MEDICAL UNIVERSITY – PLOVDIV

FACULTY OF MEDICINE

SYLLABUS

IN

HUMAN BIOLOGY

Approved by the Department Council on 21 May 2025

Confirmed by the Faculty Council - Protocol № 6/18.06. 2025

HUMAN BIOLOGY
Syllabus

Discipline	Final exam/ semester	Auditorium classes				ECTS non-auditorium classes	ECTS total	Academic hours in years and semesters	
								1st year	
Human Biology	II	Total	Lectures	Practices	ECTS			I	II
		105	60	45	3.5	6.5	10	2	2

DISCIPLINE:

Human Biology

TYPE OF DISCIPLINE ACCORDING TO THE UNIFORM STATE REQUIREMENTS:

Mandatory

LEVEL OF QUALIFICATION:

Master degree /M/

FORMS OF TRAINING:

Lecture courses, practical courses, self-training.

YEAR OF TRAINING:

1st year

DURATION OF TRAINING:

1st and 2nd semesters

ACADEMIC HOURS:

60 hours of lecture courses, 45 hours of practical courses.

TECHNICAL EQUIPMENT APPLIED IN THE TRAINING:

Microscopes, permanent and temporary microscopic preparations, cell cultures, audiovisual equipment, tools and technical devices for illustration and performance of molecular, cellular and immunological methods, laboratory protocols, test books.

Description of Interactive Teaching Methods

These are methods that enable visualization of the study material and the use of tools for both in-person and, when necessary, online classes (via Teams).

- Case-based learning – Students analyze clinical cases, solve problems, complete tests, and model processes used in medical research. This approach promotes active learning and enhances the understanding of complex processes.
- Virtual laboratories – The use of computer programs or video materials allows access to complex experiments in a safe and controlled environment.
- Team-based projects – Designed to foster collaboration, communication, and critical thinking through problem-solving tasks, project development, presentations, and more.
- Seminars and discussions – These are closely related to the course material and encourage argumentation, respect for differing viewpoints, and the development of reasoning skills.

Methods for Stimulating Students' Creative Activity

Students engage in individual or group projects aimed at generating ideas on a given topic, promoting unconventional thinking and freedom of expression. The best works are published in an essay collection, providing an opportunity for participants to apply their knowledge in an innovative way. In addition, students are encouraged to approach problems from multiple perspectives, fostering multidimensional and creative thinking. The inclusion of real or hypothetical case studies further enhances students' analytical and argumentative skills.

FORMS OF EVALUATION:

Lecture courses, practical courses, oral examination, seminars, elective course, individual work with outstanding students. Formation of the final mark is formed from the grade from the semester combined test exam and the practical exam.

EVALUATION CRITERIA:

Ongoing evaluation – weekly tests, oral examinations, colloquia on different syllabus sections, participation in seminars and elective courses.

Final evaluation – combined written test and practical exam.

ASPECTS OF EVALUATION CRITERIA:

Participation in seminars, weekly tests, practical exam on microscopic slides.

SEMESTER EXAM:

Yes / written and oral examination, practical exam /

STATE EXAM:

No

LECTURER:

Full Professor from the Department of “Medical Biology”

DEPARTMENT:

“Medical Biology”

ANNOTATION

The discipline Biology allows students to acquire knowledge and skills in the following basic biological concepts:

- Molecular foundations of life – biological macromolecules
- Realization of genetic information and Genetic code
- Organization of the genetic material in the cell
- Karyotype
- Genetic engineering
- Biology of the cell
- Reproduction
- Individual development
- Immunological homeostasis
- Molecular evolution
- Biology of parasites

BASIC AIMS OF THE DISCIPLINE:

The objective of the biology course is to develop:

- The understanding that living systems, including humans, have hierarchically ordered levels of organization with their own specificity and rules that determine biological features and functions.
- The notion that humans, as a product of biological evolution, are ecologically connected to the development of nature and of the biosphere as a whole.
- The ability to apply biological rules as scientific theory and methodology of medicine.
- Practical skills and knowledge of basic biological techniques with medical application.
- The understanding that disorders in molecular-biological, cell-biological and immunological mechanisms are related to the development of human pathology.
- Knowledge of modern methods of diagnostics and treatment based on medical-biological principles.

COURSE TASKS

Proficiency in the most important properties and manifestations of the organismal world and humans in particular:

- heredity and variability;
- molecular and cell biology;
- reproduction and individual development of organisms;
- immunological homeostasis;
- morphology and biological cycle of medically important parasites.

EXPECTED RESULTS

1. *Theoretical knowledge* – mastering and analysis of:

- hierarchical levels and structural organization of the human organism (molecular, cellular and systemic)
- genetic structures and processes of transfer of genetic and epigenetic information
- mechanisms of immunological homeostasis
- morphology and biology of parasites

2. *Practical skills:*

- preparation of temporary and permanent microscopic slides
- detection of parasites
- light microscopy
- cell culture training
- karyotyping
- basic immunological reactions
- blood typing
- basic molecular biology methods
- basic cellular biology methods

LECTURES

LECTURE №1 - 2 hours. Organization of genetic material in eukaryotic cell. Structure of the chromosomes.

Submicroscopic structure of chromosomes – levels of organization of chromatin. Microscopic structure of chromosomes: a) types; b) eu-and heterochromatin. Sex chromatin.
c) linear differentiation of chromosomes; d) Lamp-brush chromosome; e) polyten chromosomes.

LECTURE №2 – 2 hours. Karyotype. Pathological karyotype.

Normal human karyotype, types of chromosomes, karyotyping. Abnormal karyotype - autosomal and gonosomal anomalies.

LECTURE №3 – 2 hours. Cell division. Mitosis. Regulation of the cell cycle.

Individual development of the cells. Cell cycle. Mitosis – phases and mechanisms. Cytokinesis. Regulation of the cell cycle.

LECTURE №4 – 2 hours. Meiosis. Gametogenesis. Fertilization.

Sexual reproduction – essence. Cytological foundations of sexual reproduction (meiosis): a) mechanism; b) significance of meiosis. Gametogenesis: a) oogenesis; b) spermatogenesis. Origin of germ cells. Fertilization: a) types; b) fertilization in mammals and humans – mechanism. Mechanism of translation. Post-translational modifications of proteins. Characteristics of the genetic code.

LECTURE №5 – 2 hours. Nucleic acids.

Nucleic acid structure. DNA: a) helicoidal model; b) conformation; c) DNA functions. RNA – types, structure and functions. RNA – types, structure and functions.

LECTURE №6 – 2 hours. Replication of DNA.

Semi-conservative type of replication - essence, experimental evidence. Required elements for DNA replication. Replication of linear DNA molecules: a) replication in prokaryotes; b) virus and phage replication; c) replication in eukaryotes. Replication of circular DNA molecules. Reparative synthesis: a) accuracy of DNA synthesis; b) correction of errors and repair of DNA damage.

LECTURE №7 – 2 hours. Transcription.

Transcription - characteristics, required elements for Transcription**.** Transcription in prokaryotes: a) characteristics; b) mechanism. Transcription in eukaryotes: a) characteristics; b) mechanism c) maturation of the primary transcript.

LECTURE №8 – 2 hours. Translation. Genetic code.

Translation - characteristics, required elements for Translation**.** Genetic code.

LECTURE №9 - 2 hours. Gene and chromosomal mutations.

Mutations: a) characteristics and classification; b) gene mutations; c) chromosomal mutations; d) genomic mutations. Mutagenic factors. Hereditary diseases.

LECTURE №10 – 2 hours. Apoptosis.

Programmed cell death. Characteristics, mechanisms, and genetic control.

LECTURE №11 - 2 hours. Tumor Biology.

Biological characteristics of tumor cells. Genetic control of tumorigenesis.

LECTURE №12 - 2 hours. Genetic engineering

Methods on population, organisms and cellular level.

LECTURE №13 – 2 hours. Gene manipulation. Gene therapy.

Gene therapy. Methods for isolation and synthesis of genes. Recombinant DNA technologies. Methods for introducing genes into somatic cells. Vectors. Control of gene expression. Gene therapy. Achievements and perspectives.

LECTURE №14 – 2 hours. Epigenetics

Epigenetic mechanisms. DNA methylation and histone modifications. Hereditary modifications related to gene function.

LECTURE №15 – 2 hours. Immunological homeostasis. Innate and adaptive immunity

Immunological homeostasis – essence. Mechanisms for maintenance of immunological homeostasis. Types of immune response. Innate and acquired immunity, cellular and humoral. Innate immunity - mechanisms: a) barrier mechanisms; (b) phagocytosis; (c) complement; (d) soluble factors. Adaptive immunity.

LECTURE №16 – 2 hours. Antigens. Characterization and classification of antigens.

Antigens – characteristics. Natural antigens – classification. Types of antigenic specificity.

LECTURE №17 – 2 hours. Immune system. Lymphoid organs.

Functions and features of the immune system. Central and peripheral organs. Routes for antigen elimination.

LECTURE №18 – 2 hours. Immunocompetent cells - types, characteristics, functions. Differentiation.

Cells of the immune response: a) types, characteristics, functions; b) stages in the differentiation of immunocompetent cells.

LECTURE №19 – 2 hours. Antibodies. Immunoglobulin classes. Complement system.

Antibodies: a) classification; b) structure and properties; c) mechanism of action. Basic classes of antibodies. Antibody functions. Complement.

LECTURE №20 – 2 hours. Immunobiology of Blood Group Antigens. AB0 (H) system. Rhesus system.

Human alloantigenic systems. Genetics and biochemistry of ABO (H) and Rhesus systems. Origin and biological significance of alloantigens.

LECTURE №21 – 2 hours. Types, kinetics and genetics of the immune response.

Nature of the immune response. Kinetics of the immune response. Immunoglobulin genes. Mechanism of allelic exclusion and somatic recombination. Genetic mechanism of differentiation of immunocompetent cells. Antibody class switching - mechanism and biological importance.

LECTURE №22 – 2 hours. Major histocompatibility complex (MHC).

Antigens of tissue compatibility. Genes of the MHC complex. Genetics, structure and functions.

LECTURE №23 – 2 hours. Antigenic recognition, processing and presentation. Cellular interactions in the immune response.

Antigenic recognition, processing and presentation. Mediators of the immune response. Cytokines and cytokine network. Cellular interactions in the immune response.

LECTURE №24 – 2 hours. Immunological tolerance. Immunology of reproduction.

Types of immune tolerance: a) natural b) induced - conditions and mechanisms of development. Immunobiology of gametes and fertilization. Immunobiology of the placenta. Immunity in pregnancy.

LECTURE №25 – 2 hours. Immunology of transplantations.

Transplantation immunology. Types of transplantation. Basic biological principles. Immune response in graft rejection. GVHD.

LECTURE №26 – 2 hours. Tumor immunology.

Tumor antigens: (a) tumor-specific antigens; b) tumor-associated antigens. Mechanisms of anti-tumor protection. Immunological aspects of tumor growth.

LECTURE №27 – 2 hours. Immunology of HIV. AIDS.

Biological characteristics of HIV. Reproduction mechanism. Modes of transmission. Immunological aspects of AIDS.

LECTURE №28 – 2 hours. Hypersensitivity reactions.

Hypersensitivity reactions – classification, mechanisms, basic characteristics, immunopathology.

LECTURE №29 – 2 hours. Immunity in stress.

Definition for stress. Acute and chronic stress. Inducible factors. The effects of stress on the innate and adaptive immunity. Clinical consequences of the crosstalk between stress proteins and immune signaling molecules.

LECTURE №30 – 2 hours. Immunity in immunosenescence (aging).

Aging at the cellular level. Age-associated developmental changes in primary lymphoid tissue and immune cells. The effects of aging on the innate and adaptive immunity. Interplay between the immune, endocrine, and nervous systems.

PRACTICES

PRACTICAL №1 – 2 hours. Microscopy.

Structure of the microscope. Rules for microscopy: a) dry system; b) oil immersion system. Observation of a microscopic slide of blood smears and human fibroblasts in cell culture. Basic rules. Laboratory algorithm. Work with laboratory scales. The principles of centrifugation.

PRACTICAL №2 – 2 hours. Organization of genetic material in cell. Karyotype.

Microscopic and submicroscopic structure of eukaryotic chromosomes. Levels of DNA packaging. Genetic and epigenetic control of gene expression. Euchromatin and heterochromatin. X-chromosomal inactivation. Normal human karyotype. Grouping of human chromosomes. Chromosome staining. Preparation and examination of microscopic metaphase plates and Barr body. Clinical cases.

PRACTICAL №3 – 2 hours. Nucleic acids. DNA replication.

Structure of DNA. Differences with RNA. Chargaff's rules. Helicoidal model. Factors and mechanism of circular and linear DNA molecule replication. Genetic tasks.

PRACTICAL №4 – 2 hours. Transfer of genetic information. Transcription.

Transcription units in eukaryotes and prokaryotes. Mechanism and stages of transcription. Necessary factors. RNA processing and splicing. Post-transcriptional modifications. Genetic tasks.

PRACTICAL №5 – 2 hours. Translation. Genetic code. Gene mutations.

Mechanism and stages of translation. Necessary factors. Characteristics of the genetic code. Classification of gene mutations. Effects of point mutations. Genetic tasks. Clinical cases.

PRACTICAL №6 – 2 hours. Structural and numerical chromosomal mutations.

Mechanism of occurrence and classification of chromosomal mutations. Genomic mutations. Medical significance of trisomies and monosomies. Pathological human karyotype. Clinical cases.

PRACTICAL №7 – 2 hours. Molecular medicine. Application of PCR methods.

Isolation of genomic DNA from buccal mucosa. Basic steps and protocols for isolation of genomic DNA. Spectrophotometric measurement of DNA and RNA. Principle of PCR - reaction. Steps and necessary reagents. PCR for detection of X- and Y-linked genes. Analysis of PCR

products on agarose gel electrophoresis. Quantitative PCR (qPCR). DNA sequencing. Clinical cases.

PRACTICAL №8 – 2 hours. Cell cycle. Mitosis. Apoptosis. Tumor biology.

Phases of the cell cycle. Types of cell death. Characteristics of apoptosis and necrosis of normal and tumor cell. Mechanisms of tumor growth. Oncogenes and protooncogenes. Comet assay for apoptosis. Clinical cases.

PRACTICAL №9 – 2 hours. Meiosis. Gametogenesis. Fertilization.

Main features of sexual reproduction. Stages of meiosis. Differences between mitosis and meiosis. Mechanism and stages of fertilization. Preparation of permanent microscopic slides and staining of sperms from different species. Observation of cell division in cell cultures. Work with inverted microscope. Clinical cases.

PRACTICAL №10 – 2 hours. Introduction to parasitology. Basic terms. Parasite-host interactions.

Introduction to parasitology. Basic terms. Relationships between parasites and hosts. Classification of parasites. Modes of transmission. Methods for detection of parasites.

PRACTICAL №11 – 2 hours. Subkingdom Protozoa. Subphylum Sarcodina. Phylum Ciliophora.

Subphylum Sarcodina – general characteristic. Genus Entamoeba: *Entamoeba histolytica*; *Entamoeba coli*. Genus Balantidium: *Balantidium coli*. Observation of permanent microscopic slides. Clinical cases.

PRACTICAL №12 – 2 hours. Subkingdom Protozoa. Subphylum Mastigophora.

Subphylum Mastigophora – general characteristic. Genus Trypanosoma: *Trypanosoma gambiense, Trypanosoma cruzi.* Genus Leishmania: *Leishmania donovani, Leishmania tropica*. Genus Trichomonas: *Trichomonas vaginalis, Trichomonas tenax, Trichomonas hominis.* Род Giardia: *Giardia lamblia.* Observation of permanent microscopic slides. Clinical cases.

PRACTICAL №13 – 2 hours. Subkingdom Protozoa. Phylum Apicomplexa.

Subphylum Sporozoa – general characteristic. Genus Plasmodium: *Plasmodium vivax; Plasmodium malarie; Plasmodium falciparum; Plasmodium ovale.* Observation of the ring

trophozoite, schizont, merozoites, gametocytes in blood smears (permanent microscopic slides). *Toxoplasma gondii.* Clinical cases.

PRACTICAL №14 – 2 hours. Phylum Platyhelmintes. Class Trematoda.

Class Trematoda (flukes) – general characteristic. Genus Fasciola – *Fasciola hepatica*. Genus Dicrocoelium – *Dicrocoelium dendriticum*. Genus Opistorchis – *Opistorchis felineus*. Genus Schistosoma – *Schistosoma haematobium*; *Schistosoma japonicum; Schistosoma mansoni.* Observation of eggs and adult forms on permanent microscopic slides. Clinical cases.

PRACTICAL №15 – 2 hours. Phylum Platyhelmintes. Class Cestoda.

Class Cestoda – general characteristic. Genus Taenia: *Taenia solium*. Taeniarhynchus: *Taeniarhynchus saginatus;* Genus Echinococcus: *Echinococcus granulosus*. Genus Diphyllobothrium: *Diphyllobothrium latum.* Observation of eggs, scolex, proglottides, strobila on permanent microscopic slides. Clinical cases.

PRACTICAL №16 – 2 hours. Phylum Nemathelmintes. Class Nematoda.

Class Nematoda – general characteristic. Genus Ascaris: *Ascaris lumbricoides*. Genus Enterobius: *Enterobius vermicularis*. Genus Trichuris: *Trichuris trichiura*. Genus Trichinella: *Trichinella spiralis*. Observation of eggs on permanent microscopic slides. Clinical cases.

PRACTICAL №17 – 2 hours. Phylum Arthropoda. Order Acarina. Class Insecta.

General characteristics, distribution, classification, biological cycle, medical significance. Observation of eggs, larvae, nymphs. Microscopic slide of: *Sarcoptes scabiei, Pediculus capitis*; *Pediculus hominis*; *Phthirius pupis*; *Pulex irritans*; Culex, *Anopheles.* Comparison of eggs, larvae, wings, adult forms of malarial and non-malarial mosquitoes. Clinical tasks. Seminar.

PRACTICAL №18 – 1 hours. Seminar with presentations and practical exam.

Presentations on topics related to Arthropods: Lyme Disease, Japanese River Fever, Dengue fever, Plague, Marseilles fever, Chagas Disease, Zica Fever, Filariasis, Typhus, Babesiosis, Oncocercosis, Pediculosis and Phtyriasis, Scabies. Observation and analysis of microscopic and macroscopic preparations.

PRACTICAL №19 – 2 hours. Innate and acquired immunity. Antigens. Blood-Group Antigens.

Characteristics of innate and acquired immunity. Characteristics and classification of antigens. Blood Group ABO (H). Haemagglutination reaction for blood typing and Rh-factor detection. Blood typing with monoclonal antibodies. Determination of C-reactive protein with agglutination test. Interpretation of results. Clinical tasks.

PRACTICAL №20 – 2 hours. Primary and secondary immune organs. Immune cells. Intercellular interactions.

Structure and function of lymphoid organs. Types and characteristics of immune cells - T- and B-cell subpopulations, NK cells, antigen-presenting cells, other cells. Intercellular interactions in the immune response. Reaction precipitation. Phagocytosis test. NBT-test. Clinical cases.

PRACTICAL №21 – 2 hours. Cellular and humoral immunity. Antibodies. Complement system.

Specifics and connection between cellular and humoral immunity. Structure and function of antibodies. Key features of different antibody classes. Primary and secondary immune response. Complement. Types of ELISA methods for determining antigens and antibodies. Standard preparation. Protocol for ELISA. Clinical cases.

PRACTICAL №22 – 2 hours. Major histocompatibility complex (MHC). Tumor immunology.

Structure and function of the MHC. Tumor-associated and tumor-specific antigens. Mechanisms of tumor survival. Immunohistochemistry. Immunofluorescence. Protocol for determination of tumor antigens by immunohistochemistry. Clinical cases.

PRACTICAL №23 – 2 hours. Hypersensitivity reactions. Immunological tolerance. Genetics of antibody synthesis.

Hypersensitivity reactions – classification, mechanisms, cells or molecules involved, diseases. Western blot, immunoelectrophoresis, flowcytometry. Clinical cases.

BIBLIOGRAPHY

1. M. Draganova, N. Mehterov, Y. Feodorova, V. Alexandrov, M. Kazakova, Sarafyan V. Parasitology. Textbook for physicians and dentists. MU-Plovdiv, ESBN: 978-619-237-046-6, 2024.

2. Sarafian V., M. Kazakova, M. Draganova, N. Mehterov. Practical Book. Medical Biology for first year students. 4rd edition Medical University Plovdiv ISBN; 978-619-237-041-1, 2023.
3. Bios instant notes. Molecular Biology by A. McLennan, A. Bates, P. Turner, M. White. 2013, 4th edition, Garland Science, Taylor & Francis Group.
4. Bios instant notes. Immunology by P. Lydyard, A. Whelan, M. Fanger. 2003, 3rd edition, Garland Science, Taylor & Francis Group.
5. Basic Immunology: Functions and Disorders of the Immune System by A. K. Abbas, A.H. Lichtman, Shiv Pillai. 2012, 4th edition, Elsevier.
6. Human Biology by C. Starr and B. McMillan B. 2014, 10th edition, BOOKS/COLE.
7. Alexandrov V., Feodorova Y., Filipova M., Kazakova M., Mehterov N., Sarafian V. Parasitology. Manual for first year students in medicine and dental medicine. Plovdiv, 2016.
8. Feodorova Y., M. Kazakova, V. Alexandrov, N. Mehterov, V. Sarafian. Ed. V. Sarafian. Tests in Medical Biology. ISBN: 978-619-7085-88-4, 2017.

CONSPECTUS

MOLECULAR AND CELL BIOLOGY

1. Nucleic acids. DNA – localization and structure. The double helix model. Chargaff's rules. DNA conformations.
2. Nucleic acids. Linear and circular DNA. DNA functions. Mitochondrial DNA – characteristics, functions.
3. Nucleic acids. RNA – structure and types, functions. Differences between RNA and DNA.
4. Replication of DNA. Necessary elements and mechanism. Replication of linear DNA molecules. Fidelity of replication.
5. Replication of circular DNA molecules. Differences between prokaryotic and eukaryotic replication.
6. Transcription. Necessary elements, stages and mechanism. Reverse transcription.
7. Transcription in prokaryotes and in eukaryotes – comparison. Processing of mRNA.
8. Translation. Necessary elements, stages and mechanism.
9. Transfer of genetic information. The Central dogma. The genetic code – characteristics.
10. Gene therapy – vectors, principles.
11. Mutations – characteristics and types. Gene rearrangements and point mutations.
12. Genetic engineering – pre and post – zytogic selection, in vitro fertilization.
13. Genetic engineering – cellular hybridization, fusion of embryos (hymeras), animal cloning.

14. Molecular engineering. Recombinant DNA technologies.

15. Submicroscopic structure of chromosomes. Chromatin.

16. Microscopic structure of chromosomes. Types of chromosomes.

17. Epigenetic control of gene expression. X – chromosome inactivation. Genomic imprinting.

18. The normal human karyotype. Numerical chromosomal mutations – aneuploidy and polyploidy.

19. Structural chromosomal mutations – deletions, duplications, inversions, translocations.

20. The eukaryotic cell cycle. Mitosis. Cell cycle regulation – cyclins and Cdk.

21. Apoptosis. Characteristics. Genetic control, mechanisms, detection.

22. Tumor biology.

23. Biology and genetics of cancer. Tumor-suppressor genes and oncogenes.

24. Meiosis – mechanism and stages. Differences between mitosis and meiosis.

25. Gametogenesis. Spermatogenesis. Oogenesis.

26. Fertilization.

27. Basic molecular biology techniques - PCR, DNA sequencing, DNA electrophoresis.

IMMUNOLOGY

28. Innate and adaptive immunity. Characteristics of the immune response.

29. Innate immunity – factors and mechanisms.

30. Adaptive immunity. Fate of the antigen.

31. The immune system. Central and peripheral lymphoid organs.

32. Antigens – characteristics, types. Haptens.

33. Human alloantigens. Blood group antigens ABO (H), Se and Rhesus.

34. Cells and molecules of the immune system. B-cells, T-cells. Characteristics and functions.

35. APC, NK-cells. Characteristics and functions.

36. Intercellular communications in the immune response. Activation of T- and B-cells. Cytokines.

37. Kinetics of the immune response. Humoral and cellular immunity. Primary and secondary immune response. Immunological memory.

38. The Complement system – characteristics and functions.

39. Antibodies – structure and function. Immunoglobulin classes and characteristics.

40. MHC – complex. Structure and function. MHC restriction.

41. Transplantation immunology. Immune response in graft rejection. Graft versus host reaction.

42. Tumor immunology. Tumor antigens. Tumor escape mechanisms. Immune response to tumors.

43. Immunobiology of HIV/AIDS. AIDS.

44. Hypersensitivity reactions – general characteristics and types.

45. Antigen-antibody reactions. Agglutination, precipitation, immunoelectrophoresis, Western blotting, ELISA, immunofluorescence, flowcytometry, immunohistochemistry - principles and application.

BIOLOGY OF PARASITES

46. Parasitism as a biological phenomenon. Parasites and hosts. Adaptation of the parasite to the host.

47. Relationships and interactions between the parasite and the host.

48. Subkinngdom *Protozoa*. Subphylum *Sarcodina*. Genus *Entamoeba – Entamoeba histolytica*, *Entamoeba coli, Entamoeba gingivalis.*

49. Subkinngdom *Protozoa.* Subphylum *Mastigophora*. Order *Kinetoplastida.* Genus Trypanosoma – Trypanosoma gambiense, Trypanosoma cruzi.

50. Subkinngdom *Protozoa.* Subphylum *Mastigophora.* Order *Kinetoplastida*. Genus *Leishmania – Leishmania donovani, Leishmania tropica.*

51. Subkinngdom *Protozoa.* Subphylum *Mastigophora*. Order *Diplomonadida.* Genus *Trichomonas – Trichomonas hominis, Trichomonas tenax, Trichomonas vaginalis. Genus Giardia - Giardia lamblia.*

52. Class *Sporozoa.* Malarial plasmodia - types. Morphology and biological cycle.

53. Class *Sporozoa. Toxoplasma gondii.*

54. Subkinngdom *Protozoa.* Phylum *Ciliophora. Balantidium coli.*

55. Phylum *Platyhelminthes*. Class *Trematoda.* Morphology and general characteristics. *Fasciola hepatica. Dicrocoelium dendriticum. Opisthorchis felineus.*

56. Genus *Schistosoma. Sch. haematobium. Sch. japonicom, Sch. mansoni.*

57. Phylum *Platyhelminthes.* Class *Cestoda.* Morphology and general characteristics. *Diphyllobothrium latum.*

58. Phylum *Platyhelminthes*. Class *Cestoda. Taenia solium. Taenia saginata.*

59. Phylum *Platyhelminthes*. Class *Cestoda. Echinococcus granulosus.*

60. Phylum *Nemathelminthes.* Class *Nematoda*. Morphology and general characteristics. *Ascaris lumbricoides.*

61. Class *Nematoda. Enterobius vermicularis. Trichuris trichiura. Trichinella spiralis.*Phylum *Nemathelminthes.* Class *Nematoda. Strongiloides stercorolis. Ancylostoma duodenole. Wuchereria bancrofti. Dracunculus medinensis.*

62. Phylum *Arthropoda.* Order *Acarina* - morphology, biological cycle, medical importance of ticks. *Sarcoptes scabiei.*

63. Class *Insecta.* Morphology and general characteristics. Order *Anoplura* /lice/. *Pediculus capitis, Pediculus vestimenti, Phthirius pubis.*

64. Order *Aphaniptera* /fleas/.

65. Order Diptera - genus *Culex*, genus *Anopheles. Phlebotomus papatasii.*

66. Family *Muscidae, Glossina palpalis.*