

**Тематический план практических занятий
по медицинской биологии и общей генетике для студентов 1го курса
факультета иностранных учащихся (язык обучения – английский)**

№п /п	Тема	Количество часов
1	The Science of Biology: 1. Biology in medicine 2. Essence of Life: properties of life. 3. The Organization of Life. 4. Molecular and cellular levels are the main organization levels of Life	3
2	Cell is a unit of life. 1. The Cell theory emerges. 2. Modern principles of the Cell theory. 3. Investigating Life: the microscopes reveal cell structure. 4. Two types of organisms – Prokaryotes and Eukaryotes.	3
3	Cell Biology. 1. A cell is a basic unit of Life 2. The structure components of the eukaryotic cells: • A cell membrane, its structure and functions • A cytoplasm and a cytoskeleton, that supports cells • The cell organelles: the ribosomes, the endoplasmic reticulum, the lysosomes, the mitochondria, the plastids 3. The nucleus: structure and functions 4. The chromosomes: structure, levels of compression of the DNA into chromosomes. An euchromatin and a heterochromatin 5. Classification of the chromosomes. Human karyotype and ideogram <i>Controlled self-depended work: The cell biology: structure and functions of the main cell organelles</i>	3 (3)
4	Cell is an open self-regulating system 1. A movement of substances across membranes. a. Diffusion and osmosis b. Active transport c. Exocytosis and endocytosis 2. Energy converting: a. aerobic cellular respiration, b. photosynthesis, c. fermentation. 3. ATP – universal source of energy 4. Information system of the cell: genetic code	3
5	Information system of the cell. 1. A central dogma of molecular biology 2. The structure of DNA and RNA 3. DNA replication 4. DNA transcription. The genetic code 5. RNA types. Translation and protein biosynthesis	3
6	Organization and regulation of gene expression of prokaryotes and eukaryotes 1. General principles of gene regulation 2. Gene regulation in bacterial cells: an Operon structure 3. Eukaryotic gene regulation	3
7	The cell physiology: the life cycle, mitosis, and meiosis	3

	<ol style="list-style-type: none"> 1. The importance of cell division. The life cycle, the cell cycle. 2. The cell cycle: interphase (G1 phase, S-phase, G2 phase) and mitosis 3. The chromosome structure, alterations of chromosome structure during the cell cycle 4. The cell cycle control 5. Meiosis: reduction division; meiosis II 6. A comparison of Meiosis and Mitosis 	
8	<p>Reproduction, particularities of human reproduction</p> <ol style="list-style-type: none"> 1. Reproduction as universal particularity of essence 2. Asexual reproduction 3. Sexual reproduction. Types of sexual reproduction 4. Characteristics of sexual reproduction of the multicellular organisms. Meiosis as specific process of formation of sexual cells: <ol style="list-style-type: none"> a. Characteristic of spermatogenesis b. Characteristic of oogenesis c. Features of human's mature gametes 5. Sexual dimorphism. Hermaphroditism 	3
9	<p>Ontogenesis. The characteristics of embryological development</p> <ol style="list-style-type: none"> 1. Ontogenesis, types of ontogenesis. Modern interpretation of ontogenesis determination 2. Embryonic period of human: fertilization, cleavage, gastrulation, organogenesis 3. Extraembryonic membranes - structures that can support the embryo (chorion, amnion, allantois). 4. Human pre-natal development; the critical periods of development <p><i>Controlled self-depended work: reproduction on both the cellular and organism levelse</i></p>	3 (2)
10	<p>The science of genetics. Mendel's laws of heredity</p> <ol style="list-style-type: none"> 1. The science of genetics 2. The main terms of modern genetics 3. Autosomal recessive and autosomal dominant inheritance 4. Mendel's laws: <ol style="list-style-type: none"> a. Law of dominance b. Law of segregation 5. Test – cross. 6. Law of independent assortment 	3
11	<p>Gene interactions. Multiple alleles</p> <p>Interaction of allelic genes:</p> <ul style="list-style-type: none"> • complete and incomplete dominance • codominance <ol style="list-style-type: none"> 2. Inheritance of blood groups as representative example of interaction of multiple alleles. 3. Interaction of non-allelic genes <ul style="list-style-type: none"> • complementary • epistasis. Recessive epistasis • polygenic inheritance 4. Pleiotropy 5. Molecular basis of gene interactions: One gene – one enzyme hypothesis. 	3
12	<p>Linkage genes. Sex-linked characteristics. Sex determination.</p> <ol style="list-style-type: none"> 1. Conception on gene linkage 2. Complete and non-complete gene linkage, linkage group 	3

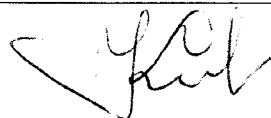
	<p>3. Crossing over and gene recombination. Gene mapping</p> <p>4. Chromosomal theory of inheritance</p> <p>5. Sex, sex determination, dosage compensation.</p>	
13	<p>Genotypic variation. Mutations</p> <p>1. Sources and mechanisms of variation.</p> <p>2. Mutations. Categories of mutations.</p> <p>3. Types of gene mutations</p> <p>a. Missense mutations</p> <p>b. Nonsense mutations</p> <p>4. Type of genome mutations</p> <p>a. Chromosomal mutations: insertions, deletions, inversions, duplications, translocations</p> <p>b. Changes of chromosome number: polyploidy and aneuploidy</p> <p>5. Causes of mutations</p> <p>6. Mutagenes. The study of mutagenes. Ames test.</p>	3
14	<p>Phenotypic variation</p> <p>1. Classification of variation</p> <p>2. Ontogenetic variation. Role of ontogenetic variation in manifestation of human hereditary diseases.</p> <p>3. Modification variation as adaptive reaction of organism on the environmental alteration.</p> <p>4. Phenotype. Genotype. Phenocopy. Norm of reaction. Penetrance and expressivity. Discontinuous and continuous variation</p> <p>Controlled self-depended work: The main mechanisms of heredity and variability.</p>	3 (3)
15	<p>Human genetics: pedigree, twins study, population study</p> <p>1. Human as a specific object of genetics.</p> <p>2. Methods of human genetics:</p> <p>3. Pedigree analysis: symbols, aims, and problems</p> <p>4. Twins study: meaning for study of phenotypical variation</p> <p>5. Dermatoglyphic method</p>	3
16	<p>Human genetics: cytogenetic, immunological, biochemical, and molecular-genetic study. Prenatal diagnostics of hereditary diseases</p> <p>1. Cytogenetic method: diagnostics of chromosomal diseases.</p> <p>2. Sex chromatin, detection of X- and Y-sex chromatins, their diagnostic significance.</p> <p>3. Prenatal diagnostics of hereditary diseases. Ethical aspects of prenatal diagnostics.</p> <p>4. Immunological methods: diagnostics of hereditary pathology and detection of histocompatibility of tissues and organs</p> <p>5. Biochemical methods as methods of detection of hereditary diseases.</p>	3
17	<p>Hereditary diseases</p> <p>1. Classification of hereditary diseases.</p> <p>2. Inherited metabolic disorders:</p> <ul style="list-style-type: none"> • Amino acids exchange • Lipids exchange • Carbohydrates exchange • Metal exchange • Diseases of blood clotting system; Defects of hemoglobin structure <p>3. The chromosomal diseases</p> <p>4. The mitochondrial diseases</p> <p>5. The congenital malformations and diseases with predisposition</p>	3(2)

	Controlled self-depended work: Diagnostic, precautions and treatment of hereditary diseases.	
18	Principles of cytology. The main questions on the genetics. Concluding session.	3
19	Genetical structure of populations, characteristic of human populations 1. Biological species as one of the organization level of Life 2. Gene pool (allele pool) conception. Gene pool of population 3. Population structure of species. 4. Ecological and genetic characteristics of species 5. Population structure of humanity. Hardy-Weinberg equilibrium. 6. Estimation of genetic similarity of human populations.	2.5
20	Subkingdom Protozoa. Phylum Sarcomastigophora. Class Flagellata (Zoomastigota). Class Sarcodina 1. Medical parasitology. 2. Main terms of the medical parasitology. 3. Subkingdom <i>Protozoa</i> : common characteristic 4. Phylum <i>Flagellata</i> or <i>Zoomastigota</i> , common characteristic. Characteristics of <i>Trypanosoma rhodesiense</i> , <i>Leishmania tropica</i> , <i>Leishmania donovani</i> , <i>Lambliia intestinalis</i> , <i>Trichomonas vaginalis</i> , <i>Trypanosoma gambiense</i> 5. Class <i>Sarcodina</i> : common characteristic, characteristic of <i>Entamoeba histolytica</i> and others specimens	2.5
21	Subkingdom Protozoa. Phylum Apycomplexa and Phylum Ciliata. 1. The general characteristics of Phylum Sporozoa and Phylum Ciliata 2. The malaria parasites 3. Life cycle of <i>Plasmodium</i> , diagnostics, preventions, and medical significance 4. Toxoplasmosis: diagnostics, prevention, and the characteristics of <i>Toxoplasma gondii</i> that is reason of toxoplasmosis 5. <i>Balantidium coli</i> – morphological features, life cycle, diagnostics, and prevention Controlled self-depended work: Protozoa – human parasites. The main characteristics.	2.5 (3.5)
22	Phylum Plathelminthes. Class Trematodes 1. The general characteristics of Plathelminthes 2. The characteristics of Trematodes 3. <i>Fasciola hepatica</i> : structure, life cycle, channel of invasion, pathogenesis, diagnostics, and prevention 4. <i>Schistoma heamatobium</i> , <i>S. mansoni</i> : structure, life cycle, channel of invasion, pathogenesis, diagnostics, and prevention	2.5
23	Phylum Plathelminthes. Class Trematodes 1. <i>Opisthorchis felineus</i> : structure, life cycle, channel of invasion, pathogenesis, diagnostics, and prevention 2. <i>Paragonimus ringeri</i> : structure, life cycle, channel of invasion, pathogenesis, diagnostics, and prevention 3. <i>Dicrocoellium lanceolatum</i> : life cycle, channel of invasion, pathogenesis, diagnostics, and prevention	2.5
24	Phylum Plathelminthes. Class Cestoidea (1 st lesson) 1. The general characteristics of Cestoideas 2. <i>Taenia solium</i> : structure, life cycle, channel of invasion, pathogenesis, diagnostics, and prevention. 3. Cysticercosis as a complication of teniasis	2.5

	4. <i>Taeniarynchus saginatus</i> : structure, life cycle, channel of invasion, pathogenesis, diagnostics, and prevention	
25	Phylum Plathelminthes. Class Cestoidea (2 nd lesson) 1. <i>Diphyllobothrium latum</i> : structure, life cycle, channel of invasion, pathogenesis, diagnostics, and prevention. 2. <i>Hymenolepis nana</i> ,: life cycle, channel of invasion, pathogenesis, diagnostics, and prevention 3. <i>Echinococcus granulosus</i> : structure, life cycle, channel of invasion, pathogenesis, diagnostics, and prevention 4. The pathogenic effect of Cestoidea on human organism Controlled self-depended work. Phylum Plathelminthes – human parasites	2.5 (3.5)
26	Phylum Nemathelminthes. Class Nematoda (1 st lesson) 1. General characteristics of phylum Nemathelminthes. Note progressive pattern of their stricture. 2. <i>Ascaris lumbricoides</i> , <i>Trichocephalus trichiurus</i> , and <i>Enterobius vermicularis</i> : structure and life cycles. 3. Preventive measures of ascariasis, trichocephaliasis, and trichinellosis	2.5
27	Phylum Nemathelminthes. Class Nematoda (2 nd lesson) 1. <i>Trichinella spiralis</i> : structure and life cycles. 2. Diagnostic and preventive measures of trichinellosis. 3. <i>Ancylostoma duodenale</i> and <i>Strongyloides stercoralis</i> : structure and life cycles. 4. Diagnostic, and preventive measures of ancylostomiasis, and strongyloidiasis	2.5
28	Phylum Nemathelminthes. Class Nematoda (3 rd lesson) 1. <i>Dracunculus medinensis</i> : structure and life cycles. 2. Diagnostic and preventive measures of dracunculiasis. 3. <i>Wuchereria bancrofti</i> and <i>W. (Brugia) malayi</i> : structure and life cycles. Diagnostic and preventive measures of elephantiasis. 4. <i>Onchocerca volvulus</i> : structure and life cycle. Diagnostics and prevention of Blinding filariasis or river blindness 5. <i>Loa loa</i> (eye worm): life cycle, and diagnostics and preventive measures of loaosis 6. The pathogenic influence of parasites on human organism Controlled self-depended work Phylum Nemathelminthes – human parasite	2.5 (4)
29	Phylum Arthropoda. Class Arachnida 1. The general characteristics of the Phylum Arthropoda 2. The significance of Arthropoda in nature 3. The main characteristics of the Class Arachnida, its medical significance 4. The mites of both Ixodidae and Argazidae family 5. <i>Sarcoptes scabiei</i> : structure and life cycle; diagnostics and preventive measures of scabies	2.5
30	Phylum Arthropoda. Subphylum Tracheata. Class Insecta 1. Main characteristics of Insecta. Medical significance of class Insecta specimens 2. Structure and localization of blood system, excretory system, digestive system, and respiratory system 3. Types of postembryonic development of insecta 4. The Culicidae: life cycle of both malaria and non-malaria mosquito 5. The Diptera insecta: the Plebotomidae (mosquitoes), the Simuliidae	2.5

	(gnat), the Muscidae (flies), the Sarcophagidae (grey meat flies).	
31	Phylum Arthropoda. Subphylum Tracheata. Class Insecta 1. The Anoplura order: <i>Pediculus humanus</i> , and <i>Phthirus pubis</i> , main features of parasites structure and reproduction 2. The Aphaniptera order: <i>Pulex irritans</i> - main features of parasites structure and reproduction 3. Medical significance of lice and fleas as the human parasites and causative agents of human diseases. 4. The species of the Blattoidea order 5. The species of the Hemiptera order.	2.5
32	Medical parasitology. Concluding session	2.5
33	Comparative anatomy of Vertebrates' organ systems: integument, skeleton, digestive and respiratory systems 1. Ontogenesis and phylogenesis. Biogenetic law (recapitulation theory). 2. Moduses of ontogenesis modification. Heterochronia, heterotopia; palingenesis, cenogenesis, and phylembryogenesis. 3. Comparative anatomy of vertebrates' skin. Human skin malformations. 4. Comparative anatomy of vertebrates' skeleton. Human skeleton malformations 5. Comparative anatomy of vertebrates' digestive system. Human digestive system malformations 6. Comparative anatomy of vertebrates' respiratory system. Human respiratory system malformations	2.5
34	Comparative anatomy of Vertebrates' organ systems: circulatory, nervous, excretory, and reproductive systems. 1. Comparative anatomy of vertebrates' circulatory system. Transformation of the aorta arches, heart development. Development of the circulatory system malformations, ontogenetic mechanisms. 2. Comparative anatomy of vertebrates' nervous system. Human nervous system malformations 3. Comparative anatomy of vertebrates' excretory system. Human excretory system malformations 4. Comparative anatomy of vertebrates' reproductive system. Human reproductive system malformations.	2.5
35	Poisonous plants and fungi 1. Toxicity – universal phenomenon in nature. The science of phytotoxicology 2. Classification of poisonous plants and fungi. The main toxic substances of plants and their mechanism of action on the human 3. The characteristics of plant poisoning and preventive measures of plant poisoning 4. The characteristics of fungi poisoning	2.5
36	Poisonous animals 1. Classification of poisonous animals. The animal toxins. 2. The poisonous invertebrates (Unicellulars, Coelenterates, Mollusks, Arthropods), their toxins. The characteristics of poisoning, the preventions 3. The poisonous vertebrates (fishes, amphibian, reptiles) and their toxins. The characteristics of poisoning, the preventions	2.5
	Всего часов	120 (99+21)

Заведующий кафедрой
мед.биологии и общей генетики, доцент



Л.С.Кизюкевич

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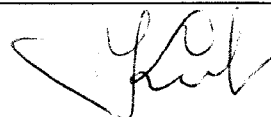
	<p>3. Crossing over and gene recombination. Gene mapping</p> <p>4. Chromosomal theory of inheritance</p> <p>5. Sex, sex determination, dosage compensation.</p>	
13	<p>Genotypic variation. Mutations</p> <p>1. Sources and mechanisms of variation.</p> <p>2. Mutations. Categories of mutations.</p> <p>3. Types of gene mutations</p> <p>a. Missense mutations</p> <p>b. Nonsense mutations</p> <p>4. Type of genome mutations</p> <p>a. Chromosomal mutations: insertions, deletions, inversions, duplications, translocations</p> <p>b. Changes of chromosome number: polyploidy and aneuploidy</p> <p>5. Causes of mutations</p> <p>6. Mutagenes. The study of mutagenes. Ames test.</p>	3
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30	Phylum Arthropoda. Subphylum Tracheata. Class Insecta 1. Main characteristics of Insecta. Medical significance of class Insecta specimens 2. Structure and localization of blood system, excretory system, digestive system, and respiratory system 3. Types of postembryonic development of insecta 4. The Culicidae: life cycle of both malaria and non-malaria mosquito 5. The Diptera insecta: the Plebotomidae (mosquitoes), the Simuliidae	2.5

	(gnat), the Muscidae (flies), the Sarcophagidae (grey meat flies).	
31	Phylum Arthropoda. Subphylum Tracheata. Class Insecta 1. The Anoplura order: <i>Pediculus humanus</i> , and <i>Phthirus pubis</i> , main features of parasites structure and reproduction 2. The Aphaniptera order: <i>Pulex irritans</i> - main features of parasites structure and reproduction 3. Medical significance of lice and fleas as the human parasites and causative agents of human diseases. 4. The species of the Blattoidea order 5. The species of the Hemiptera order.	2.5
32	Medical parasitology. Concluding session	2.5
33	Comparative anatomy of Vertebrates' organ systems: integument, skeleton, digestive and respiratory systems 1. Ontogenesis and phylogenesis. Biogenetic law (recapitulation theory). 2. Moduses of ontogenesis modification. Heterochronia, heterotopia; palingenesis, cenogenesis, and philembryogenesis. 3. Comparative anatomy of vertebrates' skin. Human skin malformations. 4. Comparative anatomy of vertebrates' skeleton. Human skeleton malformations 5. Comparative anatomy of vertebrates' digestive system. Human digestive system malformations 6. Comparative anatomy of vertebrates' respiratory system. Human respiratory system malformations	2.5
34	Comparative anatomy of Vertebrates' organ systems: circulatory, nervous, excretory, and reproductive systems. 1. Comparative anatomy of vertebrates' circulatory system. Transformation of the aorta arches, heart development. Development of the circulatory system malformations, ontophylogenetic mechanisms. 2. Comparative anatomy of vertebrates' nervous system. Human nervous system malformations 3. Comparative anatomy of vertebrates' excretory system. Human excretory system malformations 4. Comparative anatomy of vertebrates' reproductive system. Human reproductive system malformations.	2.5
35	Poisonous plants and fungi 1. Toxicity – universal phenomenon in nature. The science of phytotoxicology 2. Classification of poisonous plants and fungi. The main toxic substances of plants and their mechanism of action on the human 3. The characteristics of plant poisoning and preventive measures of plant poisoning 4. The characteristics of fungi poisoning	2.5
36	Poisonous animals 1. Classification of poisonous animals. The animal toxins. 2. The poisonous invertebrates (Unicellulars, Coelenterates, Mollusks, Arthropods), their toxins. The characteristics of poisoning, the preventions 3. The poisonous vertebrates (fishes, amphibian, reptiles) and their toxins. The characteristics of poisoning, the preventions	2.5
	Всего часов	120 (99+21)

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