



EDUCATIONAL TRAINING PROGRAM OF DISCIPLINE
“BIOLOGY”

the main professional educational program of higher education - specialty program in the
specialty 31.05.01 General Medicine, approved, May , 24, 2023

Form of education	Full-time
The period of development	6
Department of	Biology and histology

When developing an educational training program, the discipline is based on:

1. Federal State Educational Standard of Higher Education on specialty 31.05.01 General Medicine, approved by the Ministry of Education and Science of the Russian Federation on February, 09, 2016 №95
2. Academic plan on specialty 31.05.01 General Medicine,
ЛД-16-04-18 ИИ
ЛД-16-05-19 ИИ
ЛД-16-06-20 ИИ,
approved by the Scientific Council of the Federal State Budgetary Educational Institution of Higher Education «North-Ossetia State Medical Academy» of the Ministry of Healthcare of the Russian Federation “24” May 2023, Protocol № 8.

The educational training program of the discipline was approved at a meeting of the central coordinating training and methodological council from “23” May 2023, Protocol №. 5

The educational training program of the discipline was approved by the Scientific Council of the State Medical University of the Federal State Budgetary Educational Institution of Higher Education «North-Ossetia State Medical Academy» of the Ministry of Healthcare of the Russian Federation from “24” May 2023, Protocol № 8.

Developers:

Head of the department _____ L.V.Bibaeva

Senior lecturer _____ A.A.Tseboeva

Reviewers:

Dean of the faculty of biotechnology
and standardization of the Gorsky state agricultural UNIVERSITY
M. D. Professor

T..M. Butaev

Head of the Department of Hygiene of the MPF with Epidemiology of

FSBEI HE NOSMA MOH Russia M. D. Professor

B. G. Tsugkicv

Contents of the training program

1. The name of the discipline;
2. List of planned results of training in the discipline, correlated with the planned results of the development of the educational program;
3. Indication of the place of the discipline in the structure of the educational program;
4. The amount of discipline in credit units, indicating the number of academic or astronomical hours allocated to the contact work of students with the teacher (by types of training sessions) and the independent work of students;
5. Content of the discipline, structured according to topics (sections) indicating the number of academic or astronomical hours assigned to them and types of training sessions;
6. List of educational and methodological support for independent work of students in discipline;
7. A fund of evaluation tools for conducting intermediate certification of trainees in discipline;
8. List of basic and additional educational literature necessary for mastering the discipline;
9. List of resources of the information and telecommunication network "Internet", necessary for mastering the discipline;
10. Methodical instructions for students to learn the discipline;
11. List of information technologies used in the implementation of the educational process for discipline, including a list of software and information reference systems (if necessary);
12. A description of the material and technical base necessary for the implementation of the educational process for discipline.
13. Using of internet technologies and distance learning technologies

1. Discipline - Biology

2. The list of planned results of training in the discipline and the results of mastering the educational program

№№	Competency number / index	Content of competence (or part thereof)	Results of development		
			know	be able	to own
1	2	3			
1.	GC-5	Cytology. Properties of life and levels of organization of the living. Cell as an elementary form of organization of living matter. Types of cellular organization.	<ul style="list-style-type: none"> • Light microscope device, • The name of the main parts and their purpose • Rules for working with a microscope • The main types of cellular organization • The structure of pro and eukaryotes • The main provisions of the cellular theory. • Structure and function of cell organelles. 	<ul style="list-style-type: none"> • light the microscope; • Find an object at a small and large magnification • Using the audit tables to find differences in the structure of cells (unicellular, multicellular, plant, animals); • Prepare a temporary micron preparation of onion peel, identify the constituent parts of the cell, • Correctly draw the observed object 	<ul style="list-style-type: none"> • The technique of working with a light microscope and the preparation of a temporary microscopic preparation
		Cytology. Organization and implementation of hereditary material of pro- and eukaryotes.	<ul style="list-style-type: none"> • Principles of the structure of DNA and RNA, as the most important biopolymers of the cell; • The main stages and values of the reduplication process. • The main stages and values of the transcription process. • The principle of recording hereditary information in nucleic acid molecules and the properties of the biological code; • The main stages of protein biosynthesis in the cell; • The most important types of gene mutations and their possible consequences for 	<ul style="list-style-type: none"> • Distinguish features simple and complex; • To solve tasks on modeling of reduplication processes, transcription of translation. • Use the genetic code table; • using chromosome sets, to carry out karyotype analysis, to determine the sex of the organism; identify various variants of aneuploidy in humans; • using the audit tables to characterize hereditary syndromes caused by violations of the normal karyotype 	<ul style="list-style-type: none"> • Methods of solving problems in cytology.

			<ul style="list-style-type: none"> humans. • structure and classification of chromosomes; • features of human karyotype; • the most important types of chromosomal and genomic mutations, mechanisms of their occurrence and possible consequences for a person; 		
		Cytology. Reproduction as a common property of the living. The life cycle of a cell. Mitosis. Meiosis	<ul style="list-style-type: none"> • similarity and differences in the concepts of "cell cycle" and "mitotic cycle"; • processes occurring in the cell during interphase and mitosis; • the main forms of pathological mitoses, their possible causes and consequences. • distinctive features and biological significance of meiosis; • the main forms of pathology of meiosis, their possible causes and consequences. 	<ul style="list-style-type: none"> • determine the number of chromosomes and DNA (n, c) in any period of the mitotic cycle, and at various stages of meiosis. • to identify on the preparation various phases of mitosis and meiosis 	<ul style="list-style-type: none"> • Methods of solving problems in cytology.
	GPC-1	Cytology. Properties of life and levels of organization of the living. Cell as an elementary form of organization of living matter. Types of cellular organization.	<ul style="list-style-type: none"> • Light microscope device, • The name of the main parts and their purpose • Rules for working with a microscope • The main types of cellular organization • The structure of pro and eukaryotes • The main provisions of the cellular theory. • Structure and function of cell organelles. 	<ul style="list-style-type: none"> • light the microscope; • Find an object at a small and large magnification • Using the audit tables to find differences in the structure of cells (unicellular, multicellular, plant, animals); • Prepare a temporary micron preparation of onion peel, identify the constituent parts of the cell, • Correctly draw the observed object 	<ul style="list-style-type: none"> • The technique of working with a light microscope and the preparation of a temporary microscopic preparation
		Cytology. Organization and implementation of hereditary material pro-eukaryotes.	<ul style="list-style-type: none"> • Principles of the structure of DNA and RNA, as the most 	<ul style="list-style-type: none"> • Distinguish features simple and complex; 	<ul style="list-style-type: none"> • Methods of solving problems in cytology.

			<p>important biopolymers of the cell;</p> <ul style="list-style-type: none"> • The main stages and values of the reduplication process. • The main stages and values of the transcription process. • The principle of recording hereditary information in nucleic acid molecules and the properties of the biological code; • The main stages of protein biosynthesis in the cell; • The most important types of gene mutations and their possible consequences for humans. • structure and classification of chromosomes; • features of human karyotype; • the most important types of chromosomal and genomic mutations, mechanisms of their occurrence and possible consequences for a person; 	<ul style="list-style-type: none"> • To solve tasks on modeling of reduplication processes, transcription of translation. • Use the genetic code table; • using chromosome sets, to carry out karyotype analysis, to determine the sex of the organism; identify various variants of aneuploidy in humans; • using the audit tables to characterize hereditary syndromes caused by violations of the normal karyotype 	
		<p>Cytology. Reproduction as a common property of the living. The life cycle of a cell. Mitosis. Meiosis</p>	<ul style="list-style-type: none"> • similarity and differences in the concepts of "cell cycle" and "mitotic cycle"; • processes occurring in the cell during interphase and mitosis; • the main forms of pathological mitoses, their possible causes and consequences. • distinctive features and biological significance of meiosis; • the main forms of pathology of meiosis, their possible causes and consequences. 	<ul style="list-style-type: none"> • determine the number of chromosomes and DNA (n, c) in any period of the mitotic cycle, and at various stages of meiosis. • to identify on the preparation various phases of mitosis and meiosis 	<ul style="list-style-type: none"> • Methods of solving problems in cytology.

2.	GC-5	Ontogenesis. General patterns of embryonic development. Regulation of ontogenesis.	<ul style="list-style-type: none"> • periods of ontogeny and types of postembryonic development of organisms; • structure of gamets; • the course of the fertilization process, its stages, the essence of fertilization; • the main types of eggs, methods of crushing, types of blastula, mechanisms of crushing; the main methods of gastrulation, characteristic of chordates and possible consequences of gastrulation and crushing disorders; the main stages of organogenesis; • derivatives of embryonic leaflets in humans; • development, structure and functions of the amniot's provisional organs and their features in humans; • possible consequences of developmental disorders of provisional organs in humans 	<ul style="list-style-type: none"> • correctly sketch the various stages of embryogenesis, make a designation for the figures. • Apply the knowledge to understand modern methods of prenatal diagnosis of hereditary diseases of the fetus 	-
	GPC-1	Ontogenesis. General patterns of embryonic development. Regulation of ontogenesis.	<ul style="list-style-type: none"> • periods of ontogeny and types of postembryonic development of organisms; • structure of gamets; • the course of the fertilization process, its stages, the essence of fertilization; • the main types of eggs, methods of crushing, types of blastula, mechanisms of crushing; the main methods of gastrulation, characteristic of chordates and possible 	<ul style="list-style-type: none"> • correctly sketch the various stages of embryogenesis, make a designation for the figures. • Apply the knowledge to understand modern methods of prenatal diagnosis of hereditary diseases of the fetus 	-

			<p>consequences of gastrulation and crushing disorders; the main stages of organogenesis;</p> <ul style="list-style-type: none"> • derivatives of embryonic leaflets in humans; • development, structure and functions of the amniot's provisional organs and their features in humans; • possible consequences of developmental disorders of provisional organs in humans 		
	PC-1	Ontogenesis. General patterns of embryonic development. Regulation of ontogenesis.	<ul style="list-style-type: none"> • periods of ontogeny and types of postembryonic development of organisms; • structure of gamets; • the course of the fertilization process, its stages, the essence of fertilization; • the main types of eggs, methods of crushing, types of blastula, mechanisms of crushing; the main methods of gastrulation, characteristic of chordates and possible consequences of gastrulation and crushing disorders; the main stages of organogenesis; • derivatives of embryonic leaflets in humans; • development, structure and functions of the amniot's provisional organs and their features in humans; • possible consequences of developmental disorders of provisional organs in humans 	<ul style="list-style-type: none"> • correctly sketch the various stages of embryogenesis, make a designation for the figures. • Apply the knowledge to understand modern methods of prenatal diagnosis of hereditary diseases of the fetus 	-
3.	GC-5	Evolutionary teaching. Anthropogenesis. Evolution of the organic world. Phylogeny of	<ul style="list-style-type: none"> • AN Seversov's doctrine of phylembryogenesis; 	<ul style="list-style-type: none"> • Carry out a comparative analysis of the structure of 	-

		systems of organs of vertebrates.	<ul style="list-style-type: none"> • • Methods of morpho-functional transformation of organs and systems; • • The basic biogenetic law of Mueller-Haeckel and the law of germ-like similarity of K. Baer; • • Progressive directions of the evolution of organs and systems of Khordov • • General patterns of origin and development of life; • • Systematics of the species Homo sapiens; • • Evidence of a person's natural origin; • • Characteristics of races and morphofunctional adaptations to different conditions of existence. 	<p>organs and systems of vertebrates;</p> <ul style="list-style-type: none"> • • Identify the main directions of the evolution of these systems; • • Explain the causation of vices. • • Solve situation problems. • • Establish a sequence of evolutionary processes; • • Based on the phenotype, determine the individual's race. 	
	GPC-1,	Evolutionary teaching. Anthropogenesis. Evolution of the organic world. Phylogeny of systems of organs of vertebrates.	<ul style="list-style-type: none"> • AN Seversov's doctrine of phylembryogenesis; • • Methods of morpho-functional transformation of organs and systems; • • The basic biogenetic law of Mueller-Haeckel and the law of germ-like similarity of K. Baer; • • Progressive directions of the evolution of organs and systems of Khordov • • General patterns of origin and development of life; • • Systematics of the species Homo sapiens; • • Evidence of a person's natural origin; 	<ul style="list-style-type: none"> • Carry out a comparative analysis of the structure of organs and systems of vertebrates; • • Identify the main directions of the evolution of these systems; • • Explain the causation of vices. • • Solve situation problems. • • Establish a sequence of evolutionary processes; • • Based on the phenotype, determine the individual's race. 	-
			<ul style="list-style-type: none"> • • Characteristics of races and morphofunctional adaptations to different conditions of existence. 		

4.	GC-5	Fundamentals of general and medical genetics. Monogenic and polygenic inheritance. Linked inheritance. Genetics of sex. Inheritance, linked to the sex. Patterns and mechanisms of variability of traits.	<ul style="list-style-type: none"> • definitions of the basic concepts of genetics and examples illustrating them; • the formulation of Mendel's laws and their cytological rationale; • Chromosomal theory of heredity • What is the gene balance and what are the consequences of its violation • features of different types of interactions of allelic and non-allelic genes • distinctive features of different types of inheritance • basic symbols for the compilation of pedigrees. • cytological mechanisms of combinative variability • methods of studying human genetics 	<ul style="list-style-type: none"> • correctly use the symbolism of genetic records when solving problems; • when solving problems, to analyze the genotype and phenotype of the parent generation and offspring; to determine the probability of the birth of sick children • compile and analyze pedigrees. 	Methods of solving problems in genetics.
	GPC-1	Fundamentals of general and medical genetics. Monogenic and polygenic inheritance. Linked inheritance. Genetics of sex. Inheritance, linked to the sex. Patterns and mechanisms of variability of traits.	<ul style="list-style-type: none"> • definitions of the basic concepts of genetics and examples illustrating them; • • the formulation of Mendel's laws and their cytological rationale; • • Chromosomal theory of heredity • • What is the gene balance and what are the consequences of its violation • • features of different types 	<ul style="list-style-type: none"> • correctly use the symbolism of genetic records when solving problems; • when solving problems, to analyze the genotype and phenotype of the parent generation and offspring; to determine the probability of the birth of sick children • compile and analyze pedigrees. 	Methods of solving problems in genetics.
			<ul style="list-style-type: none"> • of interactions of allelic and non-allelic genes • • distinctive features of different types of inheritance • • • basic symbols for the compilation of pedigrees. • • cytological mechanisms of combinative variability • • methods of studying human genetics 		

5.	GC-5	Fundamentals of general and medical ecology. Ecological and medico-biological bases of parasitism. Medical protozoology. Medical helminthology. Medical arachnoentomology.	<ul style="list-style-type: none"> • Forms of biotic bonds; • • Classification of parasitism and parasites; • • Ways of transmission and infection of parasitic diseases; 	<ul style="list-style-type: none"> • work with the immersion magnification of the microscope; • to diagnose the causative agents of parasitic diseases of a person on a preparation, a slide, photos • correctly draw the observed object. • Solve situational tasks in parasitology 	<ul style="list-style-type: none"> • skills of microscopy
	GPC-1	Fundamentals of general and medical ecology. Ecological and medico-biological bases of parasitism. Medical protozoology. Medical helminthology. Medical arachnoentomology.	<ul style="list-style-type: none"> • Forms of biotic bonds; • Classification of parasitism and parasites; • Ways of transmission and infection of parasitic diseases; 	<ul style="list-style-type: none"> • work with the immersion magnification of the microscope; • to diagnose the causative agents of parasitic diseases of a person on a preparation, a slide, photos • correctly draw the observed object. • Solve situational tasks in parasitology 	<ul style="list-style-type: none"> • skills of microscopy
	PC-1	Fundamentals of general and medical ecology. Ecological and medico-biological bases of parasitism. Medical protozoology. Medical helminthology. Medical arachnoentomology.	<ul style="list-style-type: none"> • Forms of biotic bonds; • Classification of parasitism and parasites; • Ways of transmission and infection of parasitic diseases; 	<ul style="list-style-type: none"> • work with the immersion magnification of the microscope; • to diagnose the causative agents of parasitic diseases of a person on a preparation, a slide, photos 	<ul style="list-style-type: none"> • skills of microscopy
				<ul style="list-style-type: none"> • correctly draw the observed object. • Solve situational tasks in parasitology 	

3. The place of discipline in the structure of the educational program:

Discipline Biology belongs to the basic part of the Block 1 of the GEF HE in the specialty "General Medicine".

4. The volume of the discipline and types of academic work

Total labor intensity of the discipline is 6 credit units, 216 hours.

Type of educational work		Total hours / credit units	Semesters	
			№ 1	№ 2
			hours	hours
1		2	3	4
Classroom activities (total), including:		126	48	78
Lectures (L)		34	16	18
Practical training (Pt), Seminars (C)		92	32	60
Laboratory work (Lw)		0	0	0
Independent work of the student, including:		54	24	30
Preparation for classes		34	14	20
Preparing for modules		20	10	10
Type of Intermediate Grading (G) exam (E)	Type of Intermediate Grading (G)	-	-	-
	exam (E)	36	-	36
TOTAL: Total time required per hour.	TOTAL: Total time required per hour.	216	72	144
	Credit units (3ET)	6,0	2,0	4,0

5. Sections of disciplines and types of activities

п/ №	№ semest er	The name of the section of the academic discipline (module)	Types of educational activities, including independent work of students (in hours)				Forms of the current control.
			Л	ПЗ	СРС	всего	
1	2	3	4	6	7	8	9
1	1	Cytology.	6	16	10	32	Interview, test, the solution of cytological problems.
2	1	Ontogenesis.	4	8	7	19	Interview, test, the solution of situational problems.

3	1	Evolutionary teaching. Anthropogenesis. Evolution of the organic world. Phylogeny of systems of organs of vertebrates.	6	8	7	21	Interview, test.
4	2	Fundamentals of general and medical genetics.	6	16	8	30	Interview, test, the solution of situational problems.
5	2	Ecology. Medical parasitology. 1) medical protozoology	4	16	6	26	Interview, test, the solution of situational problems, the recognition of microscopic preparations.
5	2	2) medical helminthology	6	20	10	36	Interview, test, the solution of situational problems, the recognition of microscopic preparations.
5	2	3) medical arachnoentomology	2	8	6	16	Interview, test, the solution of situational problems, the recognition of microscopic preparations.
		TOTAL:	34	92	54	180	

6. List of educational and methodological support for independent work of students in discipline

№№ п/п	№ semester	Название издания	Авторы
1	1	WORKBOOK for practical classes and independent work "CYTOLOGY, ONTOGENESIS" of discipline "biology"	Professor, Doctor of Medicine, Head of department of Biology and Histology o of FSBEI HE NOSMA MOH Russia Bibaeva L.V. Senior Lecturer of department of Biology and Histology of FSBEI HE NOSMA MOH Russia Tseboeva A.A.
2	2	WORKBOOK for practical classes and independent work "GENETICS, PARASITOLOGY" of discipline "biology"	Professor, Doctor of Medicine, Head of department of Biology and Histology o of FSBEI HE NOSMA MOH Russia Bibaeva L.V. Senior Lecturer of department of Biology and Histology of FSBEI HE NOSMA MOH Russia Tseboeva A.A.
3	1	WORKBOOK for practical classes and independent work "EVOLUTION OF VERTEBRATES" of discipline "biology"	Professor, Doctor of Medicine, Head of department of Biology and Histology o of FSBEI HE NOSMA MOH Russia Bibaeva L.V. Senior Lecturer of department of Biology and Histology of FSBEI HE NOSMA MOH Russia Tseboeva A.A.
4	1	Textbook "CELL BIOLOGY"	Professor, Doctor of Medicine, Head of department of Biology and Histology o of FSBEI HE NOSMA MOH Russia Bibaeva L.V. Senior Lecturer of department of Biology and Histology of FSBEI HE NOSMA MOH Russia Tseboeva A.A.
5	2	Textbook "GENETICS"	Professor, Doctor of Medicine, Head of department of Biology and Histology o of FSBEI HE NOSMA MOH Russia Bibaeva L.V. Senior Lecturer of department of Biology and Histology of FSBEI HE NOSMA MOH Russia Tseboeva A.A.
6	1	Textbook "ONTOGENESIS"	Professor, Doctor of Medicine, Head of department of Biology and Histology o

			of FSBEI HE NOSMA MOH Russia Bibaeva L.V. Senior Lecturer of department of Biology and Histology of FSBEI HE NOSMA MOH Russia Tseboeva A.A.
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7. The Fund of Evaluation Means for the Intermediate Certification of Students in Discipline

№/ п	List of competences	№ semester	Indicator (s) assessments	The evaluation criterion (s)	Scale of assessment	Name Fund of Evaluation
1	2	3	4	5	6	7
	GC-5-readiness for self-development, self-realization, self-education, use of creativity	1,2	See the standard for assessing the quality of education, approved by the order of the State Higher Educational Institution of Higher Professional Education of the Ministry of Health of the Russian Federation of 10.07.2018 №264/o	See the standard for assessing the quality of education, approved by the order of the State Higher Educational Institution of Higher Professional Education of the Ministry of Health of the Russian Federation of 10.07.2018 №264/o	See the standard for assessing the quality of education, approved by the order of the State Higher Educational Institution of Higher Professional Education of the Ministry of Health of the Russian Federation of 10.07.2018 №264/o	<ul style="list-style-type: none"> • Standard of test tasks. • Examination tickets • Examination tickets for practical skills
	GPC-1-readiness to solve standard tasks of professional activity using information, bibliographic resources, medical-biological terminology, information and communication technologies and taking into account the basic information security requirements	1,2	See the standard for assessing the quality of education, approved by the order of the State Higher Educational Institution of Higher Professional Education of the Ministry of Health	See the standard for assessing the quality of education, approved by the order of the State Higher Educational Institution of Higher Professional Education of the Ministry of Health	See the standard for assessing the quality of education, approved by the order of the State Higher Educational Institution of Higher Professional Education of the Ministry of Health	<ul style="list-style-type: none"> • Standard of test tasks. • Examination tickets • Examination tickets for practical skills

			of the Russian Federation of 10.07.2018 №264/o	of the Russian Federation of 10.07.2018 №264/o	of the Russian Federation of 10.07.2018 №264/o	
	PC-1-ability and readiness to implement a set of measures aimed at preserving and strengthening health, including the formation of a healthy lifestyle, preventing the occurrence and (or) spread of diseases, their early diagnosis, identifying the causes and conditions for their occurrence and development, and also aimed at eliminating the harmful effect on human health of the factors of its habitat	2	See the standard for assessing the quality of education, approved by the order of the State Higher Educational Institution of Higher Professional Education of the Ministry of Health of the Russian Federation of 10.07.2018 №264/o	See the standard for assessing the quality of education, approved by the order of the State Higher Educational Institution of Higher Professional Education of the Ministry of Health of the Russian Federation of 10.07.2018 №264/o	See the standard for assessing the quality of education, approved by the order of the State Higher Educational Institution of Higher Professional Education of the Ministry of Health of the Russian Federation of 10.07.2018 №264/o	<ul style="list-style-type: none"> • Standard of test tasks. • • Examination tickets • • Examination tickets for practical skills

8. List of main and additional literature

Main literature

п/ №	Name	Authors)	Year, place of publication	Number of copies		Name / reference in EBS
				library	At the department	
1	2	3	4	5	6	7
1.	Cell biology	Thomas D. Pollard [et al.]. - third edition.	Philadelphia : Elsevier, Book aid international, 2017	50	-	-
2.	Markell and Voge`s Medical Parasitology	David T. John, William A. Petri. - ninth edition.	St. Louis : Elsevier, Book aid international, 2006	50	-	-
3.	Medical genetics	Lynn B. Jorde, John C. Carey, Michael J. Bamshad. - fifth edition.	Philadelphia : Elsevier, Book aid international, 2016	50	-	-

additional literature

п/ №	Name	Authors)	Year, place of publication	Number of copies		Name / reference in EBS
				At library	At the department	
1	2	3	4	5	6	7
1.	Histology and cell biology	Kurt E. Johnson.	Baltimore : Williams & Wilkins, 1991	1	-	-
2.	Principles of medical genetics	D. Gelehrter	Baltimore : Williams & Wilkins, 1990	1	-	-
3.	Genetics	ed. J. M. Friedman. -	Baltimore : Williams & Wilkins, 1992	1	-	-
4.	Terminologia Histologica. Международные термины по цитологии и гистологии человека	. В.В. Банина.	М. : ГЭОТАР-Медиа, 2009	1	-	-

	с официальным списком русских эквивалентов					
5.	Terminologia Embryologica. Международные термины по эмбриологии человека с официальным списком русских эквивалентов	Колесников Л.Л., Шевлюк Н.Н., Ерофеева Л.М.	М. : ГЭОТАР- Медиа, 2014.	-	-	http://www.studmedlib.ru/book/ISBN9785970430804.html

СОГЛАСОВАНО
Зав. библиотекой

Л.В. Логтаева

9. The list of resources of the information and telecommunication network "Internet", necessary for mastering the discipline

- <http://scools.keldysh/rusch1964/project3> (cell structure)
- <http://www.college.ru/biology/course/content/chapter1/section2/paragraph1/theory.html> (Prokaryotes)
- <http://www.homeedu/en/user/00000545/prostejshie/prostejshie.doc> (General characteristic of protozoa)
- <http://molbiol.ru/pictures/list-biochem.html> (Mitotic cycle)
- <http://biology.asvu.ru/list.php?c=orgplchervi> (Type Flat Worms, Classification)
- <http://abc192.mosuzedu.ru/projects/gorbunova/ploskie.html> (Type Flat Worms General Characteristics: Structure)
- <http://abc192.mosuzedu.ru/projects/gorbunova/krygl/html> (Type Roundworms General Characteristics: Structure)
- <http://biology.asvu/en/page.php?id=126> (Class Arachnids - General Characteristics)
- <http://floranimal.ru/classes/2703.html> (Class Insects: General Characteristics)
- <http://floranimal.ru/gallery.php?c=10&=0> (Ecology, Biotic Relations)
- <http://www.darwin.museum/en/expos/floor1/LivePlanet/5.htm> (Ecology, Natural Communities)

10. Methodical instructions for students to learn the discipline

Training consists of classroom activities (126 hours), including a lecture course and practical classes, and self-study (54 hours). The main academic time is allocated to practical work on the assimilation of theoretical knowledge, the acquisition of practical skills and abilities.

When studying the discipline, it is necessary to use the entire resource of basic and additional educational literature, lecture material, visual aids and demonstration materials, laboratory equipment and learn the practical skills acquired in the course of working with demonstration visual aids and solving situational problems.

Practical classes are held in the form of seminars, classroom work with microscopic techniques, studying micro- and macro preparations, museum exhibits and the use of visual aids, solving situational problems, answering test tasks using the algorithm of methodological development of the department staff.

In accordance with the requirements of **FSES HE 31.05.01** Medical practice in the educational process is widely used active and interactive forms of conducting classes (developing and problem training in the form of role-playing games, modular training, informatization training, multimedia training). The proportion of classes conducted in interactive forms is not less than 5.0% of classroom activities.

The independent work of students implies preparation for practical classes, for entrance, current, intermediate and final controls and includes individual classroom and home work with visual materials, educational basic and additional literature, Internet resources, solving situational problems, writing abstracts, etc. .

Work with educational literature is considered as a kind of educational work on the discipline of biology and is carried out within the hours allocated for its study. Each student is provided with access to the library funds of the Academy and the department.

For each section of the discipline, methodical recommendations for students ("Workbook on Biology") and guidelines for teachers on all sections of the discipline in the electronic database of the department have been developed.

During the study of the discipline, students under the supervision of the teacher conduct a microscopic study of temporary and permanent micropreparations from living and fixed, colored objects, visual study of macro preparations and museum exhibits, solve situational problems, fill out training tables, prepare a workbook and present the results of the work done for the teacher's signature .

Writing an essay contributes to the formation of skills in working with educational literature, the systematization of knowledge and contribute to the formation of general cultural and professional skills.

The work of the student in the group forms a sense of teamwork and sociability.

The initial level of knowledge of students is determined by testing, the current control of mastering the subject is determined by an oral questionnaire during classes, when solving typical situational tasks and responding to test tasks.

At the end of the study of the discipline, an intermediate control of knowledge is carried out using

oral questioning, test control, testing of practical skills and solving situational problems.

Questions on discipline are included in the GIA program of graduates.

11. List of information technologies used in the implementation of the educational process in discipline

- Microsoft word
- Microsoft excel
- Microsoft Power Point
- Adobe photoshop
- Adobe Acrobat
- Adobe Finereader

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

The use of laboratory and instrumentation equipment, study rooms for students, specially equipped computer classes, cabinets for storing micro and macro preparations, training tables,

Laboratory equipment: microscopic technique (microscopes MBS, MDB loupes, etc.)

Technical equipment: slidescopes, PC, multimedia complex (laptop, projector, screen), laptop, TV, VCR, and also:

Sets of slides, tables, charts, multimedia visual materials on various sections of the discipline. Micro- and macro preparations. Museum exhibits and models. Situational tasks, test tasks on the topics under study,

- computer presentations on all topics of the lecture course,

- educational videos on the sections: development biology, medical parasitology, ecology and biosphere, evolution, anthropogenesis.

№	Number of equipment	Number of technical	condition
Special equipment			
1	Microscope, pcs.	50	satisfactory
2	Binocular microscope	1	satisfactory
3	Loupes	3	satisfactory
Macro preparations			
4	Human parasites	36	satisfactory
5	Skeletons of Vertebrates	9	satisfactory
6	Opened vertebral	27	satisfactory
Sculptures			
7	Sculptures of tapeworms of tapeworms	21	satisfactory
8	Modeling in the section of anthropogenesis	29	satisfactory
9	Pieces on the section of phylogeny	10	satisfactory
10	Pieces on the section of phylogeny	128	satisfactory
Tables.			
11	Tables for all sections of biology	800	satisfactory

13. Conducting educational activities using e-learning and distance learning technologies

In the conditions of the introduction of restrictive measures (quarantine) associated with an unfavorable epidemiological situation, the threat of the spread of a new coronavirus infection and other force majeure events that do not allow conducting training sessions in full-time, it is possible to study this discipline or part of it with the use of e-learning and distance educational technologies.

Teaching the discipline in the above situations will be carried out through the development of an electronic course with access to video lectures and interactive course materials: presentations, articles, additional materials, tests and various tasks. When conducting training sessions, current performance monitoring, as well as intermediate certification of students, the platforms of the electronic information and educational environment of the academy and/or other e-learning systems recommended for use in the academy, such as Moodle, Zoom, Webinar, etc., can be used.

Lectures can be presented in the form of audio, video files, offline lectures, etc.

Seminars and practical classes can be held on-line in both synchronous and asynchronous mode. Seminars can be held in the form of web conferences