



SYLLABUS OF THE DISCIPLINE «MEDICAL BIOLOGY, PARASITOLOGY AND GENETICS»

1. General information	
Faculty	Faculty of foreign students
Education Programme	22 Public Healthcare 222 Medicine the 2 nd (master) level of high education, daytime study
Academic year	2023-2024
Discipline, code <i>(e-mail on the website of the Danylo Halytsky Lviv National Medical University)</i>	Medical Biology, Parasitology and Genetics, OK 7 Kaf_medicalbiology@meduniv.lviv.ua
Department <i>(name, adress, phone number, e-mail)</i>	Department of Medical Biology, Parasitology and Genetics Adress: 79010, Lviv, Pekarska str., 69 (Shimzeriv, 3 a) ph +380(32)275-49-66 e-mail Kaf_medicalbiology@meduniv.lviv.ua e-mail kaf_med_biol@ukr.net
Head of the Department <i>(e-mail)</i>	Vorobets Zinovij Dmytrovych, Doctor of Biological Sciences, Professor e-mail Kaf_medicalbiology@meduniv.lviv.ua
Studying year	I course
Semester <i>(semester, when the study of the discipline is realized)</i>	I, II
Type of discipline <i>(obligatory / selective)</i>	Obligatory
Educators <i>(names, surnames, Scientific Degree and Academic Titles, e-mail)</i>	1. Paryzhak S.Ya. – Ph.D., Associate Professor sola.paryzhak@gmail.com 2. Odnorih L.O. – Ph.D., Associate Professor liliyaodnorig@gmail.com 3. Onufrovych O.K. – Ph.D., Associate Professor onufrovychok@ukr.net e-mail Kaf_medicalbiology@meduniv.lviv.ua
Erasmus <i>yes/no (availability of the discipline for students in framework of Erasmus+ program)</i>	No
Person, responsible for syllabus <i>(person, who is to be given comments concerning syllabus, contact e-mail)</i>	Solomiya Paryzhak – Ph.D., Assoc. Prof. sola.paryzhak@gmail.com Lydmyla Serhiyenko – Ph.D., Assoc. Prof. serhiyenkol@gmail.com
Quantity of ECTS credits	5.5 credits
Quantity of hours <i>(lectures/ practical classes/ individual work)</i>	Total – 165 h Lectures – 16 h; Practical classes – 64 h; Individual student's work – 85 h.
Language of Instruction	English
Information about consultations	According to the schedule

2. Course overview

«Medical Biology with Parasitology» as a studying discipline consists of 2 chapters:

Chapter 1. «Biological features of human vital functions. Molecular-genetic level of life organization. Organismic level of life organization. Basics of human genetics ».

In the Chapter 1. the molecular-genetic and cellular levels of life organization are being considered, taking into account specificity of the human organism, cell biology and reproduction; the basic patterns of inheritance and human diseases, forms of allelic and non-allelic gene interactions, basis of genetic linked inheritance, methods of human inheritance investigation are being discussed. The material is being organized in the manner, so that obtained knowledges were closely related to the further study of hereditary diseases in theoretical and clinical departments and could be used by a physician in his practice.

Chapter 2. «Population-species, biogeocenotic and biospheric levels of life organization».

In the Chapter 2 medical and biological aspects of human ecology are being revealed, which should ensure the formation of ecological thinking, necessary for the doctor nowadays. This section shows the animal world as part of the ecological human environment. Considerable attention is given to the study of parasites life cycles, various forms of relationships between them and the human organism, the origin and evolution of parasitism, modes of infection, methods of diagnosis, parasites prophylaxis. The study of various aspects of parasitology is important because a large number of parasitic diseases very common in the human population. From the perspective of modern synthetic theory of evolution questions of speciation, population patterns of species and microevolution process (for elementary evolutionary factors, elementary evolutionary phenomena) are being taught. Attention is drawn to the specific action of elementary evolutionary factors in human populations, genetic and phenotypic polymorphism of humanity. Anthropogenesis is considered in connection with animal world phylogeny and phylogenesis of organs and their systems in the chordates - ontophylogenetic preconditions of human congenital malformations. Additionally, the issues of structure and function of the biosphere, the doctrine of the noosphere and the impact of human activity on the biosphere as a whole and its constituent parts are being considered, the attention is drawn to environmental protection in national and international research programs.

3. Aim and goals of the course

The overall aim of the course is to study the basics of human vital activity, patterns of heredity, variability, ontogenesis and morphophysiological adaptation of human to environmental conditions based on its biosocial nature and the impact of molecular-genetic, cellular, ontogenetic, population, environmental factors on human health.

The ultimate goals of the course:

1. To determine the biological nature and mechanisms of diseases that arise from anthropogenic changes in the environment.
2. To identify the manifestations of general biological laws during human ontogenesis.
3. To explain the patterns of human organism vital functions manifestation at the molecular-biological and cellular levels.
4. To explain the nature and mechanisms of inherited human diseases manifestation in a phenotype.
5. To make a preliminary conclusion about the presence of parasitic infestations in human organism and define measures of disease prevention.

Competencies and studying process results (*general and special (professional)*)

Integral competency. The ability to solve complex problems, including those of a research and innovation nature in the field of medicine. Ability to continue learning with a high degree of autonomy.

General competencies (3K):

- 3K 1. The ability for abstract thinking, analysis and synthesis.
- 3K 2. The ability to learn and acquire advanced knowledge.
- 3K 3. The ability to apply knowledge in practical situations.
- 3K 4. Knowledge and understanding of the subject area and understanding of professional activity.
- 3K 5. The ability to adapt and act in a new situation.

- 3K 6. The ability to make responsible decisions.
- 3K 7. The ability to work as a team member.
- 3K 8. Skills of interpersonal interaction.
- 3K 9. The ability to communicate in the foreign language.
- 3K 10. Skills to apply information and communication technologies.
- 3K 11. The ability to search, process and analyze information from various sources.
- 3K 12. To be determined and insistent in according to tasks and responsibilities.
- 3K 13. Awareness of equal opportunities and gender issues.
- 3K 14. The ability to realize the own rights and responsibilities as a member of society, to recognize the values of civil (free democratic) society and the need for its sustainable development, the rule of law, human and civil rights and freedoms in Ukraine.
- 3K 15. The ability to preserve and multiply the moral, cultural, scientific values and achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, techniques and technologies, to use different types and forms of motor skills for recreation and a healthy lifestyle.

Special (professional) competencies (ΦK):

- ΦK 2. The ability to determine the necessary list of laboratory and instrumental studies and evaluate their results.
- ΦK 13. The ability to carry out sanitary and hygienic and preventive measures.
- ΦK 17. The ability to evaluate the impact of the environmental, socio-economic and biological determinants on the individual, family and population health.
- ΦK 21. To convey one's own knowledge clearly and nonambiguous, conclusions and arguments on health care problems and related issues to specialists and non-specialists, in particular to people who are studying.
- ΦK 24. Compliance with ethical principles when working with patients and laboratory animals.
- ΦK 25. Adherence to the values of professional and academic integrity, to be responsible for the reliability of the obtained scientific results.

Program learning outcomes in accordance with the Standards of higher education:

- PIPH 1. To have thorough knowledge of the professional activity structure. To be able to carry out professional activities that require updating and integration of knowledge. To be responsible for professional development, the ability for further professional training with a high level of autonomy.
- PIPH 2. Understanding and knowledge of basic and clinical biomedical sciences, at a level sufficient for solving professional tasks in the field of health care.
- PIPH 19. To plan and to implement a system of anti-epidemic and preventive measures regarding the occurrence and spread of diseases among the population.
- PIPH 21. To collect information the necessary information in the professional literature and databases of other sources, to analyze, to evaluate and to apply this information.
- PIPH 23. To evaluate the environmental impact on human health in order to assess the morbidity of the population.
- PIPH 25. To convey one's own knowledge, conclusions and arguments on health care problems and related issues to specialists and non-specialists clearly and nonambiguous.
- PIPH 27. To communicate freely in the state language and in English, both orally and in writing to discuss professional activities, research and projects.

4. Prerequisites of the Course

For successful learning and gaining necessary competencies in the discipline being studied, fundamental knowledge of biology (such subjects as "General Biology", "Human Biology", "Biology of Animals", "Biology of Plants") in accordance with State standard for basic general secondary education is advisable.

5. Program learning results

List of the learning results

Code of education results	Essence of education results	Matrix of competencies
<i>3H – knowledge УМ – skills AB – independence and responsibility K – competencies</i>		<i>ПП – program learning outcomes</i>
<i>3H-1</i>	To know and understand the levels of living matter organization, forms and fundamental properties of living matter.	<i>ПРH-1, ПРH-2, ПРH-21, ПРH-27</i>
<i>3H-2</i>	To know the structural and functional organization of eukaryotic cells; types of organisms reproduction.	<i>ПРH-1, ПРH-2, ПРH-21, ПРH-25, ПРH-27</i>
<i>3H-3</i>	To know and understand basic patterns of heredity and variability, methods of human inheritance investigation, classification of hereditary diseases	<i>ПРH-1, ПРH-2, ПРH-21, ПРH-25, ПРH-27</i>
<i>3H-4</i>	To know the main stages of ontogenesis, classification of congenital anomalies.	<i>ПРH-1, ПРH-2, ПРH-21, ПРH-25, ПРH-27</i>
<i>3H-5</i>	To know the processes of transplantation and regeneration.	<i>ПРH-1, ПРH-2, ПРH-21, ПРH-25, ПРH-27</i>
<i>3H-6</i>	To know the main stages of anthropogenesis.	<i>ПРH-1, ПРH-2, ПРH-21, ПРH-25, ПРH-27</i>
<i>3H-7</i>	To know patterns of phylogenesis and realize the onthophylogenetic prerequisites of congenital malformations.	<i>ПРH-1, ПРH-2, ПРH-21, ПРH-25, ПРH-27</i>
<i>3H-8</i>	To know and understand the forms of symbiosis, principles of classification of parasites, hosts, and diseases.	<i>ПРH-1, ПРH-2, ПРH-19, ПРH-21, ПРH-23, ПРH-25, ПРH-27</i>
<i>3H-9</i>	To know the morphology and life cycles of parasites; modes of parasitic diseases transmission and prophylaxis.	<i>ПРH-1, ПРH-2, ПРH-19, ПРH-21, ПРH-23, ПРH-25, ПРH-27</i>
<i>3H-10</i>	To know and understand the basics of ecology, biosphere, anthropogenic environmental changes.	<i>ПРH-1, ПРH-2, ПРH-21, ПРH-23, ПРH-25, ПРH-27</i>
<i>УМ-1</i>	Be able to make temporary microslides and to examine them under a light microscope.	<i>ПРH-1, ПРH-2, ПРH-21</i>
<i>УМ-2</i>	Be able to differentiate the components of animal cell in electron microphotographs and figures.	<i>ПРH-1, ПРH-2, ПРH-21</i>
<i>УМ-3</i>	Be able to solve problems in molecular biology.	<i>ПРH-1, ПРH-2, ПРH-21</i>
<i>УМ-4</i>	Be able to solve problems in Genetics.	<i>ПРH-1, ПРH-2, ПРH-21</i>
<i>УМ-5</i>	Be able to analyze the human karyotype and to determine the diagnosis of the most common chromosomal diseases.	<i>ПРH-1, ПРH-2, ПРH-21</i>
<i>УМ-6</i>	Be able to make family trees and to conduct genealogical analysis.	<i>ПРH-1, ПРH-2, ПРH-21</i>

<i>УМ-7</i>	Be able to solve problems according with Hardy-Wineberg law.	<i>ПРH-1, ПРH-2, ПРH-21</i>
<i>УМ-8</i>	Be able to recognize atavistic developmental defects.	<i>ПРH-1, ПРH-2, ПРH-21</i>
<i>УМ-9</i>	Be able to diagnose on macro- and microspecimens causative agents and vectors of parasitic diseases.	<i>ПРH-1, ПРH-2, ПРH-21</i>
<i>УМ-10</i>	Be able to substantiate methods of laboratory diagnosis of parasitic diseases of humans.	<i>ПРH-1, ПРH-2, ПРH-19, ПРH-23</i>
<i>УМ-11</i>	To form the requirements of environment protection.	<i>ПРH-1, ПРH-2, ПРH-19, ПРH-23</i>
<i>К-1</i>	To apply in physician practice knowledge of molecular and cytological basis of heredity, mechanisms of development of hereditary and acquired human diseases.	<i>ПРH-1, ПРH-2, ПРH-21, ПРH-25</i>
<i>К-2</i>	To apply knowledge of peculiarities of human ontogenesis and its connection with phylogenesis in diagnostic and treatment of various human diseases.	<i>ПРH-1, ПРH-2, ПРH-21, ПРH-23,</i>
<i>К-3</i>	To apply knowledge of biological basis of parasitism, life cycles of the human parasites for diagnostics, prevention and treatment of human parasitic diseases, development of preventive measures.	<i>ПРH-1, ПРH-2, ПРH-19, ПРH-21, ПРH-23, ПРH-25</i>
<i>К-4</i>	To estimate the impact of environmental factors on human health, use their professional activities for the environment protection.	<i>ПРH-1, ПРH-2, ПРH-21, ПРH-23, ПРH-25</i>
<i>АВ-1</i>	To be responsible for mastering the relevant knowledge and skills.	<i>ПРH-1, ПРH-2, ПРH-21, ПРH-25, ПРH-27</i>
<i>АВ-2</i>	To manifest responsible attitude and care for the environment.	<i>ПРH-1, ПРH-2, ПРH-23, ПРH-25, ПРH-27</i>

6. Course format and content

Course format	Full-time Course	
Classes	Hours	Quantity of groups
lectures	16	1
practical	64	1
seminars	-	-
individual	85	1

7. Topics and content of the course

Code of class	Topic	Content	Code of education results	Educator
Л – lecture П – practical				

class CPC – individual student’s work				
ЛІ-1 (<i>lecture-1</i>)	Introduction to Medical Biology Course. Structural and functional organization of a cell.	To acquaint students with the essence of the evolutionary process at all levels of living matter organization; to consider the chemical composition, molecular organization and functions of biological membranes; structure and functional interrelation between organelles of prokaryotic and eukaryotic cells. To draw students’ attention to the structural and functional features of the cell as an elementary unit of all living organisms. To list the key differences in the structure between prokaryotic and eukaryotic cells.	3H-1, 3H-2, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
ЛІ-2	Molecular basis of heredity. Realization of hereditary information. Novel coronavirus (SARS-CoV-2): structure, methods of diagnostics and prophylaxis of coronavirus disease.	To consider the structure and functions of nucleic acids as units of the genetic code that provide the organization of biological information flow in a cell; to consider molecular mechanisms of genetic information realization; to present the structure and functions of the Lac operon of <i>E. coli</i> and exon-intron organization of the eukaryotic genome. To explain to the students the genome structure and life cycle of SARS-CoV-2. To explain to the students the evolution of different forms of asexual and sexual reproduction, to characterize mitosis and meiosis. To consider the mechanisms of gene recombination in gametes during meiosis. To find out the structural peculiarities of gametes and specific features of human reproduction. To draw students’ attention to the way how the coded in DNA genetic information is transferred by means of RNA (transcription) and further decoding during protein biosynthesis (translation). To highlight the biological benefits of sexual reproduction over asexual reproduction, the contribution of Ukrainian scientists to this scientific issue.	3H-2, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
ЛІ-3	Molecular and genetic mechanisms of ontogenesis. Breaks of the ontogeny and their place in	To get acquainted students with ontogenesis and its periodization. To consider types of cleavage, gastrulation; critical periods of embryo development; provisional organs. To classify congenital malformations. To consider the postnatal period of ontogenesis: age periodization,	3H-4, 3H-7, K-2, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.

	human pathology.	critical periods and types of human constitution. Theories of aging.		
Л-4	Organismic level of the genetic information organization. Gene interactions. Chromosomal theory of heredity. Genetics of sex.	To explain basic laws and notions of genetics by means of hybridological analysis; to consider forms of allelic and nonallelic genes; the phenomena of multiple allelism and pleiotropy. To stress on the importance of gene interactions as a basis for the development of morphological, physiological, biochemical, immunological, as well as pathological signs and symptoms of diseases in humans. To consider the genetic mechanisms of sex determination in human and animals; the pattern of sex-linked traits inheritance; problems of sex determination; the main postulates of Chromosomal theory of heredity; mechanism of linkage inheritance of genes, the role of crossing-over in this process, its role as a source of combinatorial variation of organisms; the rules of chromosome mapping.	ЗН-3, АВ-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
Л-5	Variation in human as life property and genetic phenomenon. Methods of the human inheritance investigation. Hereditary human diseases.	To consider the main forms of variation, their characteristics; norm of reaction; types of chromosomal aberrations; classification of mutations and mutagens. To explain the role of mutations and mutagens of different nature in the origin of molecular and chromosomal diseases in humans. To highlight the importance of variability in the formation of morphological, physiological and biochemical features of an organism, the development of human hereditary diseases and the birth of genetically loaded offspring. To get acquainted students with methods of human heredity investigation; to explain the advantages and disadvantages of each method. To consider the classification of human hereditary diseases, mechanisms of their origin and principles of molecular and chromosomal diseases diagnosis. To stress on the peculiarities of human as a specific object of genetic analysis, knowledge of genetic disorders is necessary for a doctor for understanding the reasons, correct diagnosis and prevention of these syndromes. To find out the role of genetic load in the hereditary human diseases development, the importance of medical-genetic	ЗН-3, К-1, АВ-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.

		counseling in preventing of children birth with hereditary pathology, the achievements and prospects of gene therapy.		
ЛІ-6	The medical and biological basis of parasitism. Protozoa are human parasites.	To get acquainted students with the basis of parasitism, to reveal the main forms of biotic interaction between the parasite and host. To list the main representatives of Protozoa with parasitic lifestyle. To describe their peculiarities of the organization, epidemiological importance, life cycles and prophylaxis. To stress on the current importance of medical parasitology taking into account the increasing people migration; the role of scientists-parasitologists.	ЗН-8, ЗН-9, К-3, АВ-1, АВ-2	Assoc. Prof. Paryzhak S. Ya., Assoc.Prof. Onufrovych O.K.
ЛІ-7	Medical Helminthology. Medical Helminthology. Flatworms and roundworms are human parasites.	To get acquainted students with peculiarities and characteristic features of flatworms and their pathogenicity to human. To find out peculiarities of helminths life cycles. To stress on the principles of helminths evolutionary development and their adaptation to environment, the importance of biotic relationship within antropobiocenoses. To investigate into helminths life cycles and to differentiate the notions of bio-, geo- and contact helminths.	ЗН-8, ЗН-9, К-3, АВ-1, АВ-2	Assoc. Prof. Paryzhak S. Ya., Assoc.Prof. Onufrovych O.K.
ЛІ-8	Medical Arachnoentomology. Arthropods as the carriers of human infections and invasions.	To get acquainted students with the main representatives of Phylum Arthropoda, their characteristic morphoanatomical features of organization and medical importance. To study the main features of the structure, life cycles, distribution areas of arthropods that cause invasions and transmit pathogens of severe infectious diseases, which is necessary for the development of profilaxis and disease control methods.	ЗН-9, К-3, АВ-1, АВ-2	Assoc. Prof. Paryzhak S. Ya., Assoc.Prof. Onufrovych O.K.
ІІ-1 (<i>practical class 1</i>)	Levels of living matter organization. Optical systems in biological investigations. Cell membranes. Transport of substances across the plasmalemma.	Levels of living matter organization. Cell as an elementary unit of living matter. Structure of the light microscope, rules for using. The techniques of making temporary preparations. Peculiarities of the prokaryotic cell structure. Peculiarities of the eukaryotic cell structure. Functions of cell membranes. Chemical components of biological membranes and their functions.	ЗН-1, ЗН-2, УМ-1, УМ-2, К-1, АВ-1	Assoc. Prof. Paryzhak S. Ya., Assoc.Prof. Onufrovych O.K.

		Molecular organization of biomembranes based on fluid-mosaic model of Singer and Nicolson. Types of substances transport across a plasma membrane. Cell surface apparatus.		
II-2	Cell morphology. Structural components of cytoplasm.	Structural components of eukaryotic cell: plasma membrane, cytoplasm and nucleus. Structure and functions of eukaryotic cell organelles. Cytoplasm. Cyclosis. Differences between plant and animal cells.	3H-2, Y _M -2, K-1, AB-1	Assoc. Prof. Paryzhak S. Ya., Assoc.Prof. Onufrovyh O.K.
II-3	Chromosomes morphology. Human karyotype.	Structural components of the nucleus and their importance. Heterochromatin and euchromatin. Morphological characteristic of chromosomes. Denver classification of human chromosomes. Human karyotype and ideogram. Barr body and its functional significance.	3H-2, Y _M -2, K-1, AB-1	Assoc. Prof. Paryzhak S. Ya., Assoc.Prof. Onufrovyh O.K.
II-4	Characteristic of nucleic acids. The organization of the information flow in cell.	Nucleic acids, their structure and functions. Genetic code, its properties. Mechanisms of biological information flow in the cell.	3H-2, 3H-3, Y _M -3, K-1, AB-1	Assoc. Prof. Paryzhak S. Ya., Assoc.Prof. Onufrovyh O.K.
II-5	The gene structure in pro- and eukaryotes. Genes Structural and regulatory genes. Processes of genetic information realization. The genome structure of the human immunodeficiency virus. Genome organization of coronavirus (SARS-CoV-2).	Mechanisms of gene expression regulation in prokaryotes. Eukaryotic genom organization. Exon-intron structure. Mechanisms of transcription regulation in eukaryotes. The human immunodeficiency virus genome structure. Genome organization and life cycle of coronavirus (SARS-CoV-2).	3H-2, Y _M -3, K-1, AB-1	Assoc. Prof. Paryzhak S. Ya., Assoc.Prof. Onufrovyh O.K.
II-6	Reproduction – the basic property of living matter. Cell cycle. Mitosis.	Classification of reproduction forms and types in organisms. Types of asexual reproduction of uni- and multicellular organisms. Sexual reproduction, its forms. Peculiarities of cell cycle.	3H-2, Y _M -3, K-1, AB-1	Assoc. Prof. Paryzhak S. Ya., Assoc.Prof. Onufrovyh O.K.

		Interphase, its periods. Mitosis: phases, their characteristic. Mitotic errors and their consequences.		
II-7	Biological features of human reproduction. Gametogenesis. Meiosis. Fertilization.	Meiosis: cytogenetic characteristic. Biological features of human reproduction. Gametogenesis – the process of gametes (sex cells) formation. Peculiarities of human spermatogenesis and oogenesis. Structure of egg and sperm cells. Fertilization.	3H-2, УМ-3, К-1, АВ-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovyh O.K.
II-8	Peculiarities of the prenatal period of human development. The possibility of perinatal transmission of the virus in HIV-infected pregnant women. Postnatal period of ontogenesis.	Peculiarities of prenatal and postnatal periods of human development; derivatives of germinal layers; the main stages and types of gastrulation; critical periods of embryogenesis; malformations depending on the stage of embryogenesis. Postnatal period of ontogenesis, its periodization. Hormonal regulation of human growth and developmental rates. Acceleration, its signs. Puberty. Mature age: periods, their characteristics. The main types of human constitution.	3H-4, УМ-8, К-2, АВ-1, АВ-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovyh O.K.
II-9	Practical skills for Part «Cell biology. Reproduction».	Levels of living matter organization and their importance for medicine. Cell theory. Peculiarities of the prokaryotic cell structure. Plant cell: structure and functions of structural components and organelles Animal cell: main structural components. Cell membranes: chemical composition, functions. Types of substances transport across a plasma membrane. Structure and functions of nucleus. Hereditary apparatus of the cell. Human karyotype and ideogram, importance for medicine. Barr body its formation and significance. Nucleic acids: structure and functions. Gene structure. Structural, regulatory, tRNA and rRNA synthesis genes. Mechanisms of DNA replication. Genetic code, its properties. The main stages of protein biosynthesis in the cell. Peculiarities of gene regulation prokaryotes. Peculiarities of gene work regulation in prokaryotes.	3H-1, 3H-2, 3H-3, УМ-3, К-1, АВ-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovyh O.K.

		<p>Realization of genetic information in eukaryotes.</p> <p>Cell cycle, its periodization.</p> <p>Interphase, its periods.</p> <p>Mitosis: phases.</p> <p>Differences between mitosis and meiosis.</p> <p>Meiosis, cytogenetic characteristic.</p> <p>Types of asexual reproduction.</p> <p>Types of sexual reproduction</p> <p>Oogenesis. Cytogenetic characteristic and biological importance of spermatogenesis.</p> <p>Characteristic of gametes (sex cells).</p> <p>Peculiarities of human reproduction.</p>		
II-10	<p>Peculiarities of human genetics.</p> <p>Basic patterns of human mendelian traits inheritance (mono- and polyhybrid crosses).</p> <p>Phenomenon of pleiotropy.</p>	<p>Subject and tasks of medical genetics.</p> <p>Main terms of genetics: gene, genotype, phenotype, allelic genes, dominant character, recessive character, heterozygotes, homozygotes.</p> <p>Mendelian laws. Patterns of inheritance.</p> <p>Mendelian traits in humans and their inheritance. Patterns of inheritance in di- and polyhybrid crossing.</p> <p>Lethal genotypes, their influence on inheritance pattern.</p> <p>Penetrance and expressivity of gene.</p> <p>Pleiotropy: types, mechanisms of development, examples.</p>	<p>3H-3,</p> <p>УМ-4,</p> <p>К-1,</p> <p>АВ-1</p>	<p>Assoc. Prof. Paryzhak S.Ya.,</p> <p>Assoc.Prof. Onufrovych O.K.</p>
II-11	<p>Allelic gene interactions.</p> <p>Inheritance of blood groups according to the АВО and rhesus factor systems.</p>	<p>Forms of allelic gene interactions: complete dominance, incomplete dominance, overdominance, co-dominance.</p> <p>Mechanism of gene action.</p> <p>Multiple allelism: essence of the process, reasons for origin.</p> <p>Inheritance of human АВО-blood groups.</p> <p>Phenomenon of codominance.</p> <p>Inheritance of rhesus factor system.</p> <p>Rh incompatibility.</p>	<p>3H-3,</p> <p>УМ-4,</p> <p>К-1,</p> <p>АВ-1</p>	<p>Assoc. Prof. Paryzhak S.Ya.,</p> <p>Assoc.Prof. Onufrovych O.K.</p>
II-12	<p>Non-allelic gene interactions.</p>	<p>Types of non-allelic gene interaction.</p> <p>Complementary interaction of non-allelic genes. Genetic scheme. Examples.</p> <p>Dominant epistasis. Genetic scheme. Examples. Inheritance of enzymopathies in human.</p> <p>Recessive epistasis. Genetic scheme. Bombay phenomenon.</p> <p>Polymeric genes interaction. The genetic scheme. Examples.</p> <p>Multifactorial diseases. Concept about immunogenetics.</p>	<p>3H-3,</p> <p>УМ-4,</p> <p>К-1,</p> <p>АВ-1</p>	<p>Assoc. Prof. Paryzhak S.Ya.,</p> <p>Assoc.Prof. Onufrovych O.K.</p>
II-13	<p>Linkage inheritance.</p>	<p>Genetic mechanism of sex determination in human and animals.</p>	<p>3H-3,</p> <p>УМ-4,</p>	<p>Assoc. Prof. Paryzhak</p>

	Genetics of sex. Sex-linked inheritance.	Concept about homo-, heterogametic sex and hemizygoty. Inheritance of sex-linked traits. X-linked traits. Genetic scheme. Y-linked traits. Genetic scheme. Holandric traits. Problems of sex determination.	K-1, AB-1	S.Ya., Assoc.Prof. Onufrovykh O.K.
II-14	Chromosomal theory of heredity. Linkage of genes. Crossing-over.	Linkage inheritance of genes. Genes linkage groups. Complete linkage of genes. Genetic scheme. Incomplete linkage of genes. Genetic scheme. Chromosome theory of heredity.	3H-3, YM-4, K-1, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovykh O.K.
II-15	Variability of organisms, its forms. Phenotypic and genotypic variation.	Variability, its forms. Modification variation: norm of reaction, variation series, variation curve. Combinatorial variation as a result of different combinations of parental genes. Mutational variation: gene and genomic mutations, chromosomal aberrations. Types of chromosomal aberrations: deletion; duplication; inversion; translocation. Classification of mutations: somatic and generative; spontaneous and induced. Mutagens of environment and their classification. Antimutagens and comutagens. Natural and induced mutagenesis.	3H-3, YM-4, K-1, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovykh O.K.
II-16	The basic principles of medical genetics. Gene's and chromosomal diseases. Cytogenetics and biochemical analysis of the human being.	Human organism as a specific object of the genetic studies: disadvantages and advantages. Cytogenetic method of human inheritance investigation, its scopes. Karyotyping, its application in clinical practice. Method of X- and Y- sex chromatin detection, application for sex determination. Gene and chromosomal diseases of human being. Mosaicism. Biochemical method of human inheritance investigation. The principles of molecular diseases laboratory diagnostics. General principles of hereditary enzymopathies treatment. Methods of the hereditary diseases prenatal diagnostics and the importance of medico-genetic counseling.	3H-3, YM-5, K-1, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovykh O.K.
II-17	Genealogy of human as the method of human inheritance	The essence of genealogy method (pedigree analysis), its possibilities. Genetic symbols for pedigree construction. Stages of pedigree analysis. Genetic analysis of family pedigree. The	3H-3, YM-6, K-1, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovykh

	investigation. Study of twins.	basic types of character inheritance: autosomal dominant, autosomal recessive, sex-linked. The twin method, its value for medicine. Concordant and discordant characters of twins. Determination of the heredity coefficient (H) by Holtzinger's formula and calculation of environmental influence (C).		O.K.
II-18	Study of heredity by the method of dermatoglyphics . Population-statistical method of heredity study.	Dermatoglyphics as a method of human inheritance investigation, the possibility of use in medicine. Sections of dermatoglyphics: dactyloscopy, palmoscopy, plantoscopy. Population statistics method of human inheritance investigation, use for study of the genetic structure of the population, the frequency distribution of genes and genotypes in the population. Hardy-Weinberg law, its value for medicine.	ЗН-3, УМ-7, К-1, АВ-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
II-19	Practical skills for the Part "Basic principles of heredity and variability. Methods of the human inheritance investigation".	Subject and tasks of medical genetics. Main terms of genetics: gene, genotype, phenotype, allelic genes, dominant character, recessive character, heterozygotes, homozygotes. Mendelian laws. Penetrance and expressivity of the gene. Mendelian traits in humans and their inheritance. Lethal genotypes, their influence on inheritance pattern. Pleiotropy: types, mechanisms of development, examples. Forms of allelic genes interactions. Complete dominance, incomplete dominance. Essence of the processes, mechanism of gene action. Multiple allelism: essence of the process, reasons for origin. Inheritance of human ABO-blood groups. Phenomenon of codominance. Inheritance of rhesus factor system. Forms of nonallelic genes interactions. Complementary interaction of non-allelic genes. Dominant epistasis. Inheritance of enzymopathies in human. Recessive epistasis. Bombay phenomenon. Polymeric genes interaction. Concept about homo-, heterogametic sex and hemizygoty. Inheritance of sex-linked traits. X-linked traits. Genetic scheme. Y-linked traits. Genetic scheme. Holandric traits. Linkage inheritance of genes: complete and incomplete linkage of genes. Crossing-over and its biological essence. Chromosome theory of heredity.	ЗН-3, УМ-4, УМ-5, УМ-6, УМ-7, К-1, АВ-1, АВ-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.

		<p>The main postulates of Chromosomal theory of heredity. Genetic maps of chromosomes.</p> <p>Chromosome mapping.</p> <p>Variability, its forms. Modification variation: norm of reaction, variation series, variation curve.</p> <p>Combinatorial variation, its role in evolutionary process.</p> <p>Mutational variation: gene and genomic mutations, chromosomal aberrations.</p> <p>Types of chromosomal aberrations: deletion; duplication; inversion; translocation. Classification of mutations: somatic and generative; spontaneous and induced.</p> <p>Mutagens of environment and their classification. Antimutagens and comutagens. Natural and induced mutagenesis. The role of mutations in the occurrence of human diseases.</p> <p>Cytogenetic method of human inheritance investigation, its scopes.</p> <p>Karyotyping, its application in clinical practice. Method of X- and Y- sex chromatin detection, application for sex determination.</p> <p>Genocopies and phenocopies in human pathology.</p> <p>The principles of molecular diseases laboratory diagnostics.</p> <p>General principles of hereditary enzymopathies treatment. Methods of the hereditary diseases prenatal diagnostics and the importance of medico-genetic counseling.</p>		
II-20	<p>Medical Protozoology.</p> <p>Phylum Sarcomastigophora, Class Lobosea.</p> <p>Phylum Ciliophora.</p> <p>Class Rimostomatea.</p>	<p>General characteristic of Subregnum Protozoa. Characteristic of Class Lobosea. The forms of existence of pathogenic and non-pathogenic representatives of the Class. Morphological differences between dysentery and intestinal amoeba. Life cycle of dysenteric amoeba. The geographical distribution of infection, pathogenic action, diagnosis and prevention of amebiasis. Characteristics of mouth amoeba. Characteristics of Class Rimostomatea. Morphological features, life cycle, pathogenic significance of intestinal balantidium.</p>	<p>3H-8, 3H-9, YM-9, YM-10, K-3, AB-1, AB-2</p>	<p>Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.</p>
II-21	<p>Representatives of the Class</p>	<p>Characteristics of Class Zoomastigophora and its evolutionary significance.</p>	<p>3H-8, 3H-9,</p>	<p>Assoc. Prof. Paryzhak</p>

	Zoomastigophora – human parasites.	Morpho-anatomical peculiarities of Giardia lamblia and its life cycle. Morpho-anatomical differences between intestinal and urogenital trichomonads, their pathogenic effect on the human organism. Morphological features of Leishmania, their life cycles and pathogenic effect on the human organism. Geographical distribution, pathogenic action, diagnosis and prophylaxis of leishmaniasis. The concept of obligate-transmissible and natural-focal diseases.	УМ-9, УМ-10, К-3, АВ-1, АВ-2	S.Ya., Assoc.Prof. Onufrovych O.K.
II-22	Phylum Apicomplexa. Representatives of the Class Sporozoa – human parasites.	Life cycle of plasmodium parasites. Peculiarities of blood films for different types of malaria. Peculiarities of the Toxoplasma structure. Life cycle of Toxoplasma.	ЗН-8, ЗН-9, УМ-9, УМ-10, К-3, АВ-1, АВ-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
II-23	Medical Helminthology. Phylum Flat worms (Platyhelminthes). Class Trematoda: liver, lancet, cat and lung flukes.	General characteristics of Phylum Platyhelminthes. General characteristics of Class Trematoda. Morpho-anatomical peculiarities of sheep liver, lancet liver, cat and lung flukes. Geographical distribution, pathogenesis and prophylaxis of fascioliasis, dicrocoeliasis, opistorchiasis and paragonimiasis.	ЗН-8, ЗН-9, УМ-9, УМ-10, К-3, АВ-1, АВ-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
II-24	Class Trematoda: blood flukes, causative agents of metagonimus and nanophyetus	General characteristics of Phylum Platyhelminthes. General characteristics of Class Trematoda. Morpho-anatomical peculiarities of blood flukes, metagonimus and nanophyetus. Geographical distribution, pathogenesis and prophylaxis of schistosomiasis, metagonimiasis and nanophyetiasis.	ЗН-8, ЗН-9, УМ-9, УМ-10, К-3, АВ-1, АВ-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
II-25	Class Cestoidea: unarmed, armed and dwarf tapeworms.	General characteristics of cestodes. Adaptations to parasitism. Morpho-anatomical peculiarities of the structure and life cycles of Taenia solium, Taeniarhynchus saginatus and Hymenolepis nana. Geographical distribution, pathogenic action and prophylaxis of taeniosis, taeniarhynchosis, cysticercosis and hymenolepidosis. Medical importance of Cestodes.	ЗН-8, ЗН-9, УМ-9, УМ-10, К-3, АВ-1, АВ-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
II-26	Class Cestoidea: echinococcus, alveococcus, broad tapeworm.	Peculiarities of the structure of Cestoidea, their adaptations to parasitism. Morpho-anatomical peculiarities of Diphyllbothrium latum, Echinococcus granulosus, Alveococcus multilocularis	ЗН-8, ЗН-9, УМ-9, УМ-10,	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych

		and their life cycles. Geographical distribution, pathogenic action, diagnosis and prophylaxis of diphyllbothriasis, echinococcosis and alveococcosis. Life cycles of these helminthes. Medical importance of <i>D. latum</i> , <i>E. granulosus</i> , <i>A. multilocularis</i> .	K-3, AB-1, AB-2	O.K.
II-27	Phylum Round worms (Nemathelminthes). Class Nematoda: large intestinal round worm, pinworm (seatworm), whipworm and trichina worm.	General characteristics of roundworms. Morpho-anatomical peculiarities of <i>A. lumbricoides</i> , <i>E. vermicularis</i> , <i>T. trichiurus</i> and <i>T. spiralis</i> structure. Life cycles of these helminths. Geographical distribution, pathogenesis and prophylaxis of ascariasis, enterobiosis, trichocephalosis and trichinelosis. Characteristics of the following terms: bio-, geo- and contact helminths, reinvasion.	3H-8, 3H-9, YM-9, YM-10, K-3, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
II-28	Phylum Round worms (Nemathelminthes). Class Nematoda: threadworm, hookworm, Guinea worm and Filariidae.	General characteristics of Phylum Nemathelminthes. Morpho-anatomical peculiarities of the structure of: <i>Ancylostoma duodenale</i> , <i>Strongyloides stercoralis</i> , <i>Dracunculus medinensis</i> and representatives of Family Filariidae. Life cycles of these helminthes. Geographical distribution and pathogenic action of <i>A. duodenale</i> , <i>S. stercoralis</i> , <i>D. medinensis</i> . Diagnosis and prophylaxis of strongiloidiasis, ancylostomiasis, dracunculiasis, wuchereriasis and onchocerciasis.	3H-8, 3H-9, YM-9, YM-10, K-3, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
II-29	Practical skills for the Parts "Medical Protozoology" and "Medical Helminthology".	Modes of human infection with protozoan diseases. Life cycle of dysenteric amoeba. The geographical distribution of infection, pathogenic action, diagnosis and prevention of amebiasis. Characteristics of mouth amoeba. Morphological features, life cycle, pathogenic influence of intestinal balantidium. Morpho-anatomical peculiarities of <i>Giardia lamblia</i> and its patogenesis. Morpho-anatomical peculiarities of urogenital trichomonad, its pathogenic effect on the human organism. Morpho-anatomical peculiarities of intestinal trichomonad, its pathogenic effect on the human organism. Asexual and sexual malaria parasite reproduction. The doctrine of academician E.N. Pavlovsky about natural focality of parasitic diseases. Peculiarities of the <i>Toxoplasma</i> structure. Life cycle of <i>Toxoplasma</i> .	3H-8, 3H-9, YM-9, YM-10, K-3, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.

		<p>Methods of laboratory diagnosis of protozoan diseases.</p> <p>Morpho-anatomical peculiarities of sheep liver and lancet liver flukes. Geographical distribution, pathogenesis and prophylaxis of fasciolosis and microcoeliosis.</p> <p>Morpho-anatomical peculiarities of cat's, blood and lung flukes. Geographical distribution, pathogenesis and prophylaxis of opistorchosis, urogenital shistosomiasis and paragonimosis.</p> <p>General characteristics of cestodes. Adaptations to parasitism. Morpho-anatomical differences between pork and beef tapeworms. Cysticercosis: causative agent, diagnosis and prophylaxis. Pathogenesis of armed and unarmed tapeworms, diagnosis and prophylaxis. Morpho-anatomical peculiarities and life cycle of dwarf tapeworm. Pathogenesis of dwarf tapeworm, diagnosis and prophylaxis of hymenolepidosis. Phynn structure peculiarities in cestodes. Laboratory diagnosis and prophylaxis of echinococcosis. Peculiarities of A. lumbricoides structure according with its parasitic lifestyle. Life cycle of A. lumbricoides. Structural peculiarities and life cycle of pinworm. Structural peculiarities and life cycle of whipworm. Modes of infection with ascariasis, enterobiasis, trichocephalosis and trichinosis. Methods of laboratory diagnosis of nematodosis. Differences in life cycles between bio-and geohelminths.</p>		
II-30	<p>Phylum Arthropoda.</p> <p>Class Arachnoidea.</p> <p>Ticks and mites are vectors and activators of human diseases.</p>	<p>General characteristics of Arthropoda. Class Arachnoidea. Main features of organization. Structural peculiarities of ticks and mites. Morphology, life cycle, epidemiological importance of dog's tick and taiga tick. Epidemiological importance of steppe tick. Morphology, life cycle, epidemiological importance of settlement tick. Morphology, life cycle, epidemiological importance of itch mite. Morphology, life cycle, epidemiological importance of Demodex folliculorum. Methods of laboratory diagnosis of scabies and demodecosis. Ways of getting rid with ticks and mites, measures of prophylaxis.</p>	<p>3H-8, 3H-9, УМ-9, УМ-10, К-3, AB-1, AB-2</p>	<p>Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.</p>

II-31	Class Insecta: diptera, lice and fleas – vectors and causative agents of human infections and invasions.	General characteristics of Class Insecta. Morphology, biology and reproduction of different species of flies. Peculiarities of structure, biology and development of mosquitoes and their epidemiological importance. Differences of developmental stages between <i>Anopheles maculipennis</i> and <i>Culex pipiens</i> . Epidemiological importance of flies. Conception about gonotrophic cycle. Ways of getting rid with bloodsucking insects. Midges and its components. Morphology, biology and development of lice and fleas. Epidemiological importance of lice, modes of infection transmission. Prophylaxis of pediculosis. Epidemiological importance of fleas.	3H-8, 3H-9, YМ-9, YМ-10, K-3, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
II-32	Biosphere as a system, supporting existence of human being. Human ecology.	Biosphere: the structure of the shells of the Earth, the role of organisms in the shells of the Earth conversion. The current state of the biosphere. Ecological factors. Acclimatization, endemic diseases. Adaptive human types. The major races of mankind.	3H-10, YМ-11, K-4, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
CPC-1 (<i>individual work 1</i>)	Organization for matter and energy flow in the cell.	Principles of synthetic processes in cells and organisms; cell organelles involved in the flow of matter and energy in the cell; the role of chemosynthetic bacteria in the biosphere and the cycle of matter; peculiarities of chemosynthesis and photosynthesis; processes of glycolysis, aerobic and anaerobic respiration in pro- and eukaryotic cells; substantiate the relationship between catabolic and anabolic pathways of cell metabolism.	3H-2, K-1, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
CPC-2	Structure of human immunodeficiency virus and coronavirus SARS-CoV-2 genomes. Realization of hereditary information in viruses.	Peculiarities of human immunodeficiency virus and coronavirus "SARS-CoV-2" genome structure; structural and regulatory genes; functions of important structural proteins. To find out the life cycle of viruses: transcription, translation.	3H-2, K-1, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
CPC-3	Methods of diagnosis and prophylaxis of coronavirus disease.	To consider methods for coronavirus disease diagnosing: polymerase chain reaction (PCR) test; immunofluorescent methods; enzyme-linked immunosorbent assay (ELISA) for detection of class antibodies M and G in blood serum.	3H-1, AB -1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.

		Find out measures to prevent coronavirus disease.		
CPC-4	Regeneration and its types: physiological and reparative. The importance of the regeneration system for homeostasis.	Kinds and levels of regeneration; factors that affect the intensity of regeneration processes; the importance of regeneration for the homeostasis.	3H-5, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovykh O.K.
CPC-5	The life of cells outside the organism. Cell cloning.	Peculiarities of cell life outside the body, ideas about cell cloning; historical aspects of the study of cloning; the importance of cell cloning; useful areas of cloning (in medicine); problems of human cloning; the principle of therapeutic cloning.	3H-2, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovykh O.K.
CPC-6	Influence of biological teratogenic factors on the prenatal period of human ontogenesis.	Biological teratogens are the causative agents of infectious and invasive human diseases: rubella virus, cytomegalovirus, herpes simplex virus, chickenpox virus, toxoplasma, syphilis pathogen, chickenpox virus. The influence of biological teratogens on the developmental defects formation in embryo and fetus.	3H-4, K-1, K-2, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovykh O.K.
CPC-7	Aging as the terminal stage of human ontogeny. Theories of ageing.	Aging processes: features of structural-functional and biochemical changes. Main theories of aging. Syndromes of premature aging in children and adults. Gerontology and geriatrics. Problems of life expectancy and longevity.	3H-4, K-2, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovykh O.K.
CPC-8	Genetic engineering. Biotechnology. Concept about gene therapy.	Genetic engineering (principles of work and tasks); main fields of biotechnology application; types of genetic engineering techniques; stages of genetic engineering; the concept of gene therapy.	3H-2, 3H-3, K-1, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovykh O.K.
CPC-9	Genetic maps. Methods of the human chromosomes mapping. The modern state of human genome investigation.	Methods of the human chromosomes mapping; the concept of genetic and cytological maps of chromosomes; structural and functional features of the human genome; main stages of human genome research; the importance of the Human Genome Project for studying the nature of hereditary and malignant diseases, as well as the development of gene and cell therapy.	3H-3, K-1, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovykh O.K.
CPC-10	Transplantation and the immune	Types of transplantation, the reasons for the development of transplant immunity	3H-5, AB-1	Assoc. Prof. Paryzhak

	system. Achievements of transplantology.	and mechanisms for overcoming tissue incompatibility.		S.Ya., Assoc.Prof. Onufrovych O.K.
CPC-11	Methods of laboratory diagnosis and prophylaxis of protozoan diseases.	Protozoan diseases: factors of transmission, material for examination, methods of laboratory diagnosis.	3H-8, 3H-9, K-3, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
CPC-12	Methods of laboratory diagnosis and prophylaxis of helminthiasis.	Helminthiasis: source of infection, material for examination, methods of laboratory diagnosis, morphological features of helminth eggs.	3H-8, 3H-9, K-3, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
CPC-13	Poisonous plants and animals for human.	Formation of ecological thinking in medical students is based on the study of poisonous plants and animals, as integral components of biocenoses; examples of poisonous plants, fungi and animals; the origin of venoms in the animal world; the concept of phyto- and zootoxins; adaptation in poisonous animals; properties of venoms; signs and symptoms of poisoning; use of poisons for medicinal purposes.	3H-10, K-4, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
CPC-14	Midges and its components: characteristic, importance as the intermediate hosts of helminthes and vectors of human diseases.	Peculiarities of blood-sucking insects (causative agents and vectors of transmissible diseases) biology. Morphophysiological features of the midges representatives. Their life cycles, pathogenicity and medical significance, prevention and control of these parasites.	3H-9, K-3, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
CPC-15	Cockroaches and bedbugs: their species, medical importance.	Morphophysiological features of the Orders Blattoidea and Heteroptera representatives. Variety of orders. РІЗНОМАНІТНІСТЬ р'ядів. Life cycles, pathogenicity and medical significance, prevention and control.	3H-9, K-3, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
CPC-16	Phylogenesis of urogenital systems of Vertebrates. Onto-phylogenetic causes of congenital defects.	Directions of phylogenesis of the urogenital system. Structure and functioning of the adrenal gland, primary and secondary kidneys. Evolution of the urogenital ducts in the anamniotes and amniotes. Congenital birth defects of the urogenital system in humans, their ontophylogenetic origin.	3H-7, K-2, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovych O.K.
CPC-17	Phylogenesis of	Evolution of vertebrate circulatory	3H-7,	Assoc. Prof.

	circulatory systems of Vertebrates. Onto-phylogenetic causes of congenital defects.	system. Structural peculiarities of fish, amphibians, reptiles, birds and mammals circulatory systems. Phylogenesis of aortic arches. Congenital developmental defects of cardiovascular system in humans.	УМ-8, К-2, АБ-1	Paryzhak S.Ya., Assoc.Prof. Onufrovykh O.K.
CPC-18	Origin of human. Human races as the reflection of the adaptive patterns of human development.	Peculiarities of human as an object of evolutionary factors action, to consider the origin of human races as a manifestation of adaptive adaptive value; the main stages of anthropogenesis; to explain the Homo sapiens position in the system of the animal world; to be able to characterize the morphological features of human races.	ЗН-6, К-2, АБ-1	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovykh O.K.
CPC-19	Synthetic theory of evolution. Population structure of mankind.	The main statements of the Synthetic theory of evolution. Characteristics of ideal and real populations. Factors of evolution: mutation process, population waves, migration, isolation, gene drift, natural selection. Characteristics of evolutionary factors and the specifics of their action in human populations.	ЗН-10, К-4, АБ-1, АБ-2	Assoc. Prof. Paryzhak S.Ya., Assoc.Prof. Onufrovykh O.K.

System of classes organization

- according to information sources: verbal and auditory perception methods of learning information (lecture, conversation, explanation, discussion); methods of presenting information and visual methods (illustration, demonstration of slides, tables, figures, review of literature; visual sources of information); methods of practical application of the information (practical assignment, practical tasks solving, mastering of practical skills).

- according to individual work: by means of problems, partial-searching, research (situational tasks solving, preparing scientific reports)

Interactive methods

-problem-oriental method

-method of individual educational-research and practical tasks

- method of competing groups

- method of training technologies

-«business game» method

- «brainstorming» method

8. Verification of results

Scoring system

Students are being tested and scored at each and every single class.

Criteria of evaluation:

Learning outcome code	Code of classes type	The method of learning outcomes verification	Criteria of passing
		Methods of control	
		Types of educational activities of students are: a) lectures b) practical classes	Criteria for evaluation Excellent ("5") – the student perfectly mastered the theoretical material of the topic, demonstrates deep and

<p>3H-1, 3H-2, 3H-3, 3H-4, 3H-7, 3H-8, 3H-9, K-1, K-2, K-3, K-4, AB-1, AB-2</p>	<p>Л-1, Л-2, Л-3, Л-4, Л-5, Л-6, Л-7, Л-8</p>	<p>c) individual work of student (CPC) Thematic plans of lectures, practical classes and individual work provide the discipline topics realization in educational process.</p> <p>Lecture course consists of 8 lectures. The course of lectures comprises all problematic issues of relevant chapters of medical biology and parasitology. The lecture course is aimed at presenting basic knowledge of the discipline, motivate and orient the students. Didactic means – multimedia presentations, educational films, and slides are widely used during the lectures.</p>	<p>comprehensive knowledge of the topic, the main concepts of scientific sources and recommended literature, thinks logically and answers thoroughly, freely uses the acquired theoretical knowledge in analyzing of practical material, expresses his attitude to certain problems, demonstrates high level of practical skills acquisition.</p> <p>Good ("4") – the student has well mastered the theoretical material of the lesson, knows the basic aspects of primary sources and recommended literature; possess practical skills, expresses his views on certain issues, but assumes certain inaccuracies and errors in the logic of the presentation of theoretical content or in the implementation of practical skills.</p>
<p>3H-1, 3H-2, 3H-3, 3H-4, 3H-7, 3H-8, 3H-9, 3H-10, УМ-1, УМ-2, УМ-3, УМ-4, УМ-5, УМ-6, УМ-7, УМ-8, УМ-9, УМ-10, УМ-11, K-1, K-2, K-3, K-4, AB-1, AB-2</p>	<p>П-1, П-2, П-3, П-4, П-5, П-6, П-7, П-8, П-9, П-10, П-11, П-12, П-13, П-14, П-15, П-16, П-17, П-18, П-19, П-20, П-21, П-22, П-23, П-24, П-25, П-26, П-27, П-28, П-29, П-30, П-31, П-32</p>	<p>Practical classes serve for checking the level of students understanding of theoretical material presented at lectures, and forming practical skills. They also urge the students to apply the acquired knowledge for solving practical tasks. Every lesson starts with control test for the assessment of the level of output student knowledge. The teacher formulates the aim of the lesson and creates the positive motivation; then answers the questions, which appeared during individual work. The main part of the lesson is dedicated to practical work. Students have practical access to macro- and micropreparations, solve typical situation tasks, problems from molecular biology, genetics and</p>	<p>Satisfactory ("3") – the student has mainly mastered the theoretical knowledge of the subject, is guided by primary sources and recommended literature, but answers unconvincingly, confuses concepts, additional questions cause the student uncertainty or lack of stable knowledge; answering questions of a practical nature, reveals inaccuracies in knowledge, is unable to assess facts and phenomena, relate them to future activities, makes mistakes in the implementation of practical skills</p> <p>Unsatisfactory ("2") – the student has not mastered the study material of the topic, does not know the scientific facts, definitions, almost does not navigate in the original sources and recommended literature, there is no scientific thinking, practical skills are not formed.</p>

		<p>medical genetics, and draw pictures of the studied species in their students' personal albums.</p> <p>At the end of the lesson, the student is supposed to present their solutions of the situational tasks for the teacher to assess the level of their understanding.</p> <p>The teacher summarises the lesson, gives home assignment for individual work, points out the basic issues of next topic and gives the list of the recommended literature.</p> <p>The duration of the practical lesson is 2 academic hours.</p>	
Current educational activity			
<p>Current control is performed during the studying classes and is aimed at checking the mastering by students the learning material.</p> <p>The forms of current control are:</p> <p>a) tests with a choice of one correct answer (multiple choice questions), the definition of the correct sequence of actions, definition of correspondency, the definition of specific areas in a picture or diagram («recognition»). Control can be performed using the Misa distance learning platform.</p> <p>b) individual oral examination, interview;</p> <p>c) solving of typical situational problems;</p> <p>d) identification of causative agents and vectors of parasitic diseases in the photos, macro- and micropreparations;</p> <p>e) control of practical skills;</p> <p>f) solving of typical problems from molecular biology, genetics and medical genetics.</p> <p>During the estimation of mastering of each topic for current educational activity student is graded in 4-point (traditional) scale according with the approved assessment criteria for the appropriate discipline. This takes into account all types of work, provided by the program of the discipline. The traditional scores from discipline are converted to the points.</p> <p>The student's individual work is assessed on practical classes and is a part of the final grade of the student.</p>			
Final control			
General assessment system	Is performed after the discipline completion in the form of a written exam.		
Assessment scales	Traditional 4-point scale, 200-point scale, ECTS rating scale.		
Requirements for final control access	The student attended all the practical lessons and received not less than 72 points.		
Type of the final	Exam	Passing criteria	

control		
Exam	<p>Exam – a form of final control of mastering of student theoretical and practical material from studying discipline. The final control will be carried out in written according to the schedule. Takes 2 academic hours.</p> <p>The final control is performed in the form of a written exam:</p> <p>I level – MCQ (50), composed according to topics from Parts 1 and 2 of the subject «Medical biology with parasitology».</p> <p>II level – 4 open describing questions.</p> <p>III level – 2 situational problems (from genetics, medical genetics and molecular biology).</p>	<p>I level Maximum quantity of points – 50 (1 point for each test);</p> <p>II level – answers to 4 open questions. Maximum quantity of points – 20 (5 points for each question);</p> <p>III level – solution of situational problems. Maximum quantity of points – 10 (5 points for each problem); Total quantity – 80 points.</p>

Maximum quantity of points, which student can collect for the current educational activity for admission to the exam (differentiated credit) makes 120 points.

Minimum quantity of points, which student can collect for the current educational activity for admission to the exam (differentiated credit) makes 72 points.

The calculation of the number of points is made on the basis of the collected student's marks on the traditional scale during the discipline study, by calculating the arithmetic mean (AM or average), rounded to two decimal places. The obtained value is converted into points according to the scoring scale as follows:

$$x = \frac{AM \times 120}{5}$$

Individual student's work is estimated during current control topics at the proper lesson. Learning of topics present only on individual work is controlled by final exam.

Maximum quantity of points, which the student can collect on the exam makes 80 points.

Minimum quantity of points on the exam – not less than 50.

Mark of the discipline, which is completed with an exam is defined as the sum of points for current educational activity (at least 72) and points for the exam (at least 50).

The scores from discipline are converted to the ECTS scale and to the 4-point scale independently.

„A”, „B”, „C”, „D”, „E” ranking is made for students studying at one of the specialty and who have successfully completed study course.

Points of discipline for students who have successfully completed the program are converted into traditional 4-point scale by absolute criteria, which are listed in the following table:

Points from discipline	Estimation on 4-point scale
From 170 to 200 points	5
From 140 to 169 points	4
From 139 points to minimal quantity of points, which student must collect	3
Less than minimal quantity of points, which student must collect	2

Objective evaluation of educational activities of students is tested by statistical methods (the correlation coefficient between ECTS score and score in a national scale).

9. Course policy

The course policy is determined by the requirements of the discipline learning «Medical biology, parasitology and genetics» and is based on academic integrity. The students are explained

the value of the knowledge and necessity of thorough individual work and fulfill all the tasks included in the syllabus. The examples of inadequate integrity are: missing of references to the used sources, cheating, sources fabrication, interference in the work of other students. Any kind of unintegrity, no matter of its volume is unacceptable and results in poor academic mark. Sources that are recommended by the teacher may be used only for academic purposes and transfer this information to third parties is forbidden. Students are encouraged to use other literature resources which are not provided by the recommended list.

10. Recommended literature

Basic:

1. Paryzhak S.Ya., Vorobets Z.D. Medical Biology. Textbook – Lviv: Qvart, 2020. – 426 p.
2. Paryzhak S.Ya., Odnorih L.O. Medical biology and parasitology. Manual for the first-year students of the English department, the faculties of medicine and dentistry. – Lviv: Danylo Halytsky Lviv National Medical University, 2021. – 306 p.
3. Bazhora Y.I., Bulyk R.Ye., Chesnokova M.M., Shevelenkova A.V., Smetyuk O.O., Lomakina Yu.V. Medical Biology: textbook. – Vinnytsia: Nova Knyha, 2018. – 448 p.: il.
4. Step 1. Lecture notes 2018 Biochemistry and Medical genetics. New York. Kaplan, Inc. – 2018 – 403 c.

Additional:

1. Bihunyak T.V. Medical biology / T.V. Bihunyak. – Ternopil: TSMU Ukrmedknyha, 2020. – 214 p.
2. Bogitsh B.J., Carter C.E., Oeltmann T.N. Human parasitology. – 5th ed. Textbook. – Academic Press, 2019. – 407 p.
3. Elsheikha H.M., Jarroll E.L. Illustrated Dictionary of Parasitology in the Postgenomic Era. – Caister Academic Press, 2017. – 332 p.
4. Ghosh S., Chander J. Paniker's Textbook of Medical Parasitology. 8th Edition. – Jaypee Brothers Medical Pub, 2018. – 276 p.
5. Kaplan Medical's USMLE STEP 1. Biochemistry and Medical Genetics. Lecture notes. – 2018. – 432 p.
6. Pap E., Falus A., László V., Oberfrank F., Szalai C., Tóth S. Medical Genetics and Genomics. Edited by Typotex Kiadó. – Budapest University of Technology and Economics, 2016. – 206 p.
7. Ryabokon E.V., Onishchenko T.E., Ushenina L.O., Furyk E.A., Mashko O.P. Manual of helminthiasis: for the students of medical faculty. – Zaporozhye: [ZSMU], 2013. – 66 p.

Informational resources:

1. Testing center – database of license tests Krok – 1 <http://testcentr.org.ua/>
2. OMIM (Online Mendelian Inheritance in Man) – An Online Catalog of Human Genes and Genetic Disorders <http://omim.org/>
3. NCBI databases <http://www.ncbi.nlm.nih.gov>
4. Encyclopedia of DNA elements <http://genome.ucse.edu/ENCODE/>

11. Equipment, hardware and software resources of the discipline/ course

Methodological support of the lecture course:

1. Lecture theses.
2. Methodical recommendations for lectures.
3. Presentations of lectures.
4. Video content of lectures, placed on the platform for distance learning MISA.

Methodological support of practical classes:

1. Methodical recommendations for practical classes for lecturers.
2. Methodical recommendations for practical classes for students.
3. Variants of test questions and tasks to check the initial level of knowledge on each topic.
4. Variants of situational tasks to check the mastering by students the learning topics.

5. Questions and tasks for final control (exam).
6. Methodical materials, placed on the platform for distance learning MISA.

Logistical support

1. Multimedia projector.

12. Additional information

Responsible for the educational process at the department – Assoc. Prof. Oksana PERSHYN.

There is a scientific students' association at the department. Meetings take place in the auditorium №1.

Practical classes are held in the classrooms of the department at the address: 3a Shimzeriv street.

Theoretical building, 2nd floor.

Website of the department – *e-mail* Kaf_medicalbiology@meduniv.lviv.ua

Compiler of Syllabus,
Ph.D., Associate Professor

Solomiya PARYZHAK

Ph.D., Associate Professor

Lydmyla SERHIYENKO

Head of the Department,
Doctor of Biological Sciences, Professor

Zinoviy VOROBETS