

MINISTRY OF HEALTH OF UKRAINE
KHARKIV NATIONAL MEDICAL UNIVERSITY

Department of Medical Biology

Academic year 2021-2022

SYLLABUS OF THE ACADEMIC COMPONENT
«FUNDAMENTALS OF MEDICAL BIOLOGY AND
MICROBIOLOGY»

Normative or optional educational component normative

Form of obtaining education full-time

(full-time; part-time; remote)

Field of science 22 «Health»

Specialty 223 «Nursing»

Education and professional program «Nursing»

The first (bachelor's) level of higher education

Course 1,2 (4 years of study)

The syllabus of the educational component was considered at the meeting of the Department of the Medical Biology

Protocol of

“31” August 2022 № 1

Head of department



I. P. Mesheryakova

Approved by Methodical commission of KhNMU

of problems of general and pre-professional training

Protocol of

“31” August 2022 № 1

Head



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INTRODUCTION

Syllabus of the **academic component** “**FUNDAMENTALS OF MEDICAL BIOLOGY AND MICROBIOLOGY**” is edited according educational professional program “Nursing” and to Ukrainian higher education standard (following – Standard) of 1st (bachelor’s) level of branch of science 22 “Health”, specialty 223 “Nursing”.

Description of academic component. The academic component “Fundamental of medical biology and microbiology” includes sections: ”Biological features of human vital activities”, “Organismic level of life organization”, ”Basics of human genetics”, “Population species, biogeocenotic and biospheric levels of life organization”. Teaching the academic component includes delivering lectures, practical class, student’s self-training and ends with a differentiated credit on the subject. Medical biology lays foundation for future obtaining knowledge and skills in special theoretical and clinical disciplines (biological and bioorganic chemistry, histology, cytology and embryology, pathomorphology, orthodontia, etc).

The subject of the academic component describes fundamentals of human biological life.

Interdisciplinary links.

Pre-requisites The academic component is based on the following previously learned secondary school subjects: “General biology”, ”Human biology”, ”Animal biology”, ”Vegetal biology”.

Post requisites medical and bioorganic chemistry, human anatomy, biological chemistry, physiology, pathomorphology and pathophysiology, the basics of biological physics and medical equipment, pharmacology and medical prescription, the entire complex of professional training disciplines.

Link to the page of the academic component in MOODLE

1. THE AIM AND TASK OF THE DISCIPLINE

1.1. The aim of the academic component “Fundamental of medical biology and microbiology” is the creation of the theoretical base of medical knowledge in the students in the amount necessary for the assimilation of other medical-biological and clinical disciplines by future specialists, as well as the formation of their clinical thinking. The main object of attention and activity of a nursing bachelor's specialist is man - an integral part of nature. Therefore, in the teaching educational component along with the disclosure of general processes and mechanisms inherent in all living organisms, the main attention is drawn to the study of these mechanisms in the human body, human populations, anthropobiogeocenoses. Material component is taught in accordance with the general concepts of the levels of life organization: molecular-genetic, cellular, organismal, population-species, ecosystem. Issues such as patterns of heredity, variability, individual development (including mechanisms of aging), ecology and issues of parasitism make up the core of the discipline and are planned to be studied in the world of medical education problems and in terms of content fully reflect the qualification characteristics of the "Nursing" specialty.

1.2 The main tasks of the study component "Fundamentals of medical biology and microbiology" is the acquisition by students of education of competencies in accordance with the general and professional competencies of the educational and professional training program at the first (bachelor's) level of higher education in the specialty 223 Nursing, field of knowledge 22 Health care, qualification "Bachelor of Nursing":

- to explain the regularities of manifestations of vital activity of the human organism at the molecular, biological and cellular levels;
- determine the manifestations of the action of general biological laws in the course of human ontogenesis;
- determine the biological essence and mechanisms of the development of diseases arising as a result of anthropogenic changes in the environment;
- explain the essence and mechanisms of manifestation in the phenotype of hereditary human diseases;
- make a preliminary conclusion about the presence of parasitic infestations in humans and determine disease prevention measures.

1.3. Competencies and learning outcomes, the formation of which is facilitated by the educational component (the relationship with the normative content of the training of higher education applicants, formulated in terms of learning outcomes in the OPP and the Standard).

1.3.1. The study of the academic component ensures that education seekers acquire the following **competencies**:

Integral:

the ability to solve complex tasks and problems in the field of health care in the specialty "nursing" in professional activity or in the process of learning, which involves conducting research and innovation

general:

ZK 03. Ability to abstract thinking, analysis and synthesis

ZK 04. Ability to apply knowledge in practical situations

ZK 05. Knowledge and understanding of the subject area and understanding of professional activity

ZK 06. Ability to communicate in the state language both orally and in writing

ZK 10. Ability to make informed decisions

special (professional, subject):

PC 02. The ability to recognize and interpret signs of health and its changes, illness or disability (assessment/diagnosis), limitations of the possibility of full-fledged life activities, and to determine the problems of patients with various diseases and conditions.

PC 03. The ability to meet the needs of the patient/client throughout the lifetime (including the dying process) by planning, assisting and executing nursing interventions, evaluating and correcting individual care plans created in collaboration with the patient/client, caregivers, family members and other medical and social workers.

PC 04. Application of professional skills (abilities), medical means, interventions and actions to ensure the patient/client's with dignity, privacy (intimacy), confidentiality, protection of his rights, physical, psychological and spiritual needs on the basis of

transcultural nursing, tolerant and non-judgmental behavior.
PC 05. The ability to effectively apply a combination of nursing skills (abilities), medical supplies, interventions and actions to ensure care based on a holistic approach, taking into account the satisfaction of the patient's needs for comfort, nutrition, personal hygiene and the ability of the individuals to meet their daily needs.

PC 06. The ability to effectively apply a set of professional skills (abilities), medical supplies, interventions and actions in assessing the functional status of patients/clients, preparing them for diagnostic examinations and taking biological material for laboratory examinations.

1.3.2. Study educational component ensures that students acquire the following program learning outcomes:

PRN 8. Perform medical manipulations in order to ensure a sanitary anti-epidemic regime.

PRN 9. It is necessary to perform medical manipulations in order to ensure the patient's personal hygiene.

PRN 14. Be able to prepare a patient, collect and direct biological material for laboratory and instrumental research.

PRN 17. Plan and carry out preventive and anti-epidemic measures for infectious diseases.

1.3.3. Study educational component provides acquisition learners of the following social skills (soft skills):

communication with patients, ethics and respect, time management, teamwork, stress resistance, adaptability, activity management

2. INFORMATION VOLUME OF THE EDUCATIONAL COMPONENT

Name indicators	Branch of knowledge, speciality and education level, EPP	Characteristics of the educational component	
		full-time education	
The number of credits is 5.0	Branch of knowledge <u>22 - "Health care»</u> (code and name)	Normative	
The total number of hours is 150	Specialty: <u>"223 Nursing»</u> (code and name)	Year of training (course):	
		1st	2nd
		Semester	
		2nd	1st
Hours for full-time study: classrooms - 70 independent work of the student - 80	Education level: <u>the first (bachelor's)</u>	Lectures	
		18	8
		Practical, seminar	
		32	12
		Laboratory	
		-	-
		Independent work	
		55	25
Individual tasks: 10hours			
Type of final control: diff. credit			

2.1 Description educational component

2.2.1 Lectures

No s/p	Topic name	Number hours	Types of lectures
1	Introduction to the course of medical biology. Structural and functional organization of the cell. Reproduction at the cellular level	2	Introductory, problematic
2	Molecular basis of heredity. Implementation of hereditary information	2	Thematic, problematic
3	Patterns of inheritance of traits. Interaction of genes	2	
4	Chromosomal theory of heredity. Gender genetics	2	
5	Variability in humans as a property of life and a genetic phenomenon. Basics of human genetics. Methods of studying heredity	2	
6	Human genetic diseases. Principles and methods of diagnosis, treatment and prevention	2	
7	Human chromosomal diseases. Principles and methods of diagnosis, treatment and prevention	2	
8	Molecular genetic mechanisms of ontogenesis. Disorders of ontogenesis and their place in human pathology	2	
9	Parasitism as a biological phenomenon. Medical protozoology. The simplest are human parasites	2	
10	Medical helminthology. Type Flatworms (Plathelminthes)	2	
11	Medical helminthology. Type Roundworms (Nemathelminthes)	2	
12	Type Arthropoda (Arthropoda). Classes Arachnoidea and Insecta	2	
13	Human ecology	2	
Total lecture hours		26	

2.2.2 Seminar classes not provided by curriculum

2.2.3 Practical classes

No s/p	Topic name	Number hours	Methods teaching	Forms control
1	Forms of life. Cell morphology. The structure of the plasma membrane. Transport of substances through the	2		

	plasmalemma			
2	Morphology of chromosomes. Cell cycle. Cell division	2		
3	Characteristics of nucleic acids	2		
4	Implementation of genetic information	2		
5	Peculiarities of human genetics. Manifestations of the main laws of inheritance on the example of Mendelian traits of a person.	2		
6	Interaction of allelic genes. Genetics of blood groups	2		
7	Interaction of non-allelic genes.	2		
8	Linked inheritance	2		
9	Gender genetics	2		
10	Variability in humans as a property of life and a genetic phenomenon	2		
11	Molecular diseases. Biochemical method and DNA diagnostics	2		
12	Chromosomal diseases. Cytogenetic method of their diagnosis	2		
13	Medical genetic counseling. Population-statistical method	2		
14	Biological features of human reproduction	2		
15	Introduction to medical parasitology. Medical protozoology. Type Sarcomastigophora (Sarcomastigophora).	2		
16	Type Apicomplexa (Apicomplexa). Representatives of the class Sporozoea are human parasites. Type Ciliophora (Ciliophora). Representatives of the Rimostomatea class are human parasites	2		
17	Medical helminthology. Type Flatworms (Plathelminthes). The class of mammals (Trematoda) is the causative agents of human diseases	2		
18	Type Flatworms (Plathelminthes). Class Tapeworms (Cestoidea) — causative agents of human diseases	2		
19	Type Roundworms (Nemathelminthes). Class Nematoda, the causative agents of human diseases	2		
			practical session with elements of e-learning, demonstration, presentation, videos	oral survey (individual and face-to-face); written survey; test control; creative tasks; individual tasks; essays
				oral survey (individual and

20	Medical arachnoentomology. Type Arthropoda (Arthropoda). Class Crustacea. Class Arachnida. Ticks (Acarina) are causative agents and vectors of causative agents of human diseases	2	practical session with elements of e-learning, demonstration, presentation, videos	face-to-face); written survey; test control; creative tasks; individual tasks; essays
21	Type Arthropoda (Arthropoda). Class Insecta (Insecta) — causative agents and vectors of causative agents of human diseases	2		
22	DIFFERENTIATED CREDIT	2		<i>Final control</i> : diff. credit
Total hours of practical classes		44		

2.2.4 Laboratory classes - not provided by curriculum

2.2.5. Independent work

No s/p	Topic name	Number hours	Methods teaching	Forms control
1	Preparation for practical classes — theoretical preparation and development of practical skills	42	development of educational and scientific literature	oral survey; test control
2	Elaboration of topics that are not part of the classroom lesson plan			
2.1	Methods of biological research	2	development of educational	oral survey; test control; creative
2.2	Organization of substance and energy flows in the cell	2		
2.3	Life of cells outside the body. Cell cloning	2		
2.4	Genetic maps. Methods of human chromosome mapping. Current status of human genome research	2		
2.5	Genetic danger of environmental pollution. The concept of antimutagens and commutagens	2		
2.6	Genetic engineering. Biotechnology. Concept of gene therapy	2		
2.7	Methods of human genetics: dermatoglyphic, immunological, hybridization of somatic cells	2		
2.8	Stages of human embryonic development.	3		

	Differentiation at the molecular genetic, cellular and tissue levels		and scientific literature	tasks; individual tasks; essays
2.9	Old age as the final stage of human ontogenesis. Theories of aging	2		
2.10	Congenital malformations. Critical periods of development	2		
2.11	Methods of laboratory diagnosis of diseases caused by parasitic protozoa	2		
2.12	Blood mammals are the causative agents of human parasitic diseases. The causative agents of metagonimosis, nanophytosis	1		
2.13	Rishta and filaria are the causative agents of human diseases	1		
2.14	Ticks are inhabitants of human homes and their medical importance	2		
2.15	Gnus and its components: characteristics, importance as intermediate hosts of helminths and carriers of human pathogens	2		
2.16	Biological variability of people in connection with biogeographic features of the environment. Formation of adaptive ecotypes of people.	2		
2.17	Plants and animals poisonous to humans	2		
3	Preparation for differentiated assessment	5		oral survey; test control
Total hours of independent student work		80		

3. EVALUATION CRITERIA

3.1. The evaluation of the educational success of education seekers is carried out on the basis of the current "Instructions for the evaluation of the educational activity of education seekers of the KHNMU" (table 1)

Table 1

Recalculation of the average grade for the current activity in a multi-point scale

4-point scale	120-point scale	4-point scale	120-point scale
5	120	3.91-3.94	94
4.95-4.99	119	3.87-3.9	93
4.91-4.94	118	3.83-3.86	92
4.87-4.9	117	3.79-3.82	91
4.83-4.86	116	3.74-3.78	90
4.79-4.82	115	3.7-3.73	89
4.75-4.78	114	3.66-3.69	88
4.7-4.74	113	3.62-3.65	87
4.66-4.69	112	3.58-3.61	86

4-point scale	120-point scale	4-point scale	120-point scale
4.62-4.65	111	3.54-3.57	85
4.58-4.61	110	3.49-3.53	84
4.54-4.57	109	3.45-3.48	83
4.5-4.53	108	3.41-3.44	82
4.45-4.49	107	3.37-3.4	81
4.41-4.44	106	3.33-3.36	80
4.37-4.4	105	3.29-3.32	79
4.33-4.36	104	3.25-3.28	78
4.29-4.32	103	3.21-3.24	77
4.25-4.28	102	3.18-3.2	76
4.2-4.24	101	3.15-3.17	75
4.16-4.19	100	3.13-3,14	74
4.12-4.15	99	3.1-3,12	73
4.08- 4.11	98	3.07-3.09	72
4.04-4.07	97	3.04-3.06	71
3.99-4.03	96	3.0-3.03	70
3.95-3.98	95	Less3	Not enough

Points for individual tasks (from 2 to 10 points) are awarded to students by a one-time committee (the committee is the head of the department, head teacher, teacher of the group) only under the conditions of their successful completion and defense and are added to the PND.

The total sum of points for CIS and IZZ from 70 to 120 points, cannot exceed 120 points.

Mastery of topics that are assigned only to independent work is checked during differential assessment.

Differentiated crediting -is conducted by the teacher of the academic group at the last lesson in the discipline. Directly DZ is estimated from 50 to 80 points. The list of tasks that are included in the differentiated assessment in the subject "Basics of medical biology and microbiology»includes solving 5 tasks included in the program educational component and is evaluated according to table 2. From 10 to 16 points are awarded for the correct solution of the task (table 2)

Table 2

Assessment of theoretical knowledge and practical skills
educational component "Basics of medical biology and microbiology"

Number of questions	"5"	"4"	"3"	The answer is for tickets that include the theoretical and practical parts of the discipline	For each answer, the student receives from 10 to 16 points, which corresponds to: "5" - 16 points; "4" - 13 points; "3" - 10 points.
1	16	13	10		
2	16	13	10		
3	16	13	10		
4	16	13	10		
5	16	13	10		
	80	65	50		

Score with educational component the student is presented at the last (final) lesson. Rating educational component includes the grade for the general educational activity (GLA), points for individual tasks (IZZ) and the grade for differentiated credit (DZ) and is min – 120 to max – 200. Correspondence of grades on a 200-point scale, a four-point (national) scale and the ECTS scale given in table 4.

Table 4

**Correspondence of grades on a 200-point scale,
four-point (national) scale and ECTS scale**

Rating on a 200-point scale	Evaluation on the ECTS scale	Score for four-point (national) scale
180–200	AND	Perfectly
160–179	IN	Fine
150–159	WITH	Fine
130–149	D	Satisfactorily
120–129	E	Satisfactorily
Less than 120	F, Fx	Unsatisfactorily

Rating educational component issued only to students who have passed all classes and differentiated credit.

Educators who have not met the requirements of the training programs of the educational component are assigned an FX grade if they were admitted to take the differentiated test, but did not take it. A grade of F is given to students who are not allowed to take the differentiated assessment.

3.2. Questions for differential credit:

1. Biology as a science. The place and tasks of biology in training a doctor.
2. Definition of the concept of life at the current level of development of biological science. Forms and main properties of living things.
3. Levels of life organization, their significance for medicine.
4. Cell theory, its current state and significance for medicine. General plan of the cell structure.
5. A cell is an elementary structural and functional unit of a living organism. Pro- and eukaryotic cells.
6. Methods of studying the structure and functioning of cells.
7. Chemical composition of the cell.
8. Cell morphophysiology. Cytoplasm. Double-membrane cell organelles.
9. Single-membrane cell organelles.
10. Non-membranous cell organelles. Organelles of movement. Inclusion.
11. Cell membranes: chemical composition, structure and functions. Supra- and submembrane complexes.
12. Membrane transport, its medical significance.
13. The cell as an open system. Organization of substance and energy flows in the cell. Energy supply of the cell.

14. The structure and functions of the nucleus. Euchromatin and heterochromatin. Chromatin: levels of organization (packaging) of hereditary material. Sex chromatin.
15. Chemical composition, features of chromosome morphology. Dynamics of their structure in the cell cycle (interphase and metaphase chromosomes). Polytene chromosomes.
16. Human karyotype. Morphofunctional characteristics and classification of human chromosomes. Importance of karyotype study in medicine.
17. Ultrastructural cell pathology.
18. The molecular level of the organization of hereditary information. Nucleic acids, their structure and functions.
19. Ways of transferring genetic information in bacteria: transformation, transduction, conjugation. Their importance in medicine.
20. Organization of the genome of pro- and eukaryotes. Structural, regulatory, tRNA and rRNA synthesis genes. Mobile genetic elements.
21. Organization of information flow in the cell. DNA replication, its significance. Self-correction and DNA repair.
22. Genetic code, its properties.
23. The main stages of protein biosynthesis in the cell. Transcription.
24. Translation: initiation, elongation, termination. Post-translational transformations of proteins are the basis of their functioning.
25. Implementation of genetic information in pro- and eukaryotes. Exon-intron organization of genes in eukaryotes. Processing, splicing.
26. Peculiarities of gene expression regulation in pro- and eukaryotes.
27. Genetic engineering and biotechnology.
28. The life cycle of a cell, its possible directions and periodization. Cell cycle. Interphase.
29. Cell division. Mitosis.
30. Violation of mitosis. Somatic mutations. Amitosis.
31. Regulation of the cell cycle. Cell growth, growth factors. The concept of mitotic activity of tissues.
32. Cell death: apoptosis, necrosis.
33. Life of cells outside the body. Cell cloning. Importance of the tissue culture method for medicine.
34. Subject, tasks of human genetics and medical genetics. Pharmacogenetics and immunogenetics.
35. Human genotype as a system of interacting genes.
36. Human phenotype as a set of specific and individual signs and properties of an organism. Qualitative and quantitative signs.
37. Patterns of inheritance in monohybrid crossing. Mendel's first and second laws. Mendelian traits. Monogenic features of a person.
38. Patterns of inheritance in di- and polyhybrid crossing. Mendel's third law.
39. Multiple alleles. Genetics of blood groups. Meaning for medicine.
40. Interaction of allelic genes: complete dominance, incomplete dominance, superdominance, codominance.

41. Interaction of non-allelic genes: complementarity, epistasis.
42. Polymeric inheritance of traits in humans. Pleiotropy.
43. Linked inheritance of genes (T. Morgan's law). Crossing over. Genetic and cytological maps of chromosomes.
44. Chromosomal theory of heredity.
45. Current status of human genome research. Genetic maps of human chromosomes.
46. Genes of autosomes, sex chromosomes. Sex-linked traits are gender-specific and gender-limited. Hemizygoty
47. Gender genetics. Mechanisms of genetic sex determination. Dose of genes. Effect of gene position.
48. Variability, its forms, significance in ontogenesis and evolution.
49. Modification variability, its characteristics. Reaction rate.
50. Multifactorial principle of phenotype formation. The importance of environmental conditions for the expressivity and penetrance of genes. Phenocopies.
51. Genotypic variability, its forms. Combinatorial variability. Mechanisms of occurrence and significance.
52. Mutations and their phenotypic manifestations. Mutation theory. Classification of mutations.
53. Mutagenic factors, their types. Mutagenesis. Genetic monitoring. Means of reducing the risk of mutations.
54. Gene mutations, mechanisms of occurrence. The concept of monogenic diseases.
55. Chromosomal aberrations. Mechanisms of occurrence and examples of diseases caused by chromosomal aberrations.
56. Mechanisms of mutations (polyploidy, haploidy, polysomy, monosomy) of genomes.
57. Classification of hereditary human diseases, principles of their diagnosis.
58. Methods of studying human heredity: genealogical, twin, molecular-cytogenetic, molecular-genetic (DNA analysis), biochemical, microbiological, immunological, dermatoglyphics, population-statistical, hybridization of somatic cells. Genetic markers.
59. Genealogical method. Types of trait inheritance.
60. Genetic (molecular) diseases: enzymopathies, diseases of the metabolism of amino acids, proteins, carbohydrates, lipids, nucleic acids, minerals, vitamins, hormones; mechanisms of their occurrence and principles of laboratory diagnostics.
61. Genetic diseases due to primary pleiotropy.
62. Non-chromosomal inheritance. Mitochondrial genome. Mitochondrial diseases.
63. Hereditary diseases resulting from a violation of the number of autosomes and sex chromosomes; mechanisms of their occurrence, principles of laboratory diagnostics.
64. Mutations in germ and somatic cells, their meaning. Mosaicism.
65. Genetic heterogeneity of hereditary diseases. Gene copies.
66. Diseases with hereditary predisposition. The concept of multifactorial diseases.
67. Medical and genetic aspects of the family. Medical genetic counseling.
68. Prenatal diagnosis of hereditary diseases. Screening programs for newborns to detect hereditary metabolic disorders.
69. Prevention and treatment of hereditary diseases. Prospects of gene therapy.

70. Reproduction is a universal property of living things. Ways and forms of reproduction. The possibility of cloning organisms.
71. Meiosis. Mechanisms determining the genetic diversity of gametes.
72. Gametogenesis: spermatogenesis, oogenesis.
73. Human germ cells, cytogenetic characteristics and qualitative differences from somatic cells.
74. Fertilization. Parthenogenesis. Peculiarities of human reproduction.
75. Ontogeny, its periodization. Embryonic development, its stages. Provisional bodies.
76. Genetic control of individual development. Differentiation of cells, germ leaves, tissues. Embryonic induction. Cloning of organisms and tissues.
77. Peculiarities of the prenatal period of human development, critical periods of human embryonic development. Teratogenic environmental factors.
78. Congenital malformations, their modern classification: hereditary, exogenous, multifactorial; embryopathies and fetopathy; phylogenetically determined and non-phylogenetically determined.
79. Human postembryonic development and its periodization.
80. Neurohumoral regulation of growth and development.
81. Aging as a stage of ontogenesis. Theories of aging.
82. Clinical and biological death.
83. Regeneration of organs and tissues. Types of regeneration. The significance of the problem of regeneration in biology and medicine.
84. Peculiarities and significance of regenerative processes in humans. Typical and atypical regeneration. Tumor growth.
85. Possibilities of regulation of regeneration processes.
86. The problem of organ and tissue transplantation. Types of transplants. Tissue incompatibility and ways to overcome it.
87. The structure of the species. Populations are the basic constituent units of a species. Population characteristics: morphological, ecological, genetic. The gene pool (allele pool) of the population.
88. Ideal and real populations. The law of constancy of the genetic structure of ideal populations (Hardy-Weinberg law), its use for calculating the genetic structure of real populations and human populations.
89. The concept of microevolution. Population is an elementary unit of evolution.
90. The position of the species *Homo sapiens* in the system of the animal world. Qualitative originality of a person. Correlation of biological and social factors in the process of anthropogenesis.
91. The origin of human races as a reflection of adaptive patterns of human development. The unity of humanity.
92. Parasitism. Ways of morphophysiological adaptation of parasites. Evolution of parasitism.
93. Principles of parasite classification: obligate, facultative, temporary, permanent, endo- and ectoparasites, monoxenous and heteroxenous, specific and non-specific.
94. The effect of parasites on the host.
95. Pathogenicity and virulence of parasites.
96. The influence of the host on the parasite.

97. Ways, ways and mechanisms of penetration of parasites.
98. Life cycles of parasites. Alternation of generations and the phenomenon of change of owners. Final, intermediate additional, reservoir, obligate, facultative hosts of parasites.
99. Specific and mechanical carriers of pathogens.
100. The body as a habitat for parasites. Autoinvasions and reinvasions.
101. Transmissible and natural focal diseases. The concept of obligatory and facultatively transmissible diseases.
102. Types of natural cells, synanthropic cells. Anthroponoses and zoonoses.
103. Subkingdom Protozoa. Classification, characteristic features of the organization, the importance of representatives in medicine.
**For each of the parasites, questions about the systematic position, distribution, morphofunctional features, development cycles, ways of human infection, laboratory diagnosis and prevention are repeated.*
104. Dysenteric amoeba.
105. Amoebas are facultative parasites of humans. Non-pathogenic amoebae.
106. Giardia
107. Trichomonads.
108. Biology of causative agents of cutaneous and visceral leishmaniasis.
109. Causative agents of trypanosomiasis.
110. Plasmodium malaria. The fight against malaria, tasks of the antimalarial service at the modern level. Types of malarial plasmodia.
111. Toxoplasma.
112. Balantidium.
113. Phylum Flatworms. Classification, characteristic features of the organization, medical significance of representatives.
114. Biological features of life cycles of helminths. Geohelminths, biohelminths, contact helminths.
115. Liver fluke.
116. Cat (Siberian) fluke.
117. Lung fluke.
118. Chinese fluke.
119. Blood flukes.
120. The causative agent of metagonimosis.
121. The causative agent of nanophytosis.
122. Pork tapeworm.
123. Beef tapeworm.
124. Cysticercosis. Routes of transmission and prophylactic measures.
125. Dwarf tapeworm.
126. *Echinococcus* species: *E. granulosus* and *E. multilocularis*.
127. Broad fish tapeworm.
128. Phylum Round worms. Classification, characteristic features of the organization, medical significance of representatives.
129. Ascaris human.

130. Larvae of animal roundworms as causative agents of diseases (larva migrans syndrome).
131. Pinworm.
132. Whipworm
133. Hookworms.
134. Trichinella
135. Rishta L.M. Isaev's works on the elimination of dracunculosis foci.
136. Filaria (filaria or Bancroft's wuchereria, brugia, loa loa, onchocerci).
137. Heartworms.
138. Phylum Arthropoda. Classification, structural features, medical significance.
139. General characteristics of the class Crustacea. Crustaceans as intermediate hosts of helminths.
140. General characteristics of the class Arachnids. The medical value of representatives of the class.
141. Poisonous representatives of the Arthropod type. Ticks are the causative agents of human diseases.
142. Ticks are carriers of pathogens of human diseases.
143. Class of Insects. Morphology, features of development, medical significance of representatives.
144. Flies Types of flies and medical importance.
145. Cockroaches, their species and medical significance.
146. Lice Types, peculiarities of structure and development, medical significance.
147. Fleas Features of structure and development. Types of fleas.
148. Bed bugs Medical significance.
149. Mosquitoes Types, features of structure and development, medical significance.
150. Mosquitoes Abomination and its components.
151. Molluscs as intermediate hosts of helminths.
152. Animals, plants, mushrooms that are poisonous to humans.
153. Ecology. Environment as an ecological concept. Types of environments: atmosphere, hydrosphere, lithosphere, body environment.
154. Medical and biological aspects of the impact of the biosphere on human health.
155. Environmental factors. Unity of organism and environment.
156. Biological variability of people in connection with the biogeographic features of the habitat.
157. Adaptive ecotypes of people, their characteristics: arctic, tropical, temperate zones, desert, high mountains.
158. Hereditary differences in people's reactions to environmental factors; concepts of environmental genetics.
159. Healthy (comfortable), unhealthy (uncomfortable) and extreme environments. Adequate and inadequate environmental conditions.
160. Adaptation of people to extreme conditions (Arctic, deserts, space, etc.).
161. The concept of stress. Functional types of people's response to environmental factors ("sprinter", "stayer", "mixed").
162. Man as an ecological factor. Main directions and results of anthropogenic environmental changes. Environment protection.

3.3. Control questions

1. levels of living organization,
2. forms of life and its fundamental properties;
3. structural and functional organization of the eukaryotic cell;
4. molecular basis of heredity;
5. cell cycle and methods of cell division;
6. the main patterns of heredity in mono- and dihybrid crossing and linked inheritance;
7. inheritance of human blood groups according to the AB0 system and the Rhesus factor;
8. inheritance of a person's sex and sex-linked traits;
9. variability, its forms and manifestations;
10. methods of studying human heredity: genealogical, twin, dermatoglyphic, cytogenetic, molecular-genetic, biochemical and population-statistical;
11. classification of hereditary diseases, principles of prenatal diagnosis of hereditary diseases;
12. forms of reproduction of organisms;
13. characteristics of gametogenesis, the structure of germ cells;
14. definition of ontogenesis and its periodization;
15. the main stages of embryonic development, molecular and cellular mechanisms of differentiation;
16. types of regeneration;
17. types of transplantation, causes of tissue incompatibility;
18. forms of symbiosis, parasitism as a biological phenomenon;
19. principles of classification of parasites and hosts;
20. ways of transmission of parasitic diseases; obligatorily transmissible and facultatively transmissible diseases;
21. natural focal diseases; the structure of the natural cell;
22. classification of congenital malformations; teratogenic factors;
23. basics of prevention of parasitic diseases;
24. causative agents of the most common protozoa, trematoda, cestoda, and nematoda;
25. principles of laboratory diagnosis of helminthiasis;
26. Arthropods — carriers and causative agents of human diseases, concepts of mechanical and specific carriers;
27. poisonous representatives of the type Arthropoda;
28. the concept of population as an elementary unit of evolution, the population structure of humanity, demes, isolates;
29. functional types of people's response to environmental factors ("sprinter", "stayer", "mixed");
30. concept of biological rhythms, their medical significance;
31. the subject of ecology; types of environment, environmental factors;
32. adaptive ecotypes of people;

33. the role of man as an ecological factor. Main directions and results of anthropogenic changes in the environment;
34. examples of plants and animals poisonous to humans;
35. the main tenets of academician V.I. Vernadsky about the biosphere and noosphere;
36. the position of the species *Homo sapiens* in the system of the animal world, the main stages of anthropogenesis;
37. regularities of the phylogeny of organ systems, ontophylogenetic prerequisites of congenital malformations, examples of atavistic malformations of human organs and organ systems.

3.4. Individual tasks(a list was approved at the department meeting with the determination of the number of points for their performance, which can be added as incentives):

1. Ways of interspecies exchange of biological information.
2. RNA - interference.
3. Multimeric organization of proteins is the structural basis of interallelic interactions
4. Proteomics, significance for medicine
5. Genomics, significance for medicine
6. Transcriptomics, significance for medicine
7. Principles of construction of transgenic organisms
8. Treatment of hereditary diseases - reality or fiction
9. Concept of genetic risk
10. Genotherapy and its prospects
11. Genetic load and its biological essence
12. Genetic polymorphism of humanity: scope, factors of formation
13. Balanced polymorphism and adaptive potential of the population
14. Biological aspects of the evolutionary development of sexual dimorphism
15. Ontophylogenetic conditioning of defects in the development of human organs and systems
16. Genetic consequences of natural selection in human populations
17. Evolutionary paths of origin of different groups of parasites
18. Malaria situation in Ukraine: analysis, dynamics
19. State of human immunity during trematode infestation
20. Contact helminth infections: hymenolepidosis and enterobiosis in pediatric practice
21. Trichinellosis. The current epidemiological situation in Ukraine
22. Anniversary of the main point in parasitology
23. Ecological principles of combating parasitic diseases
24. Parasites in mythology
25. Parasitocenology. Man as the main component of symbiosis.
26. Biological principles of combating transmissible and natural focal diseases.
27. Fundamentals of prevention of parasitic diseases. Methods of prevention: biological, immunological, ecological, public.
28. Factors of spread of parasitic diseases. Global migration processes and parasitic diseases.

29. Outstanding scientists-parasitologists.
30. Laboratory diagnosis of helminth infections. Egg, larval and helminthoscopy.
31. Academician V. I. Vernadsky's teachings on the biosphere and noosphere. Living matter and its characteristics.
32. Main environmental problems of Ukraine.

3.5. Rules for challenging the assessment

Provisions on the appeal of the results of the final control of higher education applicants of KhNMU (order of the rector of KhNMU dated September 30, 2020 No. 35/2020) (https://knmu.edu.ua/wp-content/uploads/2021/05/polog_apel_kontrol.pdf) allows you to avoid conflicts during appeals by students of higher education of the results of final control.

4. POLICY OF DISCIPLINE

According to the current "Instructions for the evaluation of educational activities under the European credit transfer system for the organization of the educational process" (<https://knmu.edu.ua/documents/normatyvni-dokumenty-navchalnogo-proczesu/>), students of higher education must receive an assessment for each the topic of the educational component. The procedure for the liquidation of academic debt has been regulated (Order of the rector of KhNMU dated 26.12.2019 No. 533) and the Regulation on the procedure for students of KhNMU to complete their studies (Order of the rector of KhNMU dated 30.09.2020 No. 36/20) (https://knmu.edu.ua/wp-content/uploads/2021/05/polog_vidprac_zaniat.pdf). It is important to adhere to the Code of Corporate Ethics of the KhNMU (<https://knmu.edu.ua/golovna/pro-nas/kodeks-korporatyvnoyi-etyky/>). KhNMU creates a space of equal opportunities, free from discrimination of any national, racial or ethnic origin, gender, age, disability, religion, sexual orientation, gender or marital status. All rights, privileges, programs, and types of activities granted to students of higher education or employees of KhNMU are extended to everyone without exception, subject to proper qualifications. Applicants of higher education are expected to be interested in mastering the educational component. A creative approach in its various manifestations is welcome. If you have any questions, please contact the teacher.

5. ACADEMIC INTEGRITY

Successful mastery of the educational component requires compliance with the principles of academic integrity. In accordance with Article 42 of the Law of Ukraine "On Education" and the Law of Ukraine "On Higher Education", taking into account the recommendations of NAZYAVO (protocol No. 11 dated 29.10.2019), KhNMU has implemented a system for the development of academic integrity, the main provisions of which are posted on the website of the Higher Education Institution: The Code of Academic Integrity of KhNMU (order of the rector of KhNMU dated August 27, 2019 No. 305) (https://knmu.edu.ua/wp-content/uploads/2021/05/kodex_ad.pdf); Provisions on academic integrity and ethics of academic relationships at the Kharkiv National

Medical University (order of the rector of KhNMU dated July 2, 2020 No. 165) ([https://knmu.edu.ua/wp-content/uploads/2021/05/polog_ad-1 .pdf](https://knmu.edu.ua/wp-content/uploads/2021/05/polog_ad-1.pdf)); Regulations on the Commission on Integrity, Ethics and Conflict Management of the Khzn National Medical University (Order of the Rector of the Khn National Medical University No. 165 dated July 2, 2020) (https://knmu.edu.ua/wp-content/uploads/2021/05/polog_komis_ad.pdf) ; Regulations on the procedure for checking textual documents at the Kharkiv National Medical University - dissertations, reports on scientific research works, scientific publications, materials of scientific forums, educational literature, educational and methodical publications and teaching aids for the presence of textual borrowings (order of the rector of the KhNMU dated 27.08. 2020 No. 195). Copying, use of various software tools, prompts, use of a mobile phone, tablet or other electronic gadgets during class for purposes unrelated to the educational process are not allowed. KhNMU supports zero tolerance for plagiarism. Students of higher education are expected to want to constantly increase their own awareness in academic writing. In the first classes, information activities will be held on what exactly is considered plagiarism and how to correctly conduct a research and scientific search.

6. RECOMMENDED LITERATURE

Basic

1. Medical biology / Yu. I. Bazhora, R. Ye. Bulyk, M. M. Chesnokova [et al.]. - Vinnytsia : Nova Knyha. - 448 p., 2018
2. Workbook for practical classes from the course "FUNDAMENTALS OF MEDICAL BIOLOGY AND MICROBIOLOGY" (for the First-Year Students (NURSING)). Authors: Valeriy V. Myasoedov, Irene P. Meshcheryakova — 2022 — 125 p.
3. Campbell N. A. Biology: a global approach. -11th ed. New York: Pearson Education. - 1342 p.
4. Lieberman, Michael A. Biochemistry, Molecular Biology, and Genetics / M. A. Lieberman, R. Ricer. - 6th ed. – Philadelphia : Wolters Klumer/Lippincott Williams&Wilkins. - 449 p.,2014
5. Bogitsh B. Human Parasitology. -4th ed. Amsterdam: Elsevier. - 430 p., 2013

Auxiliary

1. Kumar & Clark's Clinical Medicine / ed.: P. Kumar [et al.] . - 9th ed., international. – Edinburgh: Elsevier. - 1437 p., 2017
2. Principles and Practice of Clinical Parasitology / Ed. Gillespie SH, Pearson RD. — Chichester: John Wiley & Sons, 2001. — 630 p.

Information resources

1. OMIM (Online Mendelian Inheritance in Man): An Online Catalog of Human Genes and Genetic Disorders — <http://www.omim.org/>
2. Centers for Disease Control and Prevention — <http://www.cdc.gov/>

8. OTHER

Useful links:

Provisions on the prevention, prevention and settlement of cases related to sexual harassment and discrimination at KhNMU

http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/polog-sex.doc

Regulations on academic integrity and ethics of academic relations at the Kharkiv National Medical University

http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/polog_ad_etyka_text.pdf

The procedure for conducting classes on in-depth study by students of the Kharkiv National Medical University of individual disciplines beyond the scope of the curriculum

http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/nak-poriad-pogl-vyv-dysc.docx

Regulations on the Commission on Academic Integrity, Ethics and Conflict Management of the KhNMU

http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/polog_komis_ad_text.pdf

Regulations on the recognition of the results of non-formal education at the Kharkiv National Medical

University http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/polog_neform_osv.pdf

INCLUSIVE EDUCATION:

http://www.knmu.kharkov.ua/index.php?option=com_content&view=article&id=7108%3A2021-03-10-14-08-02&catid=12%3A2011-05-10-07-16-32&Itemid=33&lang=uk

ACADEMIC HONESTY:

http://www.knmu.kharkov.ua/index.php?option=com_content&view=article&id=2520%3A2015-04-30-08-10-46&catid=20%3A2011-05-17-09-30-17&Itemid=40&lang=uk

http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/kodex_AD.docx