

MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION
FEDERAL STATE BUDGETARY EDUCATIONAL INSTITUTION
HIGHER EDUCATION
"DAGESTAN STATE MEDICAL UNIVERSITY"

(FSBEI HE DSMU OF THE MINISTRY OF HEALTH OF RUSSIA)



AGREED
Vice-rector for academic affairs, Ph.D.
D.A. Omarova

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" 30 " August 2021

THE WORKING PROGRAM OF THE DISCIPLINE
"BIOLOGY"

Discipline index: - **B 1.O.14**

Specialty: **31.05.01 "General Medicine"**

Higher education level: **Specialty**

Graduate qualification: **Medical doctor**

Faculty: **medical**

Department: **Medical Biology**

Form of study: **full-time**

Course: **1**

Semester: **I-II**

Total labor intensity (in credit units / hours): **5 c.u. / 180 hours**

Lectures: **34 h.**

Practical lessons: **70 h.**



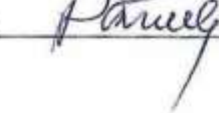
Independent work: **40 h.**

Control form: exam (**36 hours**).

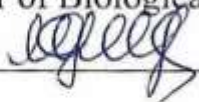
The working program of the discipline "Biology" was developed in accordance with the Federal State Educational Standard 3 ++ VO in the direction of training (specialty) 05/31/01 General medicine (higher education level - specialty), approved by order of the Ministry of Education and Science of the Russian Federation No. 988 of August 12, 2020.

The working program of discipline approved at the meeting of the Department of Medical Biology of 26 on August 2021 city of, number 1 protocol.

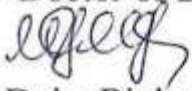
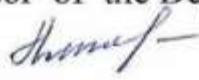

The work program has been agreed upon:

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2. Head of UUMR, S and KCO _____  (A.M. Karimova)
3. Dean of the Faculty of General Medicine _____  (R.M. Ragimov)

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I. PURPOSE AND OBJECTIVES OF LEARNING THE DISCIPLINE

The goal of mastering the discipline is the formation of fundamental systemic knowledge, abilities and skills according to general biological laws that are of greatest interest for practical health care; preparation of students for the systemic perception of general medical, social and clinical disciplines, the formation of their natural scientific outlook and the logic of biological thinking, necessary for the subsequent practical activities of a doctor, as well as the principles of medical and biological counseling, treatment and prevention of hereditary and parasitic human diseases.

Objectives of mastering the discipline :

- Master the knowledge in the field of organization and functioning of living systems and the general properties of living things; general patterns of transmission and changes in hereditary traits and properties in generations, their role in hereditary human pathology; patterns of the process of embryogenesis, including human embryonic development; developmental biology and medical significance of human parasites; general laws of the evolution of living systems, the main directions of the evolution of systems and organs; general patterns of development of the biosphere and the role of man as a creative ecological factor at different stages of anthropogenesis;

- Master the methods of microscopy; methods for the preparation of temporary micropreparations for the analysis of the structure and identification of cells, phases of division (mitosis, meiosis), embryonic stages of development of vertebrates; principles of organizing medical genetic counseling; methods for identifying causative agents of parasitic diseases;

- To be able to apply the laws of inheritance to determine the likelihood of the appearance of normal and pathological signs in the genotype and their manifestation in the phenotype, to predict the likelihood of developing hereditary diseases in humans using examples of solving genetic problems;

- To acquire knowledge on carrying out diagnostic and preventive measures aimed at preventing the occurrence of parasitic diseases;

- To teach students the ability to substantiate general patterns, directions and factors of evolution to explain the adaptive nature of the evolutionary process; patterns of population ecology, the processes of development and functioning of ecosystems and the biosphere as a whole for planning the strategy of

human existence in the biosphere, as well as for organizing preventive measures and medical care for the population;

- To develop skills in working with educational, scientific literature, official statistical reviews and conducting scientific research;
- To form the skills of experimental work;
- To develop communication skills in a team.

II. EXPECTED DISCIPLINE LEARNING OUTCOMES

Competencies formed in the process of studying the academic discipline:

Competency code and name	Competency achievement indicator code and name
General professional competencies	
OPK-5- is able to assess morphofunctional, physiological conditions and pathological processes in the human body to solve professional problems.	ID- 1 OPK 5- evaluates morpho-functional physiological processes
<p>Know: Basic biomedical terminology. The biological essence of the processes occurring in a living organism. Cell structure in interaction with their function; patterns of heredity and variability in individual development as the basis for understanding the pathogenesis and etiology of hereditary and multifactorial diseases; laws of genetics, and its importance for medicine, the phenomenon of parasitism and bioecological diseases; human anthropogenesis and ontogenesis; foundations of ecology and adaptive types of humanity.</p>	
<p>Be able to: use educational, scientific, popular science literature, the Internet for professional activities.</p>	

III. PLACE OF DISCIPLINE IN THE STRUCTURE OF THE EDUCATIONAL PROGRAM

The academic discipline "Biology" belongs to the block - B 1. O.14 of the basic part of the compulsory disciplines of the curriculum in the specialty 31.05.01 "General Medicine ".

Education of biology students at DSMU is carried out on the basis of the continuity of knowledge, skills and competencies obtained in the course of biology of general educational institutions, as well as knowledge of chemistry, human anatomy and other disciplines:

1. History of the Fatherland:

Knowledge: basic patterns and trends in the development of the world historical process; the most important milestones in the history of Russia, the place and role of Russia in the history of mankind and in the modern world.

Skills: analyze and assess the social situation in Russia, as well as abroad.

2. Chemistry:

Knowledge: chemical elements, molecules, cations, anions, chemical bonds; principles of construction of inorganic and organic molecules; features of the formation of chemical bonds; physical and chemical properties of inorganic and organic substances and their biological significance.

Skills: comparison of the structural features of chemical substances with their physicochemical and biological properties; comparison of the structural features of chemical substances with their reactivity and the conditions for the occurrence of chemical reactions.

Skills: composing fusion and decay reactions; drawing up chemical equations and determining the end products of chemical reactions; solving chemical problems to determine the quantitative and qualitative parameters of chemical reactions.

3. Histology, cytology, embryology:

Knowledge: basic patterns of development and life of the human body based on the structural organization of cells, tissues and organs; histofunctional features of tissue elements; methods of their research.

Skills: use laboratory equipment; work with a magnifying technique; analyze the histological state of various cellular, tissue and organ structures of a person.

Skills: possess a medical-functional conceptual apparatus.

4. Human anatomy:

Knowledge: tissues, organs and systems of the human body.

Skills: explain the composition, structure and functioning of the systems of the human body.

Skills: working with dummies of organ systems and the human skeleton.

IV. SCOPE OF DISCIPLINE AND TYPES OF EDUCATIONAL WORK

The total workload of the discipline is 5 credit units

Type of educational work		Total hours	one	2
			3	4
Contact work of students with the teacher, including		104	50	54
Classroom lessons (total)				
Lectures (L)		34	16	18
Practical lessons (PZ)		70	34	36
Student independent work (SRO)		40	22	18
Type of intermediate certification		exam		36
TOTAL:	Hour.	180	72	108
Total labor intensity:	Z.e	5	2	3

V. CONTENT OF THE EDUCATIONAL DISCIPLINE

5.1. Sections of the discipline and competencies that are formed during their study

No. p / p	Competency codes	The name of the discipline section	Section Contents
1	2	3	4
1	OPK-5 ID- 1 OPK 5	Introduction. General characteristics of life	Biology is the science of the laws and mechanisms of life and development of organisms. Classification of biological disciplines. Advances in biological sciences. The place of biology in the medical education system. Determination of the essence of life. Fundamental properties of living systems (self-renewal, self-regulation, self-reproduction) and attributes of life: openness, metabolism, energy, irritability, homeostasis, reproduction, equifinality, structuredness, heredity and variability. Organizational levels of living things (biological systems). The manifestation of the fundamental properties of living things at the main evolutionarily determined levels of organization: molecular-genetic, cellular, ontogenetic, population-specific, biogeocenotic, biospheric.
2	OPK-5 ID- 1 OPK 5	Fundamentals of General and Medical Genetics	Cell theory as proof of the unity of all living things, its main provisions, current state. Types of cellular organization. A cell is a miniature biosystem. Mitotic (proliferative) cell cycle. Phases of the mitotic cycle, their characteristics and significance. The main

		<p>mechanisms of the proliferative cycle, ensuring the maintenance of genetic homeostasis (reduplication, uniform distribution of genetic material). Regulation of mitosis. The importance of endomitosis and polytenia for the normal functioning of a multicellular organism. Direct cell division - amitosis. Methods and forms of reproduction of organisms. Sexual reproduction, its evolutionary significance. Gametogenesis as a process of formation of germ cells. Meiosis as a process of formation of haploid gametes. Phases of meiosis, their characteristics and significance. Definition of genetics as a science. Heredity and variability are fundamental properties of living things. Stages of development of genetics. The concepts of "genotype" and phenotype ". The relationship between a gene and a trait.</p> <p>Interaction of allelic genes in the genotype: dominance, incomplete dominance, codification, inter-allelic complementation, allelic exclusion. Types of monogenic inheritance. Homo- and heterozygous organisms, the concept of hemizygoty. Features of the autosomal type of inheritance. Polygenic inheritance. Interaction of non-allelic genes in the genotype: epistasis, polymeria, complementarity, positional effect, modifying effect. Linked trait inheritance and crossing over. Clutch groups. T. Morgan's experiments. The main provisions of the chromosomal theory. Clutch groups. Crossing over as a mechanism determining gene linkage disorders. Genetic and cytological maps of chromosomes. Principles of chromosome mapping.</p> <p>Gene level of organization of hereditary material. Gene, its properties. Gene as a functional unit of heredity. Features of the organization of genes of pro- and eukaryotes. The genetic code as a way of recording hereditary information, its properties. Cystrone, its structure. Stages of the implementation of genetic information (transcription and post-transcription processes, translation and post-translational processes). The structure and types of RNA. The role of RNA in the process of realization of hereditary information. Features of the expression of genetic information in pro- and eukaryotes. The relationship between a gene and a trait. Phenotypic variability and its types. Wednesday of the first and second order. Modifications and their</p>
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			<p>characteristics. Trait reaction rate. Types of genotypic variability: combinative and mutational. Sources of combinative variability. Mutations, their classifications and mechanisms of occurrence. Gene, chromosomal and genomic mutations. Medical and evolutionary significance of mutations. Human chromosomal diseases. Gene balance, doses of genes. The value of the normal dose balance for the formation of the phenotype. Violation of the dose of genes in chromosomal and genomic mutations. Compensation for gene dose disruption. Causes and frequency of mutations. Features of a person as an object of genetic research. Methods for studying human genetics: genealogical, cytogenetic, biochemical, twin, population-statistical, genetics of somatic cells, methods for studying DNA. Principles of chromosome mapping. Prenatal diagnosis of hereditary human diseases. Methods of prenatal diagnostics and their capabilities. Medical genetic counseling, its medical significance. Types and stages of counseling. Monogenic, chromosomal and multifactorial human diseases, mechanisms of their occurrence and manifestation. General approaches to the treatment of hereditary human diseases.</p>
3	OPK-5 ID- 1 OPK 5	Developmental biology. Homeostasis. Regeneration	<p>Phenomenology of ontogenesis. Progenesis. Evolutionary transformations of morphological and biochemical characteristics of chordate eggs. Presumptive beginnings and their further destiny. Fertilization is the initial stage in the development of a new organism. Fertilization phases. Characteristics and significance of the main stages of embryonic development. Fragmentation as a process of formation of a multicellular embryo. Crushing types. Relationship between the structure of the egg and the type of cleavage. Gastrulation as a process of forming a multilayer embryo. Gastrulapia methods. Primary organogenesis (neurulation) as a process of formation of a complex of axial organs of chordates. Differentiation of germ layers. The formation of organs and tissues. Provisional organs of chordates. Anamnia's group into Amniotes. Formation, structure, features of functioning and evolution of provisional organs and embryonic membranes. Amnion, chorion or serosa, allantois, yolk sac, placenta. Placenta</p>

			<p>types, its meaning. Violation of the processes of development and reduction of the embryonic membranes in humans. Features of the embryonic development of mammals and humans. Periodization of postembryonic development. The growth and development of the body. Aging as a natural stage of ontogenesis. Manifestations of aging at the molecular genetic, cellular, tissue, organ and organism levels. The influence of genetic factors, conditions and lifestyle on the aging process. Aging patterns. Aging hypotheses. Homeostasis. Regeneration and its forms. Phylogenesis as a process of evolution of ontogenesis. K. Baer's law of embryonic similarity. Biogenetic law. Evolution of the nervous, circulatory, digestive, respiratory, immune and endocrine systems.</p> <p>Evolution of ontogenesis. Recapitulation. Cenogenesis. Phylembryogenesis. Malformations of organs and organ systems.</p>
4	OPK-5 ID- 1 OPK 5	Environmental and biomedical basics parasitism	<p>The ecological basis for the isolation of groups of parasites. The origin of parasitism. Interaction of the "parasite-host" system. Factors of action of the parasite on the host organism. Life cycles of parasites. Transmissible and natural focal diseases. The structure of the natural hearth. Anthroponoses, zoonoses. The simplest, their characteristics (morphological and functional). Representatives of parasitic sarcodes, flagellates, sporozoans and ciliates: structure, developmental cycles, pathogenic action, preventive measures and laboratory diagnostics. Introduction to helminthology. Geohelminths and biohelminths. Characteristics of type Flat and type Round worms. The main representatives are human parasites. Medical arachnoenology. Medical arachnoentomology. The teachings of Academician E.N. Pavlovsky on the natural focus of diseases. Arthropoda type. Arthropods as ectoparasites, poisonous animals, hosts of parasites, pathogens, carriers of human pathogens. Class Arachnoidea: features of the morphology, biology and medical significance of ixodid, argasid, gamasid, sarcoptic, and iron ticks. Insecta class: features of morphology, biology and medical significance of cockroaches, lice, fleas, bedbugs, mosquitoes, mosquitoes, midges, gadflies, horseflies, biting midges and</p>

1	1	Introduction. General characteristics of life	2	2	2	6	1 interview; 2 - test control;
2	1	Fundamentals of General and Medical Genetics	8	24	10	42	1 interview; 2 - test control; 3 - situational tasks;
3	1	Developmental biology. Homeostasis. Regeneration.	4	4	8	16	1 interview; 2 - test control;
4	1	Environmental and medical and biological foundations of parasitism	2	4	2	8	1 interview; 2 - test control; 3 - situational tasks;
		Total for 1 semester:	16	34	22	72	
4	2	Environmental and medical and biological foundations of parasitism	12	24	8	44	1 interview; 2 - test control; 3 - situational tasks;
		4.1. Medical protozoology	2	6	2	10	
		4.2. Medical helminthology Type Flatworms	4	4	2	10	
		4.3 Type Roundworms	2	6	2	10	
	2	4.4. Medical Arachnoentomology	4	8	2	14	
5	2	Phylogenesis of organ systems The evolution of the organic world.	4	8	8	20	1 interview; 2 - test control;
6	2	Fundamentals of Ecology. Human ecology.	2	4	2	8	1 interview; 2 - test control;
		Total for 2 semester:	18	36	18	72	
		Exam		36			
		Total:	34	70	40	180	
Type of intermediate certification			exam				

5.3. Thematic plan of lectures

No.	The name of the discipline section	Lecture topics	Number of hours per family
			No. 1
1.	Introduction. General characteristics of life	1.1. Introduction (Biology - Medicine - Human). Molecular - the cellular level of organization of living things.	2
2.	Fundamentals of General and Medical Genetics	2.1. Genetics. Regularities of heredity in mono- and dihybrid crossing.	2
		2.2. Patterns of heredity at the cellular level. Forms of interaction of allelic and non-allelic genes. Linked gene inheritance.	2
		2.3. Variability. Forms and patterns. Types of mutational disorders.	2
		2.4. Anthropogenetics. Medical genetic counseling	2
3.	Developmental biology. Homeostasis. Regeneration.	3.1. Ontogenesis. Postnatal ontogenesis.	2
		3.2. Homeostasis. Modern problems of organ regeneration and transplantation.	2
4.	Environmental and medical and biological foundations of parasitism	4.1. Ecological and medico-biological foundations of parasitism. Forms, origin and evolution of parasitism.	2
Total for 1 semester:			16
4.	Environmental and medical and biological foundations of parasitism	4.2. Medical protozoology. Diagnostics and prevention of protozoonoses.	2
		4.3. Medical helminthology. Characteristic features of a Flatworm organization. Common human trematodes.	2
		4.4. Medical helminthology. Common human cestodoses.	2
		4.5. Type Roundworms. The class itself is roundworms. Intestinal and tissue nematodes.	2
		4.6. Medical arachnoentomology. Morpho-physiological characteristics, development cycles, geographical distribution and habitats of various	2

		representatives of the arachnid class. Diagnostics of vector-borne diseases.	
		4.7. Type Arthropods . Morpho-physiological characteristics, development cycles, geographical distribution and habitats of various representatives of the insect class. Prevention and medical significance.	2
5	Phylogenesis of organ systems. The evolution of the organic world	5.1. Phylogenesis. Basic principles of the evolution of organ systems. General patterns of development of organ systems.	2
		5.2. Evolution of the organic world The doctrine of micro- and macroevolution.	2
6	Fundamentals of Ecology. Human ecology	6.1. Fundamentals of General Ecology. The doctrine of the biosphere and noosphere. Man and the biosphere.	2
	Total for 2 semester:		18
	TOTAL:		34

5.4. Thematic plan of practical lessons

№ .	Chapter disciplines	Practical training topics	Forms of control		Number of hours in the family No. 1-2
			current **	Frontier *	
1.	Introduction. General characteristics of life	PZ.1. Light microscopes design and technology microscopy.	C, T		2
2.	Fundamentals of General and Medical Genetics	PZ. 2. The cellular level of organization of biological systems.	C, T		2
		PZ.3. Periodization of the cell cycle. Mechanisms and main stages of cell division (mitosis and amitosis).	C, T		2
		PZ.4. Reproduction. Meiosis. Gametogenesis. Colloquium on the section "Cell Biology"	S, T, SZ		2
		PZ.5. Mendel's laws. Mono- and dihybrid crossing. Forms of interaction of allelic and non-allelic genes. Solving problems	C, T		2
		PZ.6. Multiple alleles on the example of the inheritance of human blood groups in the ABO and Rh systems. Multiple allelism.	C, T	T	2

		PZ.7. Linked inheritance of traits. Genetics of sex. Sex-linked inheritance.	S, T, SZ		2
		PZ. 8. Organization of hereditary material. in pro- and karyotes. Chromosomes. Karyotype.	S, T, SZ		2
		PZ.9. The mechanism of the realization of hereditary information in the characteristics of the organism.	S, T, SZ		2
		PZ.10. Variability. Forms and patterns. Types of mutational disorders. Solving problems.	C, T		2
		PZ.11. Medical genetics. Research methods of human genetics .	C, T		2
		PZ.12. Study of human heredity by the example of drawing up genealogies. Biological bases of medico-genetic counseling.	S, T, SZ	T	2
		PZ.13. Colloquium on the section "Fundamentals of General and Medical Genetics".		T	2
3.	Developmental biology. Homeostasis. Regeneration	PZ.14. Ontogenesis. General patterns of embryonic development. Regularities of the post-embryonic period of ontogenesis.	C, T		2
		PZ.15. Homeostasis. Regeneration, transplantation as an opportunity Restoration of homeostasis. Colloquium on Development Biology. Homeostasis. Regeneration".	C, T	T	2
4	Environmental and medical and biological foundations of parasitism	PZ.16. Ecological and medico-biological foundations of parasitism. The sub-kingdom of Protozoa. Sarcocystophora type. Classes Sarcodina, Mastigophora . Morphofunctional characteristics and medical significance of representatives.	S, T, SZ		2
		PZ.17. The Sporozoa class. Ciliophora type. Morpho-functional characteristics and medical significance of representatives. Colloquium on the section "Protozoology".	S, T, SZ		2
		Total for 1 seme.-r:			34
		PZ.18. Flatworms are human parasites. Type Flatworms. Class Tapeworms I. Characteristics and medical significance of representatives.	S, T, SZ		2
		PZ.19. Type Flatworms. Class Tapeworms II. Characteristics and medical significance of representatives.	S, T, SZ		2
		PZ.20. Type Roundworms. Nematode class. Morphofunctional characteristics and medical significance of representatives.	S, T, SZ		2
		PZ.21. Type Roundworms. Nematode class. Morphofunctional characteristics and	S, T, SZ		2

		medical significance of representatives.			
		PZ.22. Laboratory methods for the diagnosis of helminthiasis.	S, T, SZ		2
		PZ.23. Colloquium on the section: "Helminthology".		T	2
		PZ. 24. Type annelids and type Arthropods. Crustacean class.	S, T, SZ	T	2
		PZ.25. Type Arthropods. Class Arachnids.	S, T, SZ		2
		PZ. 26. Type Arthropods. Class Insects. (Troops of Taraknew, Lice and Fleas)	S, T, SZ		2
		PZ.27. Type Arthropods. Order Diptera. Sem. Komarov. Cl. Insecta. Ordo Diptera.	S, T, SZ		2
		PZ.28. Type Arthropods. Order Diptera. Sem. Flies	S, T, SZ		2
		PZ.29. Colloquium on the section "Arachnoentomology".		T	2
5	Phylogenesis of organ systems The evolution of the organic world	PZ. 30. Phylogenesis of organ systems. General patterns of development of organ systems. Phylogenesis of the skin and nervous system.	C, T	T	2
		PZ.31. Respiratory, digestive phylogenesis	C, T		2
		PZ. 32. Phylogenesis of the circulatory and genitourinary system. Colloquium on the section "Phylogenesis of Organ Systems	C, T	T	2
		PZ.33. Anthropogenesis. The shape and main dimensions of the skulls of modern great apes, fossil hominids and humans	C, T		2
6	Fundamentals of Ecology. Human ecology	PZ.34. Introduction to ecology. Environmental factors. Basic laws of ecology. Biosphere as a global ecosystem of the Earth. The teachings of V.I. Vernadsky about the biosphere and noosphere.	C, T		2
		PZ.35. Medical ecology. Habitat and human health. Colloquium on the section "Anthropogenesis and Human Ecology". Final lesson.	C, T	T	2
Total for 2 semester:					36
Total for the year:					70

* Forms of current monitoring of progress (with abbreviations): T - testing, Pr - assessment of the development of practical skills (abilities), ZS - solving situational problems, R - writing and defending an abstract, C - interview on control questions and others.

5.5. Lab lessons are not included in the curriculum

5.6. Educational and methodological support for independent work in the discipline

5.6.1. Student's independent work in the discipline

P / p No.	Chapter disciplines	Name of works	Labor capacity (hour)	Control forms
1.	Introduction. General characteristics of life	Work with lecture material, providing for the study of lecture notes and educational literature; answers to security questions; solving situational tasks	2	WITH
2.	Fundamentals of General and Medical Genetics	Work with lecture material, providing for the study of lecture notes and educational literature; answers to security questions; solving situational tasks; Micropreparations: mitosis in onion root cells (longitudinal section, radio autograph of bone marrow cells, radio autograph of liver cells. Tables: block diagram of the periods of the cell life cycle, (a - mitosis and its phases; b - features of the cell life cycle), a section of a mammalian ovary, immature eggs frog slice testis of rat spermatozoa mammal spermatozoa guinea pig, a structure of sperm guinea pig slice testis rat slice mammalian ovary, ovule frog gametogenesis diagram flowchart meiosis flash animated flowchart oogenesis and fertilization. block -schemes for the interaction of allelic and non-allelic genes in humans. Photo of crossing over in bivalent, block diagrams for linked and sex-linked inheritance of genes in humans. Tables: nucleosome, metaphase chromosome, genetic maps of some human chromosomes, classification of the main forms of variability, variation series , variation curve, block diagrams: classification of mutations, types of gene mutations, nominal mutations (examples), nondisjunction of sex chromosomes during meiosis in the mother, nondisjunction of sex chromosomes during meiosis in the father, chromosomal mutations (classification, examples). Solving situational tasks. Participation in	10	T, C, SZ

		various types of educational classroom work (abstracts in practical classes); speech at the meetings of the student scientific circle (SNK) of the department.		
3.	Developmental biology. Homeostasis. Regeneration	<p>Work with lecture material, providing for the study of lecture notes and educational literature; answers to security questions; solving situational tasks; Micropreparations: crushing frog ovum, frog blastula, frog gastrula. Dummies for the development of lancelet and frog: zygote, stages of 2, 4, 8 blastomeres; morula frog; celloblastula and amphiblastula; gastrula of the lancelet (collection of models "development of the lancelet" - №№ 1, 2, 3, 4, 6, 7, 9, 10, 12; collection of models "development of the frog" - №№ 1, 13, 14). Tables: lancelet development, frog development, frog blastula and gastrula stages (photo), bird development. Wet preparations: fish arterial system, frog arterial system, lizard arterial system, turtles, rat arterial system. Diagrams of the structure of the circulatory systems of representatives of various classes of vertebrates, a block diagram of the evolution of arterial branchial arches in vertebrates, laying of the heart and blood vessels in human embryogenesis. Diagrams and photographs of some congenital anomalies of the heart and blood vessels in humans.</p> <p>Tables: circulatory systems of lancelet, fish, reptile (turtle), birds and mammals, respiratory organs of ancient lungfish, lungs of amphibians, reptiles, birds and mammals; the brain of lower and higher vertebrates, gills of bony fish, lungs of frogs, lizards, birds, rabbits; nervous system of frogs, lizards, rats, birds. Dummies: the</p>	8	T, C

		brain of a fish, frog, lizard, bird, rabbit. Studying control questions on the topic of the lesson, drawing up a synopsis. Basic and additional literature on the topic of the lesson. Participation in various types of educational classroom work (abstracts in practical classes); speech at the meetings of the student scientific circle (SNK) of the department.		
4	Environmental and medical and biological foundations of parasitism	The ecological basis for the isolation of groups of parasites. The origin of parasitism. Interaction of the "parasite-host" system. Factors of action of the parasite on the host organism. Life cycles of parasites. Transmissible and natural focal diseases. The structure of the natural hearth. Anthroponoses, zoonoses. The simplest, their characteristics (morphological and functional). Representatives of parasitic sarcodes, flagellates, sporozoans and ciliates: structure, developmental cycles, pathogenic action, preventive measures and laboratory diagnostics.	2	T, C, SZ
	Total for 1 semester:		22	
4.	Environmental and medical and biological foundations of parasitism	The ecological basis for the isolation of groups of parasites. The origin of parasitism. Interaction of the "parasite-host" system. Factors of action of the parasite on the host organism. Life cycles of parasites. Transmissible and natural focal diseases. The structure of the natural hearth. Anthroponoses, zoonoses. The simplest, their characteristics (morphological and functional). Representatives of parasitic sarcodes, flagellates, sporozoans and ciliates: structure, developmental cycles, pathogenic action, preventive measures and laboratory diagnostics. Introduction to helminthology. Geohelminths and biohelminths. Characteristics of type Flat and type Round worms. The main representatives are human parasites. Medical arachnoenology. Medical	8	T, C, SZ

		<p>arachnoentomology. The teachings of Academician E.N. Pavlovsky on the natural focus of diseases. Arthropoda type. Arthropods as ectoparasites, poisonous animals, hosts of parasites, pathogens, carriers of human pathogens. Class Arachnoidea: features of the morphology, biology and medical significance of ixodid, argasid, gamasid, sarcoptic, and iron ticks. Insecta class: features of morphology, biology and medical significance of cockroaches, lice, fleas, bedbugs, mosquitoes, mosquitoes, midges, gadflies, horseflies, biting midges and flies. Methods for controlling parasitic arthropods and measures for the prevention of diseases caused by them and vector-borne diseases.</p>		
5.	<p>Phylogenesis of organ systems The evolution of the organic world</p>	<p>Work with lecture material, providing for the study of lecture notes and educational literature; answers to security questions; solving situational tasks; Materials of the stand "Geochronological scale and evolution of life". Collections of animals classified by class (lancelet, fish, amphibians, reptiles, birds and mammals). Wet preparations: fish arterial system, frog arterial system, lizard arterial system, turtles, rat arterial system. Diagrams of the structure of the circulatory systems of representatives of various classes of vertebrates, a flowchart of the evolution of arterial branchial arches in vertebrates, the laying of the heart and blood vessels in human embryogenesis. Diagrams and photographs of some congenital anomalies of the heart and blood vessels in humans.</p> <p>Tables: circulatory systems of lancelet, fish, reptile (turtle), birds and mammals, respiratory organs of ancient lungfish, lungs of amphibians, reptiles, birds and</p>	8	T, C

		mammals; the brain of lower and higher vertebrates, gills of bony fish, lungs of frogs, lizards, birds, rabbits; nervous system of frogs, lizards, rats, birds. Dummies: the brain of a fish, frog, lizard, bird, rabbit. ... View, type criteria. Population. Natural selection. Mechanisms of micro- and macroevolution. Stages and factors of anthropogenesis. The shape and main dimensions of the skulls of modern apes, hominid fossils and humans. Studying control questions on the topic of the lesson, drawing up a synopsis. Basic and additional literature on the topic of the lesson.		
6.	Fundamentals of Ecology. Human ecology	Participation in various types of educational classroom work (abstracts in practical classes); speech at meetings of the student scientific circle (SNC) of the department Tables: "Morphophysiological characteristics of people in natural ecosystems and geographical regions (zones of the tropics, highlands, arid regions, the Arctic and continental Siberia, temperate climate"); speech at the meetings of the student scientific circle (SNK) of the department.	2	T, C
	Total:		40	
	Exam preparation	Repetition and consolidation of the studied material (work with lecture material, educational literature); formulation of questions; pre-examination individual and group consultations with a teacher.	24	
	Intermediate type appraisals	Exam	12	WITH

5.6.3. Methodical instructions for students on mastering the discipline

This section of the work program of the discipline was developed as an independent document "**Methodological recommendations for the student**" in the form of an appendix to the work program of the discipline.

VI. ESTIMATED TOOLS FOR RUNNING PERFORMANCE CONTROL AND INTERMEDIATE CERTIFICATION ON THE RESULTS OF THE DISCIPLINE DEVELOPMENT

6.1. Current monitoring of progress

6.1.1. The list of competencies with an indication of the stages of their formation in the process of mastering the work program of the discipline

No. section	The name of the discipline section (module)	Supervised competency code	Forms of control
1	2	3	4
1.	Introduction. General characteristics of life	OPK-5 ID- 1 OPK 5	1 interview; 2 - test control;
2.	Fundamentals of General and Medical Genetics	OPK-5 ID- 1 OPK 5	1 interview; 2 - test control; 3 - situational tasks;
3.	Developmental biology. Homeostasis. Regeneration	OPK-5 ID- 1 OPK 5	1 interview; 2 - test control;
4.	Environmental and medical and biological foundations of parasitism	OPK-5 ID- 1 OPK 5	1 interview; 2 - test control; 3 - situational tasks;
5.	Phylogenesis of organ systems The evolution of the organic world	OPK-5 ID- 1 OPK 5	1 interview; 2 - test control;
6.	Fundamentals of Ecology. Human ecology	OPK-5 ID- 1 OPK 5	1 interview; 2 - test control;

6.1.2. Examples of assessment tools for current and midterm monitoring of progress

For the current control of the progress of the discipline, the following assessment tools are used:

SUPERVISION INTERVIEW

**SECTION №2. FUNDAMENTALS OF GENERAL AND MEDICAL GENETICS
LESSON №3. PERIODIZATION OF THE CELL CYCLE. MECHANISMS AND MAIN STAGES OF CELL DIVISION (MITOSIS AND AMITOSIS)**

Codes of controlled competencies: ID-1 OPK 5

Key educational target questions:

1. The life cycle of a cell, its periodization and characteristics.

2. The mitotic cycle of the cell and the totality of processes occurring at the same time.
3. Periods (phases) of the mitotic cycle.
4. Interphase and its periodization, their characteristics.
5. Mitosis, its characteristics.
6. Phases of mitosis, their characteristics.
7. Biological significance and genetic meaning of mitosis.
8. Characteristics of human metaphase chromosomes.
9. Human karyotype, its study and the principle of drawing up idiograms.
10. Basic rules of chromosomes.
11. Interphase state of chromosomes (DNP), characteristics of euchromatin, heterochromatin
12. Endomitosis and polite.
13. Amitosis, its stages and significance.

**Evaluation criteria for monitoring progress
(interview on the topic of the practical lesson):**

✓ "Fine":

The student has a deep knowledge of the educational material on the topic of the practical lesson, formulated a complete and correct answer to the questions of the topic of the lesson, observing the logic of the presentation of the material, shows the assimilation of the relationship of the basic concepts used in the work, was able to answer all clarifying and additional questions. The student demonstrates knowledge of theoretical and practical material on the topic of the lesson.

✓ "Good":

The student showed knowledge of the educational material, mastered the basic literature, was able to answer almost completely all the additional and clarifying questions asked. The student demonstrates knowledge of theoretical and practical material on the topic of the lesson, allowing minor inaccuracies.

✓ "Satisfactorily":

The student as a whole mastered the material of the practical lesson, did not answer all the clarifying and additional questions. The student gives an incomplete answer, requiring leading questions from the teacher.

✓ "Unsatisfactory ":

The student has significant gaps in knowledge of the basic educational material of the practical lesson, did not fully disclose the content of the questions, and could not answer the clarifying and additional questions. An unsatisfactory mark is given to a graduate who refused to answer the questions of the topic of the practical lesson.

At the end of each section of the discipline, the following assessment tools are used to monitor progress:

TESTING

EXAMPLE!

SECTION № 3. DEVELOPMENT BIOLOGY. HOMEOSTASIS. REGENERATION.

Codes of controlled competencies: ID-1 OPK 5

LESSON №14. ONTOGENESIS. GENERAL REGULARITIES OF EMBRYONIC DEVELOPMENT. REGULARITIES OF POST-EMBRYONIC ONTOGENESIS PERIOD.

1. Internal germ layer of gastrula:

- a) ectoderm;
- b) mesoderm;
- c) endoderm;
- g) blasts - dermis;
- e) mesenchyme.

2. The opening through which the gastric cavity of the embryo communicates with the environment:

- a) blastopore;
- b) gastrocoel;
- c) blastocoel;
- d) cytostomy;
- e) the whole.

3. The process of neural tube have arisen - sha:

- a) segmentation;
- b) neurulation;
- c) delam. ination;
- d) differentiation;
- k) epiboly.

4. Somites are formed from:

- a) ectoderm;
- b) IU - zodermy;
- c) endoderm;
- d) blastoderm;
- e) Mezen - himy.

5. Skeletal muscle tissue develops from:

- a) EC - todermy;
- b) somites;
- c) endoderm;
- d) blastoderm;
- e) mesoderm.

6. During the fertilization period:

- allocation of sperm in the genital tract;
- active movement of the egg;
- blastula formation;
- + formation of a zygote;
- mitotic division without further cell growth.

7. Methods of crushing and gastrulation depend on:

- + from the amount of yolk in the egg;
- from the method of fusion of the egg and sperm;
- from the structure of the egg membranes;
- from the size of the egg;
- from the size of the sperm.

8. Methods of crushing and gastrulation depend on:

- from the duration of the acrosome reaction;
- from the structure of the egg membranes;
- from the rate of penetration of sperm into the egg;
- from ploidy of germ cells;
- + from the distribution of the yolk in the egg.

9. During the crushing period, the following occurs:

- + mitotic division without further cell growth;
- mitotic division followed by cell growth;
- intensive growth of the embryo;
- fusion of the egg and sperm;
- differentiation of cells.

10. Egg crushing ends:

- the formation of a zygote;
- + blastula formation;
- gastrula formation;
- the formation of 2 blastomeres;
- cortical reaction.

TESTING by discipline sections

EXAMPLE!

RUNNING PERFORMANCE CONTROL - TESTS

SECTION 2. FUNDAMENTALS OF GENERAL AND MEDICAL GENETICS

Codes of controlled competencies ID-1 OPK 5

1. Genotype is not a sum, but a system of genes, in which the expression of a given gene is influenced by:

- allelic gene and non-allelic genes;
- environmental factors;
- neallelic genes;
- + environmental factors, allelic gene and non-allelic genes;
- environmental factors and non-allelic genes.

2. Types of interaction of non-allelic genes:

- polymeria, epistasis, codominance;
- complementarity, pleiotropy, epistasis;
- + complementarity, polymeria, epistasis;
- codomination, pleiotropy, epistasis;
- polymeria, epistasis, pleiotropy.

3. In case of dominant epistasis (epistatic gene - B), the manifestation of a trait controlled by the dominant gene (A) will not be in the genotype:

- Aavb;
- aaBv
- Aavb;
- + AaBv;
- aaBB.

4. The type of interaction of two dominant non-allelic genes, in which a new phenotypic manifestation of a trait is called:

- epistasis;
- polymer;
- pleiotropy;
- + complementarity;
- penetrance.

5. Choose a variant of the genotype in which the comb in chickens and roosters will be nutty, if its inheritance is determined by the type of complementarity:

- Aa centuries;
- aa BB;
- aa cv
- Aa centuries;
- + Aa BB.

6. The type of inheritance in which the development of a trait is due to several (more than 2) non-allelic genes is called:

- pleiotropy;
- complementarity;
- penetrance;
- epistasis;
- + polymerization.

7. An example of the pleiotropic action of a gene is a disease:

- hemophilia;
- daltonism;
- + Marfan syndrome;
- Down syndrome;
- Edwards syndrome.

8. Name the condition for independent inheritance of traits according to III Mendel's law:

- genes that determine traits must be in the same linkage group;
- genes that determine traits must be in the X- and Y-chromosome;
- + genes that determine the analyzed traits must be in different pairs of homologous chromosomes;
- genes that determine traits must be in the same group of chromosomes;
- genes that determine traits must be on the Y-chromosome.

9. Dominant traits linked to the X chromosome determine:

- daltonism;
- + rickets resistant to vitamin D;
- Edwards syndrome;
- psoriasis;
- Marfan's syndrome.

10. A healthy woman whose father suffered from hemophilia and a sick man enter into marriage. Determine the likelihood of having healthy children:

- all children are sick;
- + 50% of children are healthy;
- 75% of girls are healthy;
- 100% of girls are healthy;
- 25% of boys are healthy.

11. If a man with color blindness marries a healthy woman, whose father suffered from this disease, and the mother was healthy, the likelihood of this symptom in children is:

- 100% among boys;
- 25% among boys;
- 75% among children;
- 100% for girls only;
- + 50% for boys and 50% for girls.

12. The express method for the determination of X-sex chromatin can be used to diagnose the following syndromes:

- + Klinefelter;
- Lezhien;
- Marfana;
- Wolf;
- Patau.

13. Violation of the number of autosomes due to the following syndromes:

- Shereshevsky-Turner;
- Klinefelter;
- "cat's cry";
- poly-X syndrome;
- + Down.

14. Patients with sickle cell anemia have disorders:

- decrease in the rate of synthesis of alpha-chains of hemoglobin molecules;
- + substitution in the sixth position of the beta chain of glutamic acid for valine;
- substitution in the seventh position of the beta chain of glutamic acid for valine;
- increased hemoglobin content in erythrocytes
- none of the above answers.

15. Intrauterine (prenatal) underdevelopment and numerous malformations of the skeletal system are characteristic of patients with the syndrome:

- + Edwards;
- Patau;
- Lezhien;
- poly - X - syndrome;
- none of the above diseases.

Evaluation criteria for monitoring progress (tests):

- ✓ "Excellent": 100-90%_
- ✓ "Good": 89-70%_
- ✓ "Satisfactory": 69-51%_
- ✓ "Unsatisfactory": <50%_

SITUATION TASKS BY SECTION OF DISCIPLINE

EXAMPLE!

SECTION 2. FUNDAMENTALS OF GENERAL AND MEDICAL GENETICS

Codes of controlled competencies ID-1 OPK 5

Task 1. Phenylketonuria (metabolic disorder of phenylalanine, resulting in dementia) is inherited as a recessive trait. What kind of children can be in a family where parents are heterozygous for this trait?

Task 2. In humans, the presence of the Rh factor (Rh +) is due to the dominant gene D. The absence of the Rh protein (Rh -) is due to the recessive gene d. Gene I₀(I) blood group is recessive in relation to genes I_A(II) and I_B(III) blood groups. A woman Rh - homozygous for I_A(II) blood group, married an Rh + man (heterozygote) with I₀(I) blood group. Determine the genotypes of the parents, possible blood groups, Rh factor and genotypes of the children.

Task 3. In humans, the presence of the Rh factor (Rh +) is due to the dominant gene D. The absence of the Rh protein (Rh -) is due to the recessive gene d. Gene I₀(I) blood group is recessive in relation to genes I_A(II) and I_B(III) blood groups. The father has a fourth blood group and a negative Rh factor, the mother has a first group and a positive Rh (homozygote). Determine the genotypes of the parents, possible blood groups, Rh factor and genotypes of the children.

**SECTION 4. ENVIRONMENTAL AND MEDICAL AND BIOLOGICAL BASIS
OF PARASITISM**

Codes of controlled competencies ID-1 OPK 5

Task 1. The specialist came from a developing African country. Two months later, he developed complaints of bloody diarrhea, pain along the bowels and in the right ileal region, general weakness, and loss of appetite. What disease can be assumed? How to clarify the diagnosis?

Objective 2. The worker worked for two years in Angola. A month after returning, he came to the doctor with complaints of periodic fever, headaches, weakness. Examination revealed enlargement of the liver and spleen. How is the suspected disease diagnosed?

Task 3. A patient with symptoms of gastrointestinal tract lesions was found to have lamblia cysts. Is it possible on this basis to say that the symptoms are caused by the parasitism of lamblia.

Task 4. Indicate which of the listed diseases can be assumed if, when analyzing a patient separated from skin ulcers, flagellate, round-shaped protozoa are found: a) trichomoniasis; b) leishmaniasis; c) trypanosomiasis; d) giardiasis; e) amebiasis.

Criteria for assessing the current monitoring of progress (situational tasks):

✓ "Fine":

The answer to the problem is correct. The explanation of the course of its solution is detailed, consistent, competent, with theoretical justifications (including from the lecture course), the answers to additional questions are correct, clear.

✓ "Good":

The answer to the problem is correct. The explanation of the course of its solution is detailed, but not logical enough, with isolated errors in details, some difficulties in theoretical substantiation (including from the lecture material), the answers to additional questions are correct, but not clear enough.

✓ "Satisfactorily":

The answer to the problem is correct. The explanation of the course of its solution is insufficiently complete, inconsistent, with errors, weak theoretical justification (including lecture material), with significant difficulties and errors; answers to additional questions are not clear enough, with errors in details.

✓ "Unsatisfactory":

The answer to the question of the problem is given incorrectly. The explanation of the course of its solution was given incomplete, inconsistent, with gross errors, without theoretical justification (including lecture material); the answers to additional questions are incorrect (missing).

6.2. Interim certification based on the results of mastering the discipline

6.2.1. Interim assessment form - exam in the 2nd semester

6.2.2. The midterm certification procedure is orally.

**6.2.3. SAMPLE LIST OF QUESTIONS TO PREPARE FOR A BIOLOGY EXAM
for 1st year students of the Faculty of General Medicine.**

Codes of controlled competencies: ID-1 OPK 5

1. Biology is the theoretical basis of medicine. Biology: definition, the current stage of development of biology, the place and tasks of biology in the system of training a doctor.
2. Genetics as a Science. The subject and tasks of genetics. Heredity and variability (definition). The main stages of the development of genetics, their brief description. The role of domestic and foreign scientists in the development of genetics. The role of genetics in modern biology and medicine.
3. The main patterns of inheritance of traits. The works of G. Mendel and their role in the study of the inheritance of traits. Genetic concepts: gene, genotype, phenotype, homozygosity, heterozygosity, hemizygosity. Monogenic inheritance as a mechanism for the transfer of quality characteristics to the descendant. The role of allelic genes. Monohybrid crossing. The law of uniformity of the first generation hybrids (example).
4. Dominance and recessiveness. The law of splitting traits in hybrids of the 2nd generation (example). The law of "gamete purity". Di- and polyhybrid crossing (examples). 3rd law of G.

Mendel. Graphic representation of the 2nd and 3rd laws of G. Mendel. The statistical nature of Mendelian laws.

5. Hybridological analysis is the main method of genetics. Conditions for the Mendelian Characteristics. Incomplete dominance (example). Analyzing cross (example). Overdominance (example).

6. Linear arrangement of genes in chromosomes. Chromosomes as linkage groups of genes. Genetic and cytological maps of chromosomes. The main provisions of the chromosomal theory.

7. Mendelian signs of a person. Independent combination of non-allelic genes. 3rd Mendel's law (definition). Linked trait inheritance (definition). Inheritance of sex-linked traits (definition). Polygenic inheritance as a mechanism for the inheritance of quantitative traits.

8. Genotype and phenotype (definition). The concept of allelic genes. Their localization is in chromosomes. The nature of the interaction of allelic genes during dominance, intermediate manifestation of a trait, codominance (examples).

9. The theory of multiple alleles. The nature of the interaction of alleles in the determination of blood groups of the ABO system in humans. Antigens of blood groups of the ABO system. Possible genotypes according to the ABO system. Inheritance of the Rh factor in humans.

10. The concept of non-allelic genes. Their localization is in chromosomes. Epistasis and hypostasis as a reflection of the interaction of non-allelic genes (example). Complementarity (definition, example). Pleiotropy (definition, example). Multifactorial principle of phenotype formation as an expression of the dialectical unity of genetic and environmental factors.

6.2.4. Sample ticket.

FSBEI VO DSMU
Ministry of Health of Russia

Department of Medical Biology

MEDICAL FACULTY
Discipline "Biology"

Examination ticket number 2

1. Biology: definition, the current stage of development of biology, the place and tasks of biology in the system of training a doctor.
2. Multiple alleles and polygenic inheritance in humans. Interaction of non-allelic genes: complementarity, epistasis, polymeria.
3. Processes of micro- and macroevolution. Differences and driving forces of these processes.

Approved at a meeting of the department, minutes of "_26" __ August 2021, No. 1__
Head of the department A.M. Magomedov
Compiled by K.G. Alieva

6.2.5. The system for assessing the results of mastering the discipline, a description of the assessment scales, grading

The grading system includes an exam

Controlled competency codes ID- 1 OPK 5			
Grading scale			
"Unsatisfactory" (minimum level not reached)	"Satisfactory" (minimum level)	"Okay" (average level)	"Great" (high level)
Know			
The student is unable to differentiate the main taxonomic groups of organisms, to use knowledge about the principles of their taxonomy and classification, does not understand the importance of biodiversity for the sustainability of the biosphere. When answering (for one question) makes more than two gross mistakes that cannot be corrected even with the help of a teacher	The student has mastered the main content of the educational material, has gaps in the assimilation of the material, which do not interfere with the further assimilation of the program material. The material is presented not in a systematic way, fragmentarily, not always consistently. Shows insufficient formation of certain knowledge and skills; arguments and generalizations weakly, makes mistakes in them.	The student demonstrates knowledge about the biodiversity of biological objects, methods of description, observation, identification of diagnostic features and identification of organisms of different taxonomic groups, which corresponds to the expected results of mastering this competence, but makes minor mistakes and shortcomings when reproducing the studied material, defining concepts, etc.	The student demonstrates knowledge about the biodiversity of biological objects, methods of description, observation, identification of diagnostic features and identification of organisms of different taxonomic groups, which corresponds to the expected results of mastering this competence
Be able to			
The student does not know how to apply in practice knowledge about the principles of the cellular organization of biological objects, does not know how to identify fragments and eggs of human helminths	The student has difficulty in identifying the main principles of cellular organization, makes mistakes when identifying parasites, helminth eggs, etc.	The student is able to independently highlight the main provisions in the studied material; on the basis of facts and examples to generalize, draw conclusions, establish intra-subject connections. Apply the knowledge gained in practice in a modified situation, observing the basic rules of the culture of oral speech and accompanying writing, using scientific terms	The student is able to make permanent micropreparations to determine the species of parasites, pathogens and carriers of various diseases;

VII. EDUCATIONAL - METHODOLOGICAL AND INFORMATION SUPPORT OF THE DISCIPLINE

7.1. Main literature

Printed editions

No.	Editions	Number of copies in the library
1	Biology: a textbook for honey. universities, ed. V. N. Yarygina, Moscow: Publishing house "GEOTAR-Media", 2014. In 2 vols. T1. - 300 s; Vol.2.- 320 p .; ISBN 978-5-9704-3028-6	600
2	Biology with general genetics . A. A. Slyusarev / Moscow: Alliance Publishing House, 2011.478 p. ISBN 978-5-91872-009-7	475

Electronic publications

1	Biology: [electronic text] textbook. : in 2 volumes / ed. V.N. Yarygina. - M.: GEOTAR-Media, 2015.-- T. 1 - 736 p. - Access mode: https://www.studentlibrary.ru/book/ISBN9785970435649.html
2	Biology: [electronic text] textbook. : in 2 volumes / ed. V.N. Yarygina. - M.: GEOTAR-Media, 2015.-- T. 2. - 560 p. - Access mode: https://www.studentlibrary.ru/book/ISBN9785970435656.html
3	Pekhov, A. P. Biology: medical biology, genetics and parasitology: [electronic text] textbook for universities / A. P. Pekhov. - 3rd ed., Stereotype. - M.: GEOTAR-Media, 2014.-- 656 p. - Access mode: https://www.studentlibrary.ru/book/ISBN9785970430729.html
4	.Biology: head of laboratory. classes: [text electronic] textbook. manual / ed. O.B. Gigani. - M.: GEOTAR-Media, 2016.-- 272 p. - Access mode: https://www.studentlibrary.ru/book/ISBN9785970437261.html

7.2. additional literature

Printed editions

No.	Editions	Number of copies in the library
1	Biology. In 2 vols. T. 2: textbook. for doctors. specialist. universities / V. N. Yarygin, V. I. Vasilyeva, I. N. Volkov, V. V. Sinelshchikova; edited by V.N. Yarygin. - 3rd publishing house, erased. - Moscow: Higher school, 2003.-- 352 p. ISBN 5-06-004588-9	720
2	Atlas on zooparasitology / (edited by M.V.Dalin . V.K. Gusev.) Moscow, 1998 ISBN 458-18	50
3	A guide to laboratory exercises in biology and ecology. / ed. N.V. Chebysheva., Moscow: Publishing house "Medicine", 2011, 180 p. ISBN 978-597-043411-6	200
4	Biology: a guide to laboratory studies: textbook ed. ABOUT. Gigani. - M: publishing house GEOTAR Media, 2012.-- 272 p. ISBN 978-597-042138-3	thirty
5	Biology: Medical biology, genetics and parasitology: a textbook for medical students, edited by A.P. Pekhov / Moscow: publishing house GEOTAR-Media, 2014.- 656 p. ISBN 978-5-9704-3072-9	one hundred

Electronic publications

No.	Editions
1	http://www.studmedlib.ru/ru/doc/ISBN9785970436639-0006.html
2	http://www.studmedlib.ru/ru/book/ISBN9785970414132.html
3	http://www.studmedlib.ru/ru/book/ISBN9785970407202.html
4	http://www.studmedlib.ru/ru/book/ISBN9785970416068.html

7.3 Resources of the information and telecommunications network "Internet"

No.	Resource name	Website address
1.	Medicine news	info@univadis.ru
2.	Health issues. Information about WHO	http://www.who.int/en/
3.	Ministry of Education and Science of the Russian Federation	http://minobrnauki.rf
4.	Ministry of Health of the Russian Federation	http://www.rosminzdrav.ru
5.	Ministry of Health of the Republic of Dagestan	http://minzdravrd.ru
6.	Scientific electronic library CyberLeninka	http://cyberleninka.ru
7.	Electronic scientific library	https://elibrary.ru/defaultx.asp
8.	Federal Electronic Medical Library (FEMB)	http://feml.scsml.rssi.ru
9.	Univadis®: An international education and information portal that helps physicians around the world stay at the forefront of their specialties.	http://www.medlinks.ru/
10.	Medical search engine	http://www.medinfo.ru/
11.	Department page address	https://dgm.ru/kafedry-2/
12.	Electronic library of textbooks.	http://studentam.net
13.	Portal textbooks - free RF.	http://tutorials-free.rf/http://sci-book.com/

7.4. Information Technology

When studying the discipline, a general package of documents is used, Internet materials, which provide ample opportunities for improving university training in biology in order to master the skills of educational activities. The standard features of most programs are the implementation of the didactic principle of visibility in teaching; their use enables students to use various methods to solve an educational problem.

Teaching methods using information technology. The methods of teaching using information technologies used in the classroom in the discipline "Biology" include:

- computer testing;
- demonstration of multimedia materials,
- a list of search engines (site moodle.dgmu.ru). - a list of encyclopedic sites.

List of licensed software

1. Operating system Microsoft Windows 7 Professional.
2. Operating system Microsoft Windows 10 Pro
3. Application packages: Microsoft Office Professional Plus 2007 Microsoft Office Professional Plus 2010
Microsoft Office Professional Plus 2013
Microsoft Office Standard 2013 Microsoft Office Standard 2016 consisting of: Microsoft Word 2007 (2010, 2013, 2016),
Microsoft Excel 2007 (2010, 2013, 2016),
Microsoft Power Point 2007 (2010, 2013, 2016).

List of information reference systems:

1. **Electronic information and educational environment (EIOS) DSMU** . URL: <https://eos-dgmu.ru>
2. EBS "Student Consultant" / <https://www.studentlibrary.ru/>
3. **Federal electronic medical library (FEML)** . URL: <http://feml.scsml.rssi.ru>
4. **Scientific electronic library eLibrary**. URL: <https://elibrary.ru/defaultx.asp>
5. **Medical informational reference system**. URL: <http://www.medinfo.ru/>

MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE

N p/ p	Room type with number	equipment identification
one	Office of the head of the department - 2 rooms -36.0 m ² St. Shamil 48, educational and laboratory building, 3rd floor.	1 personal computers - 2 pcs; 2 printer "Canon", "HP" - 1 piece; 3 refrigerator - 1 pc.
2	Classroom No. 1 - 40 m ² for practical training for 50 seats St. Shamil 48, educational and laboratory building, 3rd floor.	Portable multimedia equipment, laptop, projector; blackboard, classroom furniture, teacher's table - 1, hanger - 1pc., clock - 1pc.); microscopes, micro-, macropreparations
3	Classroom number 2 - 30 m ² for practical training St. Shamil 48, educational and laboratory building, 3rd floor.	Portable multimedia equipment, laptop, projector; blackboard, classroom furniture, teacher's table - 1, hanger - 1pc., clock - 1pc.); microscopes, micro-, macropreparations
4	Classroom № 3 - 30 m ² for practical training St. Shamil 48, educational and laboratory building, 3rd floor.	Portable multimedia equipment, laptop, projector; blackboard, classroom furniture, teacher's table - 1, hanger - 1pc., clock - 1pc.); microscopes, micro-, macropreparations
5	Classroom No. 4 - 30 m ² for practical training St. Shamil 48, educational and laboratory building, 3rd floor.	Portable multimedia equipment, laptop, projector; blackboard, classroom furniture, teacher's table - 1, hanger - 1pc., clock - 1pc.); microscopes, micro-, macropreparations
6	Classroom № 5 - 30 m ² for practical training St. Shamil 48, educational and laboratory building, 3rd floor.	Portable multimedia equipment, laptop, projector; blackboard, classroom furniture, teacher's table - 1, hanger - 1pc., clock - 1pc.); microscopes, micro-, macropreparations

7	Classroom No. 6 - 30 m ² for practical training St. Shamil 48, educational and laboratory building, 3rd floor.	Portable multimedia equipment, laptop, projector; blackboard, classroom furniture, teacher's table - 1, hanger - 1pc., clock - 1pc.); microscopes, micro-, macropreparations
8	Classroom № 7 - 30 m ² for practical training St. Shamil 48, educational and laboratory building, 3rd floor.	Portable multimedia equipment, laptop, projector; blackboard, classroom furniture, teacher's table - 1, hanger - 1pc., clock - 1pc.); microscopes, micro-, macropreparations
9	Reading rooms - for independent work. st. A.Aliyeva 1, biological building, 1st floor, scientific library of the DSMU.	Tables, chairs, computers for working with electronic resources of the library, educational, scientific, periodical literature.

XI. FEATURES OF THE ORGANIZATION OF TRAINING ON THE DISCIPLINE FOR THE DISABLED AND PERSONS WITH DISABILITIES

11.1. Training of people with disabilities and people with disabilities

If necessary, it is carried out by the department on the basis of an adapted work program using special teaching methods and didactic materials, compiled taking into account the characteristics of psychophysical development, individual capabilities and the state of health of such students (student).

Mastering the curriculum of the discipline by disabled people and persons with disabilities, the department provides:

- 1) for people with disabilities and people with visual impairments:
 - placement in accessible for students who are blind or visually impaired, places and in an adapted form of reference information on the schedule of training sessions;
 - the presence of an assistant who provides the student with the necessary assistance;
 - release of alternative formats of teaching materials (large print or audio files);
- 2) for people with disabilities and people with hearing disabilities:
 - reproduction of information by appropriate sound means;
- 3) for disabled people and persons with disabilities with disorders of the musculoskeletal system:
 - the possibility of unimpeded access of students to classrooms, toilet rooms and other premises of the department. In case of impossibility of unimpeded access to the department, organize the educational process in a specially equipped center for individual and collective use of special technical training aids for the disabled and persons with disabilities (A.Aliyev st. 1, biological building, 1st floor of the DSMU).

11.3. Education of students with disabilities can be organized both together with other students, and in separate groups.

11.4. The list of educational and methodological support for independent work of students in the discipline.

Educational and methodological materials for independent work of students from among the disabled and persons with disabilities are provided in forms adapted to the limitations of their health and perception of information:

Categories of students	Forms
hearing impairment	- in printed form; - in the form of an electronic document;
Visually impaired	- in printed form in enlarged font; - in the form of an electronic document; - in the form of an audio file;
With a violation of the musculoskeletal system	- in printed form; - in the form of an electronic document;

This list can be specified depending on the contingent of students.

11.5. Fund of assessment tools for intermediate certification of students in the discipline.

11.5.1. The list of funds of appraisal means, correlated with the planned results of the development of the educational program.

For students with disabilities

Categories of students	Types of appraisal tools	Forms of control and assessment of learning outcomes
Hearing impaired	test	predominantly written verification
Visually impaired	interview	predominantly oral check (individually)
With a violation of the musculoskeletal system	solution of distance tests, control questions	organization of control in EIOS DSMU, written verification

Students with disabled persons and persons with disabilities have more time to prepare answers for the test, they are allowed to prepare for the test using distance learning technologies.

11.5.2. Methodological materials defining procedures for assessing knowledge, skills, skills and (or) experience of activities, characterizing the stages of the formation of competencies.

When carrying out the procedure for assessing the learning outcomes of disabled people and people with disabilities, the use of technical means necessary for them in connection with their individual characteristics is envisaged.

The procedure for assessing the learning outcomes of persons with disabilities and persons with disabilities by discipline provides for the provision of information in forms adapted to the limitations of their health and perception of information:

For persons with visual impairments:

- in printed form in enlarged font;
- in the form of an electronic document;
- in the form of an audio file.

For the hearing impaired:

- in printed form;
- in the form of an electronic document.

For persons with musculoskeletal disorders:

- in printed form;
- in the form of an electronic document;

- in the form of an audio file.

This list can be specified depending on the contingent of students.

When carrying out the procedure for assessing the learning outcomes of disabled people and people with disabilities by discipline (module), the following additional requirements are met, depending on the individual characteristics of students:

1. instruction on the procedure for conducting the assessment procedure is provided in an accessible form (orally, in writing, orally using the services of a sign language interpreter);

2. an accessible form for providing assignments of assessment tools (in printed form, in printed form in an enlarged font, in the form of an electronic document, assignments are read by an assistant, assignments are provided using sign language translation);

3. an accessible form of providing answers to tasks (in writing on paper, typing answers on a computer, using the services of an assistant, orally).

If necessary, for students with disabilities and the disabled, the procedure for assessing learning outcomes in a discipline can be carried out in several stages.

The procedure for assessing the learning outcomes of persons with disabilities and persons with disabilities is allowed using distance learning technologies.

11.6. The list of basic and additional educational literature necessary for mastering the discipline.

For the development of the discipline by disabled people and persons with disabilities, basic and additional educational literature is provided in the form of an electronic document in the library fund and / or in electronic library systems. And also free special textbooks and teaching aids, other educational literature and special technical training aids for collective and individual use, as well as the services of sign language interpreters and tiflosurd interpreters are provided.

11.7. Methodical instructions for students on mastering the discipline

Individual work is of great importance in mastering the discipline by disabled people and persons with disabilities. Individual work means two forms of interaction with the teacher: individual educational work (consultation), i.e. additional explanation of the educational material and in-depth study of the material with those students who are interested in this, and individual educational work. Individual counseling on a subject is an important factor in promoting individualization of teaching and the establishment of educational contact between a teacher and a student with a disability or student with a disability.

11.8. Description of the material and technical base necessary for the implementation of the educational process in the discipline

The development of discipline by disabled people and persons with disabilities is carried out using general and special-purpose teaching aids:

- lecture hall - multimedia equipment, mobile radio class (for students with hearing impairments); power supplies for individual technical equipment;

- classroom for practical classes (seminars) multimedia equipment, mobile radio class (for students with hearing impairments);

- classroom for independent work - standard workplaces with personal computers; a workstation with a personal computer, with a screen reader, a screen magnifier and a braille display for students with visual impairments.

In each classroom where disabled people and persons with disabilities are trained, there must be an appropriate number of places for students, taking into account the limitations of their health.

X. CHANGE SHEET

List of additions and changes made to the work program of the discipline	RP updated at a meeting of the department		
	date	The number of the minutes of the meeting of the department	Signature of the head of the department
<p>The following changes are made to the work program</p> <p>one.;</p> <p>2 etc.</p> <p>or a note is made about the inexpediency of making any changes for this academic year</p>			