment, Survey & Questioning of 1st UNIT.	2	12.10.-19.10.26
4.	Monohybrid crossing: the law of uniformity of first generation hybrids, the law of splitting. The law of «gamete purity». Cytological bases of laws. Analytical crossing, its practical applicationDi- and polyhybrid crossing: the law of independent combination of signs, its cytological bases.	2	12.10.-19.10.26
5.	Types of allelic and non-allelic genes interactions. Multiple alleles. Codominance, Incomplete dominance. Pleiotropy.	2	19.10.-26.10.26
6.	Introduction to Human genetics. Human karyotyping . Aneuploidy and polyploidy as chromosomal abnormalities. Cytogenetic method: main stages, aims. Chromosomal syndromes caused by human genomic anomalies: Klinefelter syndrome, Turner syndrome, Down syndrome, Patau syndrome.	2	19.10.-26.10.26
7.	Inheritance of human sex. Mechanisms of genetic sex determination in humans and their disorders. Bisexual human nature. Traits linked with sex, the laws of their inheritance. Signs limited by sex and dependent on sex Hemizygosity. Inheritance of sex-linked human diseases: Color blindness, hemophilia, Duchenne muscular dystrophy. Pedigree analysis	2	26.10.-02.11.26
8.	The molecular structure of DNA. Semi-conservative mechanism of DNA replication. Mutations, sources of mutations.	2	26.10.-02.11.26
9.	Expression of genetic information: Transcription, translation. The process of protein synthesis. Sickle cell anemia, phenylketonuria.	2	02.11.-09.11.26
10.	The human genome and hereditary diseases. Recessive autosomal allelic diseases: Tay-Sachs disease, cystic fibrosis, albinism. Dominant autosomal allelic hereditary diseases: Achondroplasia, polydactyly, Huntington's disease. Frequency and occurrence in the Human population. Modern methods of human genetics research and diagnosis of hereditary diseases. Prenatal diagnosis.	2	02.11.-09.11.26
11.	Final control of the 2nd UNIT: Formative assessment, Survey & Questioning of 2nd UNIT.	2	09.11.-16.11.26
12.	Medical protozoology. General characteristics of the Phylum Metamonada: Subphylum Eopharyngia and Parabasalia. Life cycles of *Giardia lamblia*, *Trichomonas vaginalis* parasites: biological features, epidemiology and clinical symptoms, infections prevention.	2	09.11.-16.11.26
13.	General characteristics of Phylum Sarcomastigophora, subphylum Mastigophora. Life cycles of *Trypanosoma cruzi*, *Trypanosoma br.:* biological features, epidemiology and clinical symptoms, infections prevention.	2	16.11.-23.11.26
14.	General characteristics Subphylum Sarcodina. Biological features, epidemiology and clinical symptoms of free living amoebas: *Entamoeba histolytica*; *Balamuthia mandrillaris Naegleria fowleri, Acanthamoeba spp* , its infections prevention.	2	16.11.-23.11.26
15.	General characteristics Phylum Apicomplexa, Class Aconoidasida. Life cycles of *Plasmodium vivax; Plasmodium falciparum:* epidemiology and clinical symptoms, its infections prevention.	2	23.11.-30.11.26

16.	General characteristics of Phylum Apicomplexa, Class Conoidasida; Life cycle of *Toxoplasma gondii,* epidemiology and clinical symptoms, its infections prevention.	2	23.11.-30.11.26
17.	General characteristics of Phylum Apicomplexa, Classis Aconoidasida Life cycles of: *Cryptosporidium parvum, Isospora belli.*, epidemiology and clinical symptoms, its infections prevention.	2	30.11.-07.12.26
18.	General characteristics of Phylum Ciliophora. Parasitic species of Phylum Ciliophora, class Litostomatea. Life cycles of *Balantidium coli* biological features, epidemiology and clinical symptoms, infections prevention. General characteristics of phylum *Microsporidia.*	2	30.11.-07.12.26
19.	Final control of the 3rd UNIT: Formative assessment, Survey & Questioning of 3rd UNIT.	2	07.12.-14.12.26
20.	General characteristics Phylum Platyhelminthes, Class Cestoda. Life cycles of *Taenia solium, Taenia saginata.* biological features, epidemiology and clinical symptoms, infections prevention. Microslides: of mature and young proglottids.	2	07.12.-14.12.26
21.	General characteristics of Phylum *Platyhelminthes,* class Cestoda. Life cycles of *Echinococcus* spp.: biological features, epidemiology and clinical symptoms, infections prevention	2	14.12.-21.12.26
22.	General characteristics of class Trematoda. Life cycles of *Fasciola hepatica, Fasciolopsis buski; Paragonimus westermani*. biological features, epidemiology and clinical symptoms, infections prevention. View of microslides.	2	14.12.-21.12.26
23.	General characteristics of class Trematoda Life cycles of genus *Schistosoma.* Biological features, epidemiology and clinical symptoms, infections prevention. Microslides of female and male, eggs, larvae of *Shistosoma japonicum* .	2	21.12.-28.12.26
24.	General characteristics of Phylum Nematoda (Nemathelminthes). Life cycles of *Trichinella spiralis, Dirofilaria immitis.*, Lymphatic filariasis *Brugia malayai, Wuchereria bancrofti*. epidemiology and clinical symptoms, its infections prevention.	2	21.12.-28.12.26
25.	General characteristics of Class *Arachnida*, subclassis Acari. Arthropod-borne diseases transmitted by f arachnids: tick-borne encephalitis: Japanese encephalitis, West Nile encephalitis, Russian spring-summer encephalitis.	2	28.12.-04.01.27
26.	Life cycles, epidemiology and medical importance of blood-sucking species belonging class Insecta: 1. Order Hemiptera (bed bugs) 2. Order Siphonaptera (fleas) 3. Order Anoplura (lice); pediculosis.	2	28.12.-04.01.27
27.	Final control of the 4th UNIT: Formative assessment, Survey & Questioning of 4th UNIT.	2	04.01.-11.01.27
	TOTAL	54	

THEMATIC PLAN OF INDEPENDENT WORK OF STUDENTS

Unit №	Theme of independent work	Hours	Date
1	Types of sexual reproduction in plants and animals.	6	During the semester
1	Eu and heterochomatin organization of chromosomes	6	During the semester
1	Application of the cytogenetic analysis for diagnosis and the prognosis of hereditary diseases.	6	During the semester
2	Methods of human genetics research.	14	During the semester
2	Different types of inheritance: modification, mutation, etc.	14	During the semester
2	Types of mutations. Their significance in nature and for man.	14	During the semester

2	The phenomenon of transduction in bacteria.	14	During the semester
2	The phenomenon of transformation in bacteria.	14	During the semester
2	Methods of human genetics research.	14	During the semester
2	Different types of inheritance: modification, mutation, etc.	14	During the semester
2	The embryo cloning, embryonic steam & tissue steam cell therapy and ethical problems in biomedicine.	14	During the semester
3	Prevention of parasites such as Sarcomastigophora.	14	During the semester
3	Prevention of parasites such as Spores.	14	During the semester
3	Prevention and prophylaxis of parasites of the Sarcodaceae type	14	During the semester
3	Methods of control of epidemiological situations arising in case of infection with various parasitic protozoa.	14	During the semester
3	Application of new diagnostic methods.	14	During the semester
3	Modern methods of controlling the spread of parasites.	14	During the semester
3	Prevention of parasites such as Sarcomastigophora	14	During the semester
4	Preventive and preventive measures against the spread of parasites – class Flukes.	14	During the semester
4	Modern methods of controlling the spread of parasites of the Tapeworm class.	14	During the semester
4	Measures to prevent the spread of representatives of the Roundworm type.	14	During the semester
4	Modern methods of controlling the spread of infections transmitted by blood-sucking arthropods.	14	During the semester
4	Prevention and measures to combat the spread of arthropod species of medical importance.	14	During the semester
4	Monitoring of the epidemiological situation of parasitic tropical diseases.	14	During the semester
4	Preventive and preventive measures against the spread of parasites – class Trematoda (Flukes).	14	During the semester
4	Modern methods of controlling the spread of parasites of the class Cestoda (Tapeworms).	14	During the semester
4	Measures to prevent the spread of representatives of the Phylum Nematoda	14	During the semester
4	Modern methods of controlling the spread of infections transmitted by blood-sucking arthropods.	14	During the semester

Recommended reading for the discipline:

I. Basic literature:

1 Campbell N.A. Biology, 2000.
2. Bhatia K.N. Elementary Biology.Vol.1-2., 2000.
3. Campbell N.A. Biology. 7th ed., 2005.
4. Alberts B. Essential Cell Biology. 3rd ed., 2010.
5. Khudaibergenova B.M., Mukhametalieva G.A. Medical Parasitology., 2018.

II Additional literature:

1. Maton A. Human Biology., 1993.
2. Campbell N.A. Biology.4th ed., 1996.
3. Mader S.S. Biology. Student Study Guide. 5th ed., 1998.
4. Dhami P.S. Pradeeps a Textbook of Biology., 2011.
5. Aggarwal S. A Textbook of CBSE Biology. 2016

Electronic literature

1. Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai, Sarah E. Henrickson. Cellular and Molecular Immunology.11th ed. 2026. IHSM Digital Resource http://dspace.ism.edu.kg
2. Kenneth A. Mason, Jonathan B. Losos, Tod Duncan. Biology. 13th ed.2023 IHSM Digital Resource

http://dspace.ism.edu.kg

3. Lisa A. Urry, Michael L. Cain, Peter V. Minorsky Campbell Biology 12ed. 2021. IHSM Digital Resource http://dspace.ism.edu.kg
4. Advances in Medicine and Biology 2015 EBSCO-eBooks-Medical-Collection

Resources of the information and telecommunication network "Internet"

1. IHSM Digital Resource http://dspace.ism.edu.kg
2. EBSCO https://research.ebsco.com
3. Research4Life https://portal.research4life.org
4. Oxford University Press https://academic.oup.com

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	The student is poorly oriented in the material of the lesson topic, answers questions incompletely and inconsistently. There were difficulties or mistakes were made in defining concepts and using terminology. Tried to complete assignments independently (exercises, situational tasks, tests), but about 25% of assignments were completed correctly. The answers to the questions of programmed control are not complete, or not written; there is an attempt to write definitions.	The student has limited knowledge of the topic of the lesson, answers questions incompletely and inconsistently, but has shown a general understanding of the issue and demonstrated skills sufficient to master further program material. There were difficulties or mistakes made in defining concepts and using terminology, which were corrected after several additional questions from the teacher. Completed all tasks independently (situational tasks, tests), about 80% of tasks were completed correctly. The answers to questions about programmed control are not entirely complete, but the basic concepts are reflected and written with errors.	The student showed knowledge of the topic material, but made 2-3 minor inaccuracies in the answer, which he corrected after the teacher's comment, showed the ability to think logically and gave correctly selected examples to confirm his knowledge, and was able to draw reasonable conclusions. Completed all tasks independently and correctly (situational tasks, tests). Answers to questions about programmed control with minor errors, life cycles are written correctly. 2-3 minor errors are allowed when writing definitions.	The student showed a deep understanding of the topic of the lesson and the ability to think logically. The presentation of the material fully corresponds to the questions posed, contains all the necessary theoretical facts, illustrated by correctly selected specific examples. The student was able to draw reasonable conclusions. Completed all tasks independently and correctly (situational tasks, tests). The answers to questions about programmed control are complete, without errors, and written correctly.
Independent work - 20	0-11	12-15	16-17	18-20
Interval description	if the IWS is not passed or the IWS is submitted in printed form without protection or with large comments, i.e. IWS does not meet the requirements.	significant inaccuracies were made when completing the SRS, the number of questions is up to 15, there are grammatical errors, the student does not answer all questions, the list of references is drawn up with comments - there are	Some inaccuracies were made when performing the SRS, questions 15-20, there were incorrect ones, for example, adjectives, verbs; answers all questions during defense, list of references with inaccuracies and number 6-7, there are old sources	with 90-100% fulfillment of all requirements, answers all questions without errors

		few sources, up to 5, or they are old (up to 90 years old)		
Control work (module) – 40	0-23	24-30	31-35	36-40
Interval description	the student receives in the case when he did not fully complete the task, showed an insufficient level of knowledge, and could not explain the results obtained. Such a test does not meet the requirements, contains contradictory information, and the tasks in it are solved incorrectly.	the student receives a test for a fully completed assignment if there are significant inaccuracies and shortcomings in it, the student is unable to correctly apply the acquired knowledge, there are irregularities in the design of the work, unreasoned answers, irrelevant or unreliable sources of information.	the student completed all the tasks, showed good knowledge of the material covered, but was unable to justify the proposed solutions to problems when there are shortcomings in the design of the test work and general minor comments that do not affect its quality.	The student completely completed the test assignment and demonstrated excellent knowledge of the educational material. At the same time, the work is designed in accordance with the requirements; a minimum of comments can be made to it.

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
THEME 1 STRUCTURE AND FUNCTIONS OF CELL MEMBRANE. TRANSPORT OF SUBSTANCES THROUGH THE CELL MEMBRANE.
Key questions covered in lesson № 1 (*Lecture)*

1. Introduction to the course of medical biology.
2. Cellular and molecular-genetic levels.
3. Plasma membrane: structure, properties and functions : The basic membrane components
4. Transport of substance across the membrane. Passive transport: 1) Passive transport: A) Simple diffusion, B) Osmosis, C) Facilitated diffusion. Active transport: Types of Active Transport, Sodium-potassium pump, Endocytosis and exocytosis,

Recommended reading for the discipline:
[1] Bhatia K.N. Elementary Biology.Vol.1-2., 2000.
[2] Campbell N.A. Biology. 7th ed., 2005.

Key questions covered in lesson №2 (*Practice)*

1. Pro- and eukaryotic cells, their organization.
2. Structural and functional organization of prokaryotic cells.
3. Structural and functional organization of eukaryotic cells.

Recommended reading for the discipline:
[1] Bhatia K.N. Elementary Biology.Vol.1-2., 2000.
[2] Campbell N.A. Biology. 7th ed., 2005.

Key questions covered in lesson №3 (*Practice)*

1. Reproduction – a universal property of living things, its forms.
2. Life cycle of cells (cell cycle), its possible directions and periodization.
3. Cellular Basis of Inheritance. Cell divisions: Binary Fission, Mitosis. Methods of somatic cell division (mitosis, amitosis).
4. Chromosome structure & morphology.
5. Gametogenesis. Meiosis. Mechanisms of gamete genetic diversity.

Recommended reading for the discipline:

[1] Campbell Neil A., Lawrence G. Mitchell, Jane B. Reece. Biology: Concepts and Connections/ 4d Ed. / University of California, Riverside/The Benjamin / Cummings publishing Company, Inc.. P. 128-144.
[2] Bhatia K.N. Elementary Biology.Vol.1-2., 2000.

Key questions covered in lesson № 4 (*Practice).*

1. Summary of Cellular basis of inheritance.
2. Formative assessment & Questioning. Testing

Recommended reading for the discipline:

[1] Campbell Neil A., Lawrence G. Mitchell, Jane B. Reece. Biology: Concepts and Connections/ 4d Ed. / University of California, Riverside/The Benjamin / Cummings publishing Company, Inc.
[2] Bhatia K.N. Elementary Biology.Vol.1-2., 2000

THEME 2. THE HISTORICAL REVIEW OF GENETICS. MENDEL'S WORKS. MENDEL'S LAWS OF INHERITANCE.

Key questions covered in lesson № 5 (*lecture)*

1. Subject, tasks and methods of genetics. Historical review of thef genetics development.
2. Mendel's works
3. The three laws of inheritance proposed by Mendel include:
    - Law of Dominance.
    - Law of Segregation.
    - Law of Independent Assortment.

Recommended reading for the discipline:

[1] Campbell Neil A., Lawrence G. Mitchell, Jane B. Reece. Biology: Concepts and Connections/ 4d Ed. / University of California, Riverside/The Benjamin / Cummings publishing Company, Inc. P. 156 -172.
[2] Bhatia K.N. Elementary Biology.Vol.1-2., 2000

Key questions covered in lesson № 6 (*Practice)*

1. Monohybrid crossing: the law of uniformity of first generation hybrids, the law of splitting.
2. The law of «gamete purity». Cytological bases of laws.
3. Analytical crossing, its practical application. Di- and polyhybrid crossing: the law of independent combination of signs, its cytological bases.

[1] Campbell N.A. , Lawrence G. Mitchell, Jane B.Reece.. Biology: Concepts and connections P. 156 -172..
[2] Bhatia K.N. Elementary Biology.Vol.1-2., 2000

Theme: 3. **GENE INTERACTIONS: EPISTASIS , POLYGENETIC INHERITANCE. GENE EXPRESSION AND ENVIRONMENT.**

Key questions covered in lesson № 7 (*lecture)*–

1. Types of gene interaction.
2. Epistasis.
3. Polygenic inheritance.
4. Gene expression and the environment.

Recommended reading for the discipline:

[1] Campbell N.A. , Lawrence G. Mitchell, Jane B.Reece.. Biology: Concepts and connections //P. 168-197
[2] Bhatia K.N. Elementary Biology.Vol.1-2., 2000

Key questions covered in lesson № 8 (*practice)*

1. Types of allelic and non-allelic genes interactions.
2. Multiple alleles. Codominance, Incomplete dominance.
3. Pleiotropy.

Recommended reading for the discipline:

[1] Campbell N.A. , Lawrence G. Mitchell, Jane B.Reece.. Biology: Concepts and connections //P. 168-197
[2] Bhatia K.N. Elementary Biology.Vol.1-2., 2000

Key questions covered in lesson № 9 (*Practice)*

1. Introduction to Human genetics.

2. Human karyotyping . Aneuploidy and polyploidy as chromosomal abnormalities.
3. Cytogenetic method: main stages, aims.
4. Chromosomal syndromes caused by human genomic anomalies: Klinefelter syndrome, Turner syndrome, Down **syndrome, Patau syndrome.**

Recommended reading for the discipline:

[1] Campbell N.A. , Lawrence G. Mitchell, Jane B.Reece.. Biology: Concepts and connections //P. 173-180.

[2] Bhatia K.N. Elementary Biology.Vol.1-2., 2000

Key questions covered in lesson №10 *(practice).*

1. Inheritance of human sex. Mechanisms of genetic sex determination in humans and their disorders.
2. Bisexual human nature. Traits linked with sex, the laws of their inheritance.
3. Traits limited by sex and dependent on sex.
4. Hemizygosity. Inheritance of sex-linked human diseases: Color blindness, hemophilia, Duchenne muscular dystrophy. Pedigree analysis

Recommended reading for the discipline:

[1] Campbell N.A. , Lawrence G. Mitchell, Jane B.Reece.. Biology: Concepts and connections //P. 177-180.

[2] Bhatia K.N. Elementary Biology.Vol.1-2., 2000

Key questions covered in lesson № 11 *(Practice).*

1. The molecular structure of DNA.
2. Semi-conservative mechanism of DNA replication.
3. Mutations, sources of mutations.

Recommended reading for the discipline:

[1] Campbell N.A., Lawrence G. Mitchell, Jane B.Reece.. Biology: Concepts and connections //P.184-201.

[2] Bhatia K.N. Elementary Biology.Vol.1-2., 2000

Key questions covered in lesson № 12 (*practice)* .

1. Expression of genetic information:
2. Transcription, translation. The process of protein synthesis.
3. Sickle cell anemia, phenylketonuria.

Recommended reading for the discipline:

[1]. Campbell N.A. , Lawrence G. Mitchell, Jane B.Reece.. Biology: Concepts and connections //P.193-201

[2] Bhatia K.N. Elementary Biology.Vol.1-2., 2000

Key questions covered in lesson № 13 (*Practice).*

1. The human genome and hereditary diseases.
2. Recessive autosomal allelic diseases: Tay-Sachs disease, cystic fibrosis, albinism.
3. Dominant autosomal allelic hereditary diseases: Achondroplasia, polydactyly, Huntington's disease.
4. Frequency and occurrence in the Human population.
5. Modern methods of human genetics research and diagnosis of hereditary diseases. Prenatal diagnosis.

Recommended reading for discipline.

[1]. Campbell N.A. , Lawrence G. Mitchell, Jane B.Reece.. Biology: Concepts and connections //P.193-201

[2] Maton A. Human Biology., 1993.

S **Key questions covered in lesson № 14 (***Practice).*

1. Summary of Cellular basis of inheritance.
2. Final control of the 2nd UNIT: Formative assessment, Survey & Questioning of 2nd UNIT.

Recommended reading for the discipline:

[1] Campbell N.A. , Lawrence G. Mitchell, Jane B.Reece.. Biology: Concepts and connections// P. 193-201

[2] Maton A. Human Biology., 1993.

THEME 4. INTRODUCTION TO PARASITOLOGY.

Key questions covered in lesson № 15 (*Lecture)*

1. General and medical protozoology.
2. Kingdom Protista: Subkingdom Protozoa.
3. Main principles of classification: Phylum Sarcomastigophora, Phyla Apicomplexa, Ciliophora and Microspora.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A. Medical parasitology Bishkek, 2018 ISM. P. 9-12

Key questions covered in lesson № 16 (*Practice).*

1. Medical protozoology. General characteristics of the Phylum Metamonada: Subphylum Eopharyngia and Parabasalia.
2. Life cycles of *Giardia lamblia*, *Trichomonas vaginalis* parasites: biological features, epidemiology and clinical symptoms, infections prevention.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A. Medical parasitology Bishkek, 2018 ISM. P. 17-20

Key questions covered in lesson № 17 (*Practice)* .

1. General characteristics of Phylum Sarcomastigophora, subphylum Mastigophora.
2. Life cycles of *Trypanosoma cruzi, Trypanosoma br.:* biological features, epidemiology and clinical symptoms, infections prevention.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A. Medical parasitology Bishkek, 2018 ISM. P. 50-55.

THEME 5. REPRESENTATIVE SPECIES OF SUBPHYLUM MASTIGOPHORA.

Key questions covered in lesson № 18 (*Lecture)*

1. Genus *Leishmania*. Different forms of leishmaniasis: Visceral leishmaniasis (black disease, dumdum fever, kala-azar, infantile leishmaniasis),
2. Cutaneous leishmaniasis (oriental sore), Mucocutaneous leishmaniasis (espundia).

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A. Medical parasitology Bishkek, 2018 ISM. P. 28-36.

Key questions covered in lesson № 19 (*Practice)* .

1. General characteristics Subphylum Sarcodina.
2. Biological features, epidemiology and clinical symptoms of free living amoebas: *Entamoeba histolytica*; *Balamuthia mandrillaris Naegleria fowleri, Acanthamoeba spp* , its infections prevention.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A. Medical parasitology Bishkek, 2018 ISM. P. 40-50.

THEME 6 GENERAL REVIEW OF PHYLUM APICOMPLEXA

Key questions covered in lesson № 20 (*lecture)*

1. Phylum Apixomplexa. Class Sporozoea.
2. General review of Phylum Apicomplexa, class Conoidasida (Toxoplasma gondii), class Aconoidasida (*Plasmodium* spp.)
3. Medical geography, morphofunctional features, life cycles of malarial Plasmodia and Toxoplasma. Ways of infection, laboratory diagnosis and prevention of diseases caused by them.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A. Medical parasitology Bishkek, 2018 ISM. P. 59-82

Key questions covered in lesson № 21 (*Practice)* .

1. Phylum Apixomplexa. Class Sporozoea. Malarial Plasmodiums, Toxoplasma. Class Aconoidasida (*Plasmodium* spp.)Medical geography, morphofunctional features, development cycles of malarial plasmodia and toxoplasma.
2. Ways of infection, laboratory diagnosis and prevention of diseases caused by them.Class Conoidasida (Toxoplasma gondii).

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A. Medical parasitology Bishkek, 2018 ISM. P. 59-82

Key questions covered in lesson № 22 (*Practice)* .

1. General characteristics of Phylum Apicomplexa, Classis Aconoidasida
2. Life cycles of: *Cryptosporidium parvum, Isospora belli.,* epidemiology and clinical symptoms, its infections prevention.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A. Medical parasitology Bishkek, 2018 ISM. P. 82-87.

Key questions covered in lesson № 23 (*Practice)* .

1. General characteristics of Phylum Ciliophora. Parasitic species of Phylum Ciliophora, class Litostomatea. Life cycles of *Balantidium coli* biological features, epidemiology and clinical symptoms, infections prevention.
2. General characteristics of phylum Microsporidia. Life cycles of *Cryptosporidium parvum, Isospora belli.* Epidemiology and clinical symptoms, its infections prevention.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A. Medical parasitology Bishkek, 2018 ISM. P. 82-87.

Key questions covered in lesson № 24 (*Practice)* .

1. Final control of the 3rd UNIT:
2. Formative assessment, Survey & Questioning of 3rd UNIT.

THEME 7. INTRODUCTION TO MEDICAL HELMINTHOLOGY.

Key questions covered in lesson № 25 (*Lecture)*

1. Classification of worms of medical importance:
2. Phylum Platyhelminthes and Phylum Nemathelminthes.
3. Epidemiology and geographic distribution of the human helminthes.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A. Medical parasitology Bishkek, 2018

Key questions covered in lesson № 26 *(Practice)*

1. General characteristics Phylum Platyhelminthes, Class Cestoda.
2. Life cycles of *Taenia solium, Taenia saginata.* biological features, epidemiology and clinical symptoms, infections prevention.
3. Microslides: of mature and young proglottids.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A.Medical parasitology. Bishkek, 2018

Key questions covered in lesson №27 (*Practice)*

1. General characteristics of Phylum *Platyhelminthes,* class Cestoda.
2. Life cycles of *Echinococcus* spp.: biological features, epidemiology and clinical symptoms, infections prevention

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A.Medical parasitology. Bishkek, 2018

Key questions covered in lesson № 28 *(Practice)*

1. General characteristics of class Trematoda.
2. Life cycles of *Fasciola hepatica, Fasciolopsis buski; Paragonimus westermani.* biological features, epidemiology and clinical symptoms, infections prevention.
3. View of microslides.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A.Medical parasitology. Bishkek, 2018

Key questions covered in lesson № 29 *(Practice)*

1. General characteristics of class Trematoda Life cycles of *genus Schistosoma.*
2. Biological features, epidemiology and clinical symptoms, infections prevention.
3. Microslides of female and male, eggs, larvae of *Shistosoma japonicum* .

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A.Medical parasitology. Bishkek, 2018

Theme 7. Introduction to Medical helminthology. Classification of worms of medical importance: Phylum Platyhelminthes and Phylum Nemathelminthes. Epidemiology and geographic distribution of the human helminthes.

Key questions covered in lesson № 30 *(Practice)*

1. General characteristics of Phylum Nematoda (Nemathelminthes).
2. Life cycles of *Trichinella spiralis, Dirofilaria immitis.,*
3. Lymphatic filariasis *Brugia malayai, Wuchereria bancrofti.* epidemiology and clinical symptoms, its infections prevention.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A.Medical parasitology. Bishkek, 2018

THEME 8. MEDICAL ENTOMOLOGY AND MEDICAL ARACHNOLOGY.

Key questions covered in lesson №31 (*Lecture)*

1. Classification of Phylum Arthropoda and its epidemiological significance.
2. Classification and medical significance class Arachnida.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A.Medical parasitology. Bishkek, 2018

Key questions covered in lesson № 32 (*Practice)*

1. General characteristics of Class *Arachnida*: , subclassis Acari.
2. Arthropod-borne diseases transmitted by f arachnids: tick-borne encephalitis: Japanese encephalitis, West Nile encephalitis, Russian spring-summer encephalitis.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A.Medical parasitology. Bishkek, 2018

THEME 9 . MEDICAL ENTOMOLOGY.

Key questions covered in lesson № 33 (*Lecture)*

1. Epidemiological characteristics of the class Insecta.

2. The order Diptera.
3. Epidemiology and prevention of insect-related diseases (plague, Dengue fever).

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A.Medical parasitology. Bishkek, 2018

Key questions covered in lesson № 35 (*Practice)*

1. Life cycles, epidemiology and medical importance of blood-sucking species belonging class Insecta:
2. 1. Order Hemiptera (bed bugs)
3. Order Siphonaptera (fleas)
4. Order Anoplura (lice); pediculosis.

Recommended reading for the discipline:

[1] Khudaibergenova B.M., Mukhambetalieva G.A.Medical parasitology. Bishkek, 2018

Key questions covered in lesson № 15 (*practice)*

1. Final control of the 4th UNIT:
2. Formative assessment, Survey & Questioning of 4th UNIT.

METHODOLOGICAL INSTRUCTIONS FOR THE IMPLEMENTATION OF INDEPENDENT WORK ON THE DISCIPLINE

The basis of independent work of students is systematic, purposeful and thoughtful reading of recommended literature. It is necessary to read what is recommended for each topic by the curriculum, seminar plans, other teaching materials, as well as by teachers. The basic literature includes the minimum of sources that is necessary for the complete and solid development of educational material.

Additional literature is recommended for a more in-depth study of the program material, expanding the horizons of the student. It is necessary to read literature systematically, according to the plan, correctly allocating time. Working with sources requires to:

1) focus on what you are reading;
2) highlight the main thoughts;
3) "embrace the thought" of the author quite clearly and distinctly, which helps to develop clarity and distinctness of your own thoughts;
4) think consistently;
5) imagine vividly and distinctly, as if experiencing what you read in the source;
6) consult with the instructor if facing difficulties during fulfilling practical tasks or something is not clear;