

**PRIVATE HIGHER EDUCATIONAL ESTABLISHMENT
«INTERNATIONAL ACADEMY OF ECOLOGY AND MEDICINE»**


Department of fundamental disciplines with a course of pharmacology

**SYLLABUS OF THE EDUCATIONAL
DISCIPLINE**

" Medical biology "

LEVEL OF HIGHER EDUCATION The second (master's) level
DEGREE OF HIGHER EDUCATION Master
AREA OF KNOWLEDGE 22 "Health care"
SPECIALTY 221 "Dentistry"

Reviewed and approved
at the meeting of the Department of fundamental
disciplines with a course of pharmacology

Protocol № 1 of « 01 » 09 2020
Head of the department Doctor of Biological
Sciences, associate professor
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1. General information	
Subject	Medical biology
Lector	<i>Vergolyas M.R</i>
Teacher's contact phone number	
Teacher's e-mail	<i>vet.golyas@gmail.com</i>
Discipline format	Normative discipline.
The volume of the discipline	150 hours
Link to the distance learning site	maem.kiev.ua
Consultations	
2. Annotation to the course	
The subject of the discipline is the basics of human life, the study of patterns of heredity, variability, individual development and morphophysiological adaptation of man to the environment in connection with its biosocial nature and the impact of molecular genetic, cellular, ontogenetic, population, environmental factors on human health.	Interdisciplinary links: the discipline "Medical Biology" is integrated with the following disciplines: "Histology, Cytology and Embryology", "Biological and Bioorganic Chemistry", "Microbiology", "Pathological Physiology", "Medical Genetics", "Obstetrics and Gynecology" Infectious Diseases ", " Pediatrics ".
3. Purpose and objectives of the course	
The purpose of teaching the discipline "Medical Biology" consistent with objectives of the educational-professional training program for applicants for the second educational (master's) level of higher education and are determined by the content of those systemic knowledge and skills that must be mastered by a doctor. The knowledge that students receive from the discipline "Medical Biology" is basic for the block of disciplines that provide scientific and professional training.	The main tasks of studying the discipline "Medical biology" are: - to determine the biological essence and mechanisms of disease development that occur due to anthropogenic changes in the environment; - to determine the manifestations of general biological laws during human ontogenesis; - to explain the patterns of manifestations of the human body at the molecular biological and cellular levels; - to explain the essence and mechanisms of manifestation in the phenotype of hereditary human diseases; - to make a preliminary conclusion about the presence of parasitic human infestations and determine disease prevention measures.

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4. Competencies and learning outcomes

On completion of study of discipline "Medical biology" students must *know*:

- levels of organization of living,
- forms of life and its fundamental properties;
- structural-functional organization eukarotic cells;
- molecular basis of heredity;
- cell cycle and methods of cell division;
- basic patterns of inheritance in mono - and digibridge the crossing and linked inheritance;
- inheritance of blood groups human AB0 and RH factor;
- inheritance of human sex-trait sex-linked;
- the variability, its forms and manifestations;
- methods of study of human heredity: genealogical, bliznuki, dermatology, cytogenetic, molecular genetic, biochemical and populationstatisticsfor;
- classification of hereditary diseases, the principles of prenatal diagnosis of hereditary diseases;
- forms of reproduction of organisms;
- characteristics of gametogenesis, structure of germ cells;
- definition of ontogenesis and its periodization;
- the main stages of embryonic development, the molecular and cellular mechanisms of differentiation;
- types of regeneration;
- types of transplant, causes, tissue incompatibility;
- forms of symbiosis, parasitism as a biological phenomenon;
- principles of classification of parasites and hosts;
- ways of transmission of parasitic diseases; obligate and facultative transmissible vector-borne diseases;
- natural-focal diseases; the structure of a natural focus;
- classification of congenital malformations; teratogenic factors;
- basics of prevention of parasitic diseases;
- the most common pathogens protozoon, the trematode, cestodes, of nematodoses;
- principles of laboratory diagnosis of helminthiasis;
- arthropod vectors and agents of human diseases, the concept of mechanical specific vectors;
- poisonous representatives of the type of Arthropods;
- the concept of population as an elementary unit of evolution the population structure of humanity, demos, isolates;
- functional responses of people to environmental factors (Sprinter, Stayer, "mixt");
- the concept of biological rhythms and their medical importance;
- the subject of environment; types of environment, environmental factors;
- adaptive ecotype people;

- the role of man as an ecological factor. The main directions and results of anthropogenic modifications of the environment;
- examples are poisonous to humans plants and animals;
- main provisions of the teachings of academician V. I. Vernadsky about biosphere and noosphere;
- the position of Homo sapiens in the system of the animal world, the main stages of anthropogenesis;
- the regularities of phylogenesis of organ systems, ontore background inborn malformations, examples of atavistic malformations of organs and systems of organs.

to be able:

- to study micropreparations under a light microscope at low and high magnification; produce temporary micropreparations;
- to differentiate components of the animal cell on the electronic photomicrographs and drawings;
- to identify (schematically) the primary structure of a protein, number of amino acids, molecular mass of the polypeptide with the sequence of nucleotides of a gene, its encoding;
- to provide the genotype and phenotype of offspring genotypes of parents;
- to calculate the probability of having a sick child with a monogenic disease with known genotypes of the parents:
- to exclude paternity when determining the blood groups of the parents and the child;
- to calculate the probability of hereditary diseases in the descendants, depending on penetrantnost gene;
- to analyze a human karyotype and determine the diagnosis of the most common chromosomal disorders;
- to build and the pedigree to hold his genealogical analysis;
- to calculate the role of heredity and environment in the development of the signs (according to the results of cytogenetics analysis);
- to calculate the frequency of genes and genotypes according to the law of hardy-Weinberg equilibrium;
- to distinguish between teratogenic and genetic of congenital malformations;
- to determine the place of a biological object (causative agents of parasitic diseases) in the system of nature;
- to justify the affiliation of the parasitic diseases of man to the group of transmissible and natural-focal;
- to diagnose at the macro - and micropreparations of pathogens and vectors of pathogens of parasitic diseases that are studied;
- to substantiate methods of laboratory diagnosis of parasitic diseases of man;
- to substantiate methods of prevention of parasitic diseases based on the methods of infecting them.

According to the requirements of the Standard of Higher Education, the discipline "Medical Biology" provides students with the following competencies:

integrated:

Ability to interpret the general biological patterns that underlie the processes of human life.

general:

- ability to abstract thinking, analysis and synthesis;
- ability to learn and master modern knowledge;
- ability to apply knowledge in practical situations;
- knowledge and understanding of the subject area and understanding of professional activity;
- ability to make informed decisions;
- skills of using information and communication technologies;
- definiteness and perseverance in terms of tasks and responsibilities.

Special (professional, substantive):

- ability to determine the necessary list of laboratory and instrumental research and evaluate their results;
- ability to assess the impact of the environment, socio-economic and biological determinants on the health of the individual, family, population.

Matrix of competencies

No	Competence	Knowledge	Skills	Communication	Autonomy and responsibility
	2	3	4	5	6
General competencies					
The ability to interpret the general biological patterns that underlie the processes of human life					
Special competencies					
1	Ability to use knowledge in the practice of a doctor; Molecular and cytological basis of heredity, mechanisms of development of hereditary and acquired human diseases.	Levels of organization of living organisms, life forms and its fundamental properties; structural and functional organization and life cycle of a eukaryotic cell; forms of reproduction of organisms, molecular bases of heredity, basic laws of heredity and variability, methods of studying human heredity, classification of hereditary diseases.	To study micropreparations by a microscope at low and high magnification; to make temporary micropreparations; differentiate animal cell components on electronic microphotographs and drawings; to determine the primary structure of the protein, the number of amino acids, the molecular weight of the polypeptide by the nucleotide sequence of the gene encoding it; to predict the genotypes and phenotypes of offspring by parental genotypes; to calculate the probability of giving birth to a sick child with monogenic diseases with known genotypes of parents; to be able to exclude paternity when determining the blood groups of parents and children; to analyze the karyotypes of patients with the most common chromosomal diseases and determine the diagnosis; to build a pedigree and conduct its genealogical analysis; to calculate the role of heredity and environmental conditions in the development of traits (based on the results of twin analysis); to calculate the frequencies of genes and genotypes	To be able to explain to the patient and his family the basic patterns inheritance of monogenic human traits; possible causes of mutations and their connection with hereditary diseases; the essence of the methods used in human genetics	To be responsible for mastering relevant knowledge and skills.

			according to Hardy Weinberg's law;		
2	Ability to apply knowledge of the features of human ontogenesis and its connection with phylogeny in the diagnosis and treatment of various human diseases.	Ontogenesis and its periodization; main stages of embryonic development; molecular and cellular mechanisms of differentiation; classification of congenital malformations; teratogenic factors; types of regeneration; types of transplantation, causes of tissue incompatibility. The position of the species Homo sapiens in the system of the animal world, the main stages of anthropogenesis; the concept of population as an elementary unit of evolution, the population structure of mankind, demos, isolates; regularities of phylogeny of organ systems; ontophylogenetic preconditions of congenital malformations, examples of atavistic malformations of human organs and systems.	To recognize atavistic developmental defects.	To explain the importance of genetic and teratogenic factors in the formation of congenital malformations, the role of critical periods of human embryogenesis in the formation of congenital malformations of teratogenic origin.	To be responsible for mastering the relevant knowledge and skills.
3	Ability to apply knowledge of the biological basis of parasitism, life cycles of human parasites for	Forms of symbiosis, parasitism as a biological phenomenon; principles of classification parasites and hosts; ways of	To determine the place of a biological object (pathogens of parasitic diseases) in the system of living nature; to substantiate the affiliation of parasitic human diseases to the*	To explain the ways of transmission of parasitic diseases; To explain the methods of personal prevention of parasitic diseases.	To be responsible for mastering the relevant knowledge and skills.

	<p>the diagnosis, prevention and treatment of human parasitic diseases, development of anti-epidemic measures. Ability to apply knowledge of the biological basis of parasitism, life cycles of human parasites for the diagnosis, prevention and treatment of human parasitic diseases, development of anti-epidemic measures.</p>	<p>transmission of parasitic diseases; obligate-transmissible and optionally transmissible diseases; natural focal diseases, the structure of the natural foci; basics of prevention of parasitic diseases; pathogens of the most common protozoa, trematodes, cestodes, nematodes; arthropods - vectors and pathogens of human diseases; poisonous arthropods.</p>	<p>group of transmissible and naturally focal; to diagnose on macro- and micropreparations of pathogens and vectors of parasitic diseases under study; to substantiate methods of laboratory diagnosis of parasitic human diseases; to substantiate methods of prevention of parasitic diseases, based on the ways of their infection.</p>			
4	<p>Ability to assess the impact of environmental factors on human health, to use their own professional activities to preserve the environment.</p>	<p>The subject of ecology; types of environments; environmental factors, the role of man as an environmental factor; main directions and results of anthropogenic changes in the environment; the main provisions of the teachings of Academician V.I. Vernadsky on the biosphere and noosphere; adaptive ecotypes of people; functional types of human response to environmental factors ("Sprinter", "Stayer", "Mixed"); the concept of biological rhythms, their medical significance; examples of toxic to</p>	<p>To form requirements for yourself and others to preserve the environment.</p>	<p>To explain the impact of environmental factors on the human body and the role of man as an environmental factor; To promote conservation and protection measures environment.</p>	<p>To be responsible for mastering the relevant knowledge and skills. be responsible for the implementation of environmental protection measures within its competence</p>	

		humans plants and animals.				
5. Organization of course training						
<i>The volume of the course</i>						
Type of lesson					Total amount of hours 150	
Lectures					30	
Practical (seminar) classes					60	
Independent work					60	
<i>Course signs</i>						
Semesters: The 1st, 2nd			Specialty 221 "Dentistry"		Course (year of study) The 1st	Normative discipline
<i>Course thematics</i>						
<p>The discipline is structured into 3 modules, which include content modules.</p> <p>Module I. Biological features of human life Content module 1. Molecular-cellular level of living organization.</p> <p>Module II. Organism level of living organization. Bases of human genetics. Content module 2. Laws of heredity and variability. Content module 3. Methods of human heredity studying. Hereditary diseases. Biology of individual development. Content module 4. Medical and biologic bases of parasitism. Medical protozoology. Content module 5. Medical helminthology. Content module 6. Medical arachnoentomology.</p> <p>Module III. Population-species, biogeocenotic and biosphere levels of life organization. Content module 7. Interrelation individual and historical development. Biosphere and the man.</p>						

THEMATIC PLAN OF LECTURES

The 1st semester		
№	Topic	Hours
<i>Module 1. Biological features of human vital activity.</i>		
1	Introduction to Medical Biology course. Structural-functional cell organization.	2
2	Molecular basis of inheritance. Realization of hereditary information.	2
3	Reproduction on cellular level.	2
4	Organism level of genetic information organization. Gene interactions.	2
5	Chromosomal heredity theory. Sex genetics.	2
Total		10
The 2nd semester		
<i>Module 2. Organism level of living organization. Bases of human genetics.</i>		
1	Human variation as a life characteristic and genetic phenomenon.	2
2	Human genetics. Method of studying heredity of human.	2
3	Hereditary diseases.	2
4	Medical-genetic consulting.	2
5	Molecular-genetic mechanism of ontogenesis. Disorders of ontogenesis, places in human pathology.	2
<i>Module 3. Population-species, biogeocenotical and biosphere levels of living organization.</i>		
6	Medical-biological basis of parasitism. Subkingdom Protozoa –human parasites.	2
7-8	Class Trematoda and Class Nematoda - human parasites	4
9	Medical arachnoentomology. Class Arachnida-pathogens and vectors of human infectious diseases.	2
10	Synthetic theory of evolution. Features of evolutionary factors in human population. Biosphere as a system which provides a human being.	2
Total:		20

THEMATIC PLAN OF PRACTICAL CLASSES

The 1st semester		
№	Theme	Hours
<i>Module 1. Biological features of the human vital activity.</i>		
<i>Submodule 1. Molecular cellular level of organization of life.</i>		
1.	Levels of living matter organization. Optic systems in biological investigations and their usage.	2
2.	Cell morphophysiology. Structural components of cytoplasm and nucleus. Cell membranes. Transport of the substances.	2
3.	Morphology of the chromosomes. Human karyotype.	2
4.	Characteristics of nucleic acids.	2

5.	Structure of the pro- and eukaryotes genes. Types of genes.	2
6.	Organization of the informational flow. Genes expression. Molecular mechanisms of variation.	2
7.	Cell cycle. Cells division.	2
8.	Biological feature of the human reproduction. Gametogenesis. Meiosis. Fertilisation.	2
9.	Module control 1 “ Biological features of the human vital activity”.	2
Module 2. Organismic level of life organization.		
Submodule 2. Bases of the human genetics. Regularity of heredity and variation.		
10.	Human genetics. Basic laws of human inheritance on example Mendel’s attributes. (mono-, di -and polyhybrid crossing). Pleiothropy.	2
11.	Gene interaction (allele and non-allele). Plural alleles. Genetics of the blood groups.	2
12.	Sex-linked inheritance. Sex genetics.	2
13.	Variation, its forms.	2
Submodule 3. Methods of study of heredity of man. Inherited diseases. Biology of individual development.		
14.	Genealogical and twins methods. Chromosomal diseases. Cytogenetical methods.	2
15.	Diff.credit.	2
	Total	30
The 2nd semester		
1	Molecular diseases. Biochemical method, DNA-diagnostics.	2
2.	Populational-statistics methods. Medical-genetic consulting.	2
3.	Peculiarities of prenatal period of development. Precondition of inborn defects of human development. Postnatal period.	2
4.	Module control 2 “Organismic level of life organisation. Basis of human genetics. ”	2
Module 3. Populational-specific, biogeocenotic and biosphere levels organizations of life.		
Submodule 4. Medical-biological basis of parasitism.		
Medical protozoology.		
5.	Phylum Sarcomastigophora. Class Lobosea.	2
6.	Class Zoomastigophorea – human parasites.	2
7.	Phylum Apicomplexa. Class Sporozoea – human parasites. Phylum Ciliophora. Class Rimostomatea – human parasites.	2
Submodule 5. Medical Arachnoentomology.		
8.	Phylum Plathelminthes. Flukes of Class Trematoda – livers, cats, lungs flukes.	2
9.	Class Cestoidea – beef, pork, dwarf tapeworms. Echinococcus, alveococcus – agents of the human diseases.	2
10.	Round worms - Nematelminthes. Class Nematoda – Ascaris, Necator, whipworm – agents of the human diseases.	2
11.	Round worms - Nematelminthes. Class Nematoda – pinworm, trichinella– agents of the human diseases. Laboratory diagnostics of helminths.	2
Submodule 6. Medical Arachnoentomology.		
12.	Phylum Arthropoda. Class Arachnoidea. Ticks Acarina – agents and vectors of the human diseases.	2

13.	Class Insecta: lice Anoplura, fleas Aphaniptera, bugs Hemiptera, cockroaches Blattoidea, flies Diptera– agents and vectors of the human diseases.	2
Submodule 7. Intercommunication of individual and historical development. Biosphere and man.		
14.	Synthetic theory of evolution. Genetic characters of populations.	2
15.	Biosphere as a system of the human existence. <i>Module control 3. Populational-specific, biogeocenotic and biosphere levels organizations of life.</i>	2
	Total:	30

THEMATIC PLAN OF INDEPENDENT WORK OF STUDENTS (IWS)

The 1 st semester		
№	Theme	Hours
Module 1. Biological features of the human vital activity. Content module 1. Molecular cellular level of organization of life.		
1.	Preparation to the practical classes - theoretical preparation and working of practical skills.	10
2.	Workings of the themes which are not included in the plan of audience classes.	
2.1.	Organization of the flow: substance and energy inside of the cell.	1
2.2.	Life of cell is out of an organism. Cloning of the cell.	1
3.	Preparation to the final module control 1.	3
Module 2. Organismic level of life organization. Bases of the human genetics. Content module 2. Regularity of heredity and variation.		
1.	Preparation to the practical classes - theoretical preparation and working of practical skills.	3
2.	Workings of the themes which are not included in the plan of audience classes.	
2.1.	Genetics maps. Mapping of the human chromosomes. Modern state of research of the human genome.	1
2.2.	Genetic danger of the environment pollution. Concept about antimutagenes and comutagenes.	1
	Total	20
The 2 nd semester		
Content module 3. Methods of human heredity studying . Inherited diseases. Biology of individual development.		
1.	Preparation to the practical classes - theoretical preparation and working of practical skills.	4
2.	Workings of the themes which are not included in the plan of audience classes.	
2.1.	Gene engineering. Biotechnology. Concept about the gene therapy.	1
2.2.	Methods of genetics of man: dermatoglyphic, immunological, hybridization of somatic cells.	1

2.3.	Old age as finishing stage of the human ontogenesis of man. Theories of old age. Concept about biofields, biological rhythms and their medical value.	4
3.	Solving of medical biology tasks.	2
4.	Preparation to the final module control 2.	3
Module 3. Populational-specific, biogeocenotic and biosphere levels organizations of life. Content module 4. Medical-biological basis of parasitism. Medical protozoology.		
1.	Preparation to the practical classes - theoretical preparation and working of practical skills.	2
2.	Workings of the themes which are not included in the plan of audience classes.	
2.1.	Methods of laboratory diagnostics of diseases caused by parasitic Protozoa.	2
Content module 5. Medical helminthology.		
1.	Preparation to the practical classes - theoretical preparation and working of practical skills.	2
2.	Workings of the themes which are not included in the plan of audience classes.	
2.1.	Blood suckers-agents of parasitic diseases. Agent of Metagonimus.	1
2.2.	Dracunculus and filaria – agents of human diseases.	1
3.	Preparation to the practical skills of module 5,6.	2
Content module 6. Medical Arachnoentomology.		
1.	Preparation to the practical classes - theoretical preparation and working of practical skills.	2
2.	Workings of the themes which are not included in the plan of audience classes.	
2.1.	Ticks – dwellers of the human houses. Medical importance.	1
2.2.	Blood-sucking insect. Description, value as intermediate hosts of helminths and vectors of the human disease.	1
Content module 7. Intercommunication of individual and hist orical development. Biosphere and man.		
1.	Preparation to the practical classes - theoretical preparation and working of practical skills.	2
2.	Workings of the themes which are not included in the plan of audience classes.	
	Phylogenesis of the Vertebra	2
2.1	Human origin. Human races as a reflection of human adaptation.	1
2.2	Poisonous substances for the humans and animals.	1
2.3	Bases of the human ecology.	
3.	Preparation to the final module control.	3
Total		40

**THE LIST OF THEORETICAL QUESTIONS FOR PREPARATION OF STUDENTS
FOR THE FINAL MODULAR CONTROL.**

Module 1. Biological features of human vital activity.

Content module 1. Molecular-cellular level of living organization.

Introduction to the Medical Biology course.

Levels of living matter organization. Optic systems in biological investigation and their usage.

Morphology of a cell. Structural components of cytoplasm and a nucleus.

Cellular membranes. Transport of substances through plasmalemma.

Nucleus and its structural components. Morphology of chromosomes.

Human karyotype.

Molecular bases of a heredity. Characteristic of nucleic acids.

Structure of genes pro- and eukaryotes.

Organization of information flows in the cell. Regulation of genes expression. Molecular mechanisms of the human variability.

Life cycle of a cell. Cell fission.

Module 2. Organism level of living organization. Bases of human genetics.

Content module 2. Laws of heredity and variability.

Biological characteristic of human reproduction. Gametogenesis.

Fertilization.

Organism level of the organization of the genetic information. Displays of the basic laws of inheritance on an example of human of Mendel's attributes (mono-, di -and polyhybrid crossing).

Allele and non-allele genes interaction. The phenomenon of pleiothropy. Plural alleles. Genetics of groups of blood.

Linked inheritance. Sex genetics.

Human variability as property of a life and the genetic phenomenon: phenotypic and genotypic variability.

Content module 3. Methods of human heredity studying. Hereditary diseases. Biology of individual development.

Bases of medical genetics. Methods of human heredity studying.

Chromosomal diseases.

Cytological method of their diagnostics.

Molecular diseases.

Biochemical method and DNA-diagnostics.

Population-statistical method.

Medical-genetic consulting.

Molecular-genetic mechanisms of ontogenesis.

Characteristic of the human prenatal period

Ontogenesis disorder and their place in a human pathology.

Postnatal period of ontogenesis.

Biological mechanisms of organism homeostasis maintenance.

Module 3. Population-species, biogeocenotical and biosphere level of living organization.

Content module 4. Medical and biologic bases of parasitism. Medical protozoology.

Medical and biologic bases of parasitism. Medical protozoology. Protozoa.

Sarcomastigophora. Amoeba (Lobosea.) Class Zoomastigophora – human parasites.

Phylum Apicomplexa. Representatives of Class Sporozoea – human parasites.

Class Ciliophora – human parasites. Class Rimostomatea – human parasites.

Content module 5. Medical helminthology.

Medical helminthology. Flat worms – human parasites. Flat worms

(Plathelminthes). Class Trematoda – agents of human diseases.

Phylum Flat worms (Plathelminthes). Class Trematoda – agents of human diseases (paragonimiasis and schistosomiasis). Phylum Flat worms

(Plathelminthes). Class Cestoidea – agents of human diseases: taeniasis saginata, taeniasis solium, cysticercosis, hymenolepiasis.
 Phylum Flat worms (Plathelminthes). Class Cestoidea – agents of human diseases: echinococcosis, alveococcosis, diphyllbothriasis
 Phylum Round worms Nematelminthes. Class Nematoda – human parasites: ascariasis, trichuriasis, ancylostomiasis, necatoriasis.
 Phylum Round worms Nematelminthes. Class Nematoda – human parasites: enterobiasis, trichinosis, strongyloidiasis. Laboratory diagnostics of helminthosis.

Content module 6. Medical arachnoentomology.

Medical arachnoentomology. Phylum Arthropods (Arthropoda) - agents and carriers of infections and invasions. Class Arachnoidea. Ticks (Acarina) – agents and vectors of human diseases.

Class Insecta: lice Anoplura, fleas Aphaniptera, bugs Hemiptera, cockroaches Blattoidea, flies Diptera – agents and vectors of human diseases.

Content module 7. Interrelation individual and historical development. Biosphere and man.

Synthetic theory of evolution. Population structure of mankind.

Biosphere as a system includes all the living organisms and physical environment with which they interact.

6. Course evaluation system

General course evaluation system

Current control is performed based on the control of theoretical knowledge, skills and abilities in practical classes. Independent study students are assessed in practical classes, and is an integral part of the final grade of the student. Current control is performed during the training sessions and aims at checking the assimilation of students learning the material. Forms of current control are:

- a) test tasks with a choice of one correct answer, with the definition of the correct sequence of actions, with determination of the conformity, defining the specific portion of the photo or diagram ("detection");
- b) individual oral questioning, interview;
- c) the solution of typical situational tasks;
- g) identification of pathogens and carriers of pathogens of parasitic diseases in the photographs, macro - and micropreparats;
- d) control of practical skills;
- e) the typical problems of genetics and medical genetics.

Grades on the national scale ("excellent" - 5, "good" - 4, "satisfactory" - 3, "unsatisfactory" - 2), received by students, are displayed in the journals of attendance and academic group performance.

Final control

The final control is the form of a differentiated credit at the end of the 1st semester and an exam at the end of the 2nd semester upon completion of the course of medical biology.

The semester exam is a form of final control of mastering by the student of theoretical and practical

material on academic discipline. The final control (exam) is carried out at the last control lesson.

Students are admitted to the FC who have attended all the classes provided by the curriculum in the discipline and while studying the module scored the number of points not less than the minimum (**72 points**). A student who, for good or bad reasons, has missed classes, is allowed to rework academic debt for a certain period of time.

Evaluation of current educational activities. During the assessment of mastering each topic for the current educational activity of the student scores are set on a 4-point (national) assessment scale. This takes into account all types of work provided by the discipline program. The student must receive a score on each topic. Scores on the traditional scale are converted into points. The final assessment of the current academic activity is the arithmetic mean (the sum of scores for each lesson is divided by the number of lessons per semester) and translated into points according to **Table 2.**

Table 2. Conversion of the average score for the current activity into a multi-point scale (for disciplines completed by diff.credit, exam)

4-point scale	120-point scale	4-point scale	120-point scale	4-point scale	120-point scale	4-point scale	120-point scale
5	120	4,45	107	3,91	94	3,37	81
4,95	119	4,41	106	3,87	93	3,33	80
4,91	118	4,37	105	3,83	92	3,29	79
4,87	117	4,33	104	3,79	91	3,25	78
4,83	116	4,29	103	3,74	90	3,2	77
4,79	115	4,25	102	3,7	89	3,16	76
4,75	114	4,2	101	3,66	88	3,12	75
4,7	113	4,16	100	3,62	87	3,08	74
4,66	112	4,12	99	3,58	86	3,04	73
4,62	111	4,08	98	3,54	85	3	72
4,58	110	4,04	97	3,49	84	<3	Not enough
4,54	109	3,99	96	3,45	83		
4,5	108	3,95	95	3,41	82		

The maximum number of points that a student can collect for current educational activity during semester in order to be admitted to the exam is 120 points.

The minimum number of points that a student can collect for current educational activity during semester in order to be admitted to the exam is 72 points.

Calculating of the number of points is based on obtained marks of student according to traditional scale while learning subject during the semester, by calculating the arithmetic mean (AM) that is rounded to two signs after comma.

Evaluation of independent work of students. Independent work of students, which is provided by the

	<p>topic of the lesson together with the classroom work, is evaluated during the current control of the topic in the relevant lesson. Assimilation of topics that are submitted only for independent work is checked during the final module control.</p> <p>Evaluation of final control. The maximum number of points that a student can score during the exam is 80 points. The final control is considered credited if the student scored at least 60% of the maximum amount of points (for a 200-point scale - at least 50 points).</p> <p>Determining the number of points that a student scored in the discipline: the number of points that a student scored in the discipline is defined as the sum of points for the current academic activity (Table 1) and for the final control (diff.credit, exam) (Table 3).</p> <p>Table 3. Scale of assessment of differentiated (exam) credit:</p> <table border="1"> <thead> <tr> <th>Traditional scale</th> <th>Points</th> </tr> </thead> <tbody> <tr> <td>«5»</td> <td>70-80</td> </tr> <tr> <td>«4»</td> <td>60-69</td> </tr> <tr> <td>«3»</td> <td>50-59</td> </tr> </tbody> </table>	Traditional scale	Points	«5»	70-80	«4»	60-69	«3»	50-59
Traditional scale	Points								
«5»	70-80								
«4»	60-69								
«3»	50-59								
Requirements for written work	The final written work is performed in the form of a test.								
Practical classes	Classroom work								
The 1st semester									
Module I. Biological features of human life. Molecular-cellular level of living organization.									
Topics 1-8: Classroom work - score from 2 to 5 for each topic.									
Topic 9: Final module control 3 is evaluated from 50 to 80 points and consists of: Test control - 40 tests = 40 points (1 point for the correct answer to 1 test). Answer to 2 theoretical questions of 20 points for each = 40 points. Amount: 80.									
Module II. Organism level of living organization. Bases of human genetics.									
Topics 10-14: Classroom work - score from 2 to 5 for each topic.									
Topic 15: <i>Differentiated credit (semester control)</i> Semester control at the end of the 1st semester is provided in the form of Differentiated credit. (Table 2) Provides a final grade on a 120-point scale as the sum of grades for the current control of knowledge (oral examination, written survey, Practical work, abstracts), the results of 3 submodules. Semester control includes control of theoretical and practical training. Amount: minimum $72 + 50 = 122$, maximum $120 + 80 = 200$									
The 2nd semester									
Topics 1-3: Classroom work - from 2 to 5 points for each topic.									
Topic 4: Final module control is evaluated from 50 to 80 points and consists of: Test control - 40 tests = 40 points (1 point for the correct answer to 1 test). Answer to 2 theoretical questions of 20 points for each = 40 points. Amount: 80. Amount: minimum $72 + 50 = 122$, maximum $120 + 80 = 200$									
Module III. Population-species, biogeocenotic and biosphere levels of life organization.									

Topics 5-14: Classroom work - from 2 to 5 points for each topic, the calculation of the arithmetic mean for 5 topics and conversion into points according to Table 2.

Topic 15: Final module control 3 is evaluated from 50 to 80 points and consists of:
 Test control - 40 tests = 40 points (1 point for the correct answer to 1 test).
 Answer to 2 theoretical questions of 20 points for each = 40 points. Amount: 80.

At the end of the course there is an exam.

The procedure of the exam.

The form of clothing on the exam is a medical gown and a hat.

Examination in **Medical biology** for the specialty "medicine" is conducted according to the curriculum in the winter examination session after the 2nd semester.

Issuance of tickets for the exam begins at 09.00. Upon receipt of the ticket, the student provides a credit book. To prepare abstracts, the student uses his own pen.

The student receives a block of questions - a ticket (3 questions), which must be answered in writing within 40 minutes. The questions reflect the material of the discipline and correspond to the topics of lectures, practical classes and ISW, which are part of the final module.

STRUCTURE EXAMINATION CARD ON MEDICAL BIOLOGY

1. Determine preparation, answer the questions for the scheme.
2. To solve problems.
3. Theoretical question
4. Theoretical question
5. Theoretical question

**THE CRITERIA FOR EVALUATION
 PRACTICAL SKILLS AND THEORETICAL QUESTIONS
 EXAMINATION CARD ON MEDICAL BIOLOGY**

Number of practical skills	«5»	«4»	«3»	practical skills	For each answer to the practical skill student receives from 10 to 16 points: «5» - 16 points; «4» - 13 points; «3» - 10 points.
1	16	13	10		
2	16	13	10		
Number of theoretical questions	«5»	«4»	«3»	theoretical questions	For each answer to the theoretical question student receives from 10 to 16 points: «5» - 16 points; «4» - 13 points; «3» - 10 points.
1	16	13	10		
2	16	13	10		
3	16	13	10		
The sum of points	80	65	50		

The exam is evaluated from 50 to 80 points

The traditional score is put in the credit book

"3" 50-60 points

"4" 61-70 points

"5" 71-80 points

The list of theoretical questions to prepare students for the exam.

1. Biology. Methods of biological research. The importance of biology for medicine, agriculture, preservation of the biosphere.
2. Signs of living organisms. The properties of the living.
3. Levels of organization of life.
4. The variety of existing life forms.
5. The development of cell theory (N. Schleiden, T. Schwann, G. Virgo).
6. The modern state the cell theory.
7. The structure of cells.
8. The nucleus of the cell, its structure and functions.
9. The composition and structure of chromosomes. Types of chromosomes. Sets of chromosomes. Karyotype.
10. The elemental composition of living organisms.
11. Inorganic compounds: water, mineral salts.
12. The composition, structure and function of proteins.
13. The composition, structure and function of lipids.
14. The composition, structure and functions of carbohydrates.
15. The composition, structure and function of DNA.
16. The complementarity. Reduplication DNA.
17. The composition, structure and function of RNA, types of RNA and their significance. ATP: structure, importance.
18. The protein biosynthesis.
19. The life cycle of cells. Periods of interphase.
20. Cell division: Ames, mitosis.
21. Meiosis, its cytological characteristics.
22. Physico-chemical properties of cytoplasm: osmosis, plasmas, turgor.
23. The purpose and General characteristics of the metabolism. Plastic and energy metabolism.
24. The reproduction of organisms. Asexual and sexual reproduction.
25. Sexual reproduction, its shape. The structure of the germ cells.
26. Sexual dimorphism. The hermaphroditism.
27. The gametogenesis.
28. Fertilization and its biological significance.
29. Parthenogenesis.
30. Genetics, its objectives and methods. Hybridological method for the study of heredity.
31. Managed crossing. The first law of Mendel — law of uniformity of hybrids of the first generation.
32. Homozygotes and heterozygotes, the phenotype and genotype.
33. The second law of Mendel — law of segregation of characteristics of the hybrids of the second generation.
34. Dihybrid crossing. Law of independent inheritance of traits.
35. The interaction of allelic genes.
36. The interaction of nonallelic genes.
37. The chromosomal theory of heredity. Chromosomal sex determination.
38. Linked inheritance.
39. The gene and its properties.
40. Variability of organisms and its form. Classification of mutations. Mutagens, their classification.
41. Inheritance of traits, sex-linked.
42. Research methods for the study of anthropogenetic.
43. A hereditary disease. Prevention of hereditary diseases.
44. Ontogeny, characteristics, and periods.

45. The embryonic period of development: fertilization, cleavage, gastrulation. Histogenesis and organogenesis.
46. Makeshift bodies, their value.
47. Anomalies of embryonic development. Gemini. Malformations in humans and their causes.
48. Post-embryonic period. Direct and indirect development.
49. Aging as a natural stage of ontogenesis. Morphophysiological characteristics of the aging process. Theories of aging.
50. Death is a natural stage of ontogenesis.
51. Clinical death and biological. The intensive care unit.
52. Regeneration, its forms.
53. Transplantation of organs and tissues, its types.
54. The teaching of evolution. Characterization of the evolutionary concepts of Charles Darwin.
55. The main provisions of evolutionary theory of Charles Darwin.
56. Biological species, its criteria and structure.
57. The main directions of macroevolution. Biological progress and regress.
58. The doctrine of microevolution.
59. Population — the basic unit of the species. Factors increas.
60. Synthetic theory of evolution.
61. Proof of organic evolution.
62. The origin of life on Earth. Hypotheses of the origin of life.
63. The development of life on Earth. Basic geological era, their biological characteristics.
64. The origin of man. The anthropogenesis. Race.
65. Fundamentals of ecology. Ecological factors of the organisms.
66. The ecosystem and its structure. The power supply circuit. Ecological pyramid.
67. Medical Parasitology, its subject and objectives.
68. Parasitic forms of protozoa. Their morphology, development cycles, laboratory diagnosis, prevention.
69. Worms. Geohelminths and biohelminths.
70. The teachings of K. I. Scriabin on deworming and devastate.
71. A type of flatworm. Class Suckling, their morphology, development cycles, laboratory diagnosis, disease prevention.
72. A type of flatworm. The class of tapeworms. Morphology and development cycles, ways of transmission, prevention of diseases.
73. A type of Round worms. The class round worms. Morphology and cycles of development, ways of infection, laboratory diagnosis and prevention of disease.
74. Type Arthropods. General characteristics. Medical value type. The Class Arachnida. Transmissible diseases.
75. Type Arthropods. The Insect Class. The morphology and biology of insects with medical importance.
76. Biosphere. The structure of the biosphere. Biomass.
77. Evolution of the biosphere.
78. The human role in the biosphere.
79. The noosphere as the highest stage of the biosphere evolution.
80. Scientific bases of nature protection and perspectives of environmental management.
81. Medicinal plants.

The list of practical skills for final module control

- technique microscopy;
- to produce temporary micropreparations;
- differentiate components of cells;
- to make kariogram human chromosomes;

- to identify primary structure, number of amino acids, molecular weight of the polypeptide according to the structure of the gene encoding it;
- to perform the sequence of steps in the regulation of gene expression;
- to determine the type of inheritance Mandaluyong features of a human;
- to provide the genotype and phenotype of offspring genotypes of parents;
- to exclude paternity when determining the blood groups of the parents and the child;
- to analyze the complicated mechanisms of inheritance of traits in humans;
- to develop measures to reduce the degree of manifestation of the pathological state in patients with hereditary pathology;
- to choose appropriate methods of study of human heredity for the diagnosis of various hereditary diseases;
- to calculate the probability of hereditary diseases in the descendants, depending on gene penetrance;
- to differentiate between the chromosomal human disease;
- build and conduct a genealogical analysis of pedigrees with hereditary disease;
- to calculate the role of heredity and environment in the development of the signs (according to the results of cytogenetics analysis);
- calculate the genetic composition of human populations;
- to apply biogenetic law to determine ontophylogenetically caused congenital malformations of human development;– to compare the mechanisms of occurrence of congenital malformations of the human of various origins;
- to learn the basic principles of regeneration and transplantation;
- to determine the place of a biological object in the system of nature;
- to justify the affiliation of the parasitic diseases of man;
- to diagnose pathogens and vectors of parasitic diseases on macro- and micropreparats;
- to determine the species of pathogens protozoon;
- to identify the different stages of the life cycle of human parasites;
- to substantiate methods of laboratory diagnostics of parasitic diseases;
- to determine the species of helminths and their eggs;
- to differentiate the diagnosis of infestations by laboratory methods.
- to determine species vectors of pathogens;
- to prove the effectiveness of methods of prevention of parasitic diseases based on the methods of infection of them;
- to provide for the effect of environmental factors on the human body.

Circumstance of admission to the final control

1. Semester control at the end of the 1st semester is provided in the form of a differential credit. (Table 2) Provides a final score on a 120-point scale as the sum of scores for the current control of knowledge (oral examination, written survey, tests, verification of identification of micropreparations, abstracts), the results of 2 content modules.
2. Students are allowed to take the differentiated credit, exam only if there is no debt for the implementation of the curriculum.

7. Course policy

The organization of the educational process is carried out with the use of the European Credit Transfer System (ECTS) to assess student performance. The points gained in the current survey, independent work and points of the final control are credited. This must take into account the

student's presence in class and his activity during practical work. Inadmissible: absences and late classes; use of a mobile phone, tablet or other mobile devices during the lesson (except for the cases provided by the curriculum and methodical recommendations of the teacher); copying and plagiarism; untimely performance of the task, the presence of unsatisfactory grades for 50% or more of the submitted theoretical and practical material.

8. RECOMMENDED LITERATURE

1. Basic:

1. Alters S. Biology. Understanding life. – Fifth edition. – Mosby-Year Book, 1996. – 845 p.
2. Bhatti K. A to Z in Biology: Textbook. – Forth edition. – Jahandhar City: Maanglik Printers, Focal Point, 2003. – 1246 p.
3. Kimball J.W. Cell Biology, 3rd Ed. Addison-Wesley Publishing Company, 1984. – 330 p.
4. Mader S.S. Human biology / S.S. Mader. – Seventh edition. (McGraw Hill) ISBN 0073301132. 2002. – 514 p.
5. Roberts M., Reiss M., Monger G. Advanced Biology. – Midas Printing International, Ltd, 2000. – 800 p.
6. Romanenko O.V. Medical biology: The study guide of the practical classes course / O.V. Romanenko, O.V. Golovchenko, M.G. Kravchuk, V.M. Grinkevych; Edited by O.V. Romanenko. – K.: Medicine, 2008. – 304 p.

2. Additional:

1. Campbell Neil A., Reece Jane B. Biology. – 7th edition. - San Francisco: Pearson Education, Inc. publishing as Benjamin Cummings, 1301 Sansome St., CA 94111, 2005. – 1231 p.
2. Parasitology II. The U.S. Army medical department center and school subcourse MD0842 Edition 200. Fort SAM Houston, Texas 78234-6100.
3. Hengge U. R., Currie B. J., Jäger G., Lupi O., Schwartz R. A. / Scabies: a ubiquitous neglected skin disease. Lancet Infect Dis. – 2006. Vol 6. – P. 769-779.
4. Gray J.S. Biology of *Ixodes* species ticks in relation to tick-borne zoonoses. Wien Klin Wochenschr. – 2002. Vol 114, N 13-14. – P. 473-478.
5. Medical Biology (lectures), Textbook for students / Bazhora Y.I., Clamazdina N.N., Nickolaevsky V.V., Chesnokova M.M. – Odessa, 2001.
6. Medical Parasitology (lecture notes) / Assafa D., Kibru E., Nagesh S., Gebreselassie S., Deribe F., Ali J. – Ethiopia Public Health Training Initiative, 2004. – 139 p.

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