Ministry of Health of the Russian Federation

federal state budgetary educational institution
higher education
"North-Western State Medical University named after I.I. Mechnikov"

Ministry of Health of the Russian Federation

(Federal State Budgetary Educational Institution of Higher Education North-Western State Medical University named after I.I. Mechnikov of the Ministry of Health of Russia)

DISCIPLINE WORK PROGRAM

"Biology"

Specialty: 31.05.01 General Medicine

Specialization: **Organization and provision of primary health care to the adult population in medical organizations**

Implementation language: Russian, English

2021

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The work program of the discipline "Biology" is compiled on the basis of the Federal state educational standard of higher education - specialty in the specialty 31.05.01 General Medicine, approved by order of the Ministry of Science and Higher Education of the Russian Federation dated August 12, 2020 No. 988 "On approval of the federal state educational standard of higher education - specialty in the specialty 31.05.01 Medicine."

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The work program of the discipline was discussed at a meeting of the Department of Medical Biology on April 23, 2021. Protocol No. 4.

Head of the department _____ / Kostyukevich S.V. /
(signature)

Approved by the Methodological Commission for the specialty 31.05.01 General Medicine
May 11, 2021

Chairman _____ / Bakulin I.G./
(signature)

Reviewed by the Methodological Council and recommended for approval by the Academic Council
May 20, 2021

Chairman _____ / Artyushkin S.A. /
(signature)

Date of update:

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1. The purpose of mastering the discipline

The purpose of mastering the discipline "Biology" is to develop the student's competencies based on systemic fundamental knowledge and skills in general biological laws that are of greatest interest for practical healthcare, preparing students for a systematic perception of general medical, social and clinical disciplines and forming in them a natural-scientific worldview and the logic of biological thinking necessary for the subsequent practical activities of a doctor.

2. The place of discipline in the structure of the educational program

The discipline “Biology” belongs to the mandatory part of Block 1 “Disciplines (modules)” of the main professional educational program in the specialty 31.05.01 General Medicine (specialty level of education), Focus: Organization and provision of primary health care to the adult population in medical organizations. The discipline is mandatory to study.

3. List of planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program

Code and name of competency	Code and name of the competency achievement indicator
OPK-10. Able to understand the operating principles of modern information technologies and use them to solve professional problems	**ID-1 OPK-10.1. Applies modern information technologies, searches for information on the Internet to solve professional problems** **ID-2 OPK-10.2 Maintains confidentiality when working with patient information databases**

Competency achievement indicator code	Learning outcomes (assessment indicators)	Evaluation tools
ID-1-OPK-10.1.	**Knows** Basic medical and biological terminology. The biological essence of processes occurring in a living organism. The structure of cells in interaction with their function. Basic processes occurring in cells at the molecular level. Structure and biological role of nucleic acids in the storage and implementation of genetic information. Basic methods of cell reproduction. Features of the structure and activity of bacteria and viruses, their role in medicine. General patterns of the origin and development of life. Basic patterns and periods of ontogenesis, their features. Biological and genetic significance of the fertilization process. Stages of embryogenesis, their essence. Basic hypotheses of aging. Problems of gerontology. Aging is a natural stage of ontogenesis. Morphophysiological indicators of the aging process. Types of old age and their characteristics. Pathological old age. Examples. Age-related changes in the structures of the human maxillofacial apparatus. Basic patterns of	test questions, test tasks situational tasks abstract

	heredity and variability. Basic concepts of genetics. Hereditary and non-hereditary variability. The concept of mutations. The main hereditary human diseases, their diagnosis and prevention. The biological phenomenon of parasitism, its significance for medicine. Pathogens of the main human parasitoses, their morphology, localization, development cycles. Ecological basis for the prevention and diagnosis of parasitic diseases. Biological aspects of human ecology. Anthropogenic factors and their role in the biosphere. The main scientific directions of modern research in medicine and biology. Modern direction of development of biological sciences. The biological essence of processes occurring in a living organism at the subcellular, cellular level.	
	Can Apply modern information technologies, search for information on the Internet. Use medical and biological terms. Use educational literature. Install and study permanent and temporary preparations under the "dry magnification" of a microscope. Identify the indicated cell structures, name their structure and function. Characterize the ultrastructural components of a cell in an electron diffraction pattern. Learn about eukaryotic, prokaryotic cells and viruses in diagrams, drawings, photographs. Identify the structural components of pro- and eukaryotes on the diagram. Indicate the features of their structure and functions.	
ID-2 OPK-10.2.	**Knows** Basic medical and biological terminology. The biological essence of processes occurring in a living organism.	test questions, test tasks situational tasks
	Can Maintain confidentiality when working with patient information databases	

4. Scope of discipline and types of academic work

Type of educational work	Labor intensity	Semesters	
		1	2
Contact work between students and teachers	**124**	**60**	**64**
Classroom work:	120	60	60
Lectures (L)	40	20	20
Practical exercises (PP)	80	40	40
Independent work:	**92**	**30**	**62**
during theoretical training	60	30	30

preparation for the exam	32	-	32
Interim certification: exam, including passing and group consultations	4	-	4
Total labor intensity: academic hours	**216**		
credit units	**6**		

5. The content of the discipline, structured by sections (topics) indicating the number of academic hours and types of training sessions

5.1.Content of discipline sections

No.	Name of discipline section	Annotated content of the discipline section	List of competencies formed in the process of mastering the section
1.	Cell biology.	Structural and functional organization of the cell. Surface apparatus of the cell. Cytoplasm. Organoids. Microscope. Microscopy, technique for making microspecimens. Modern methods of studying cells and their use in medicine. Hereditary apparatus. Fundamentals of molecular biology. Cytogenetic bases of reproduction. Cell reproduction	OPK-10
2.	Fundamentals of general and medical genetics.	Patterns of inheritance. gene interaction. Features and methods of studying human heredity. Genealogical cytogenetic methods for studying human heredity. Hereditary human diseases. Medical genetic counseling. Organization and expression of genes in prokaryotes and eukaryotes. The concept of genetic engineering. Chromosomal diseases. Sex-linked inheritance. And twin methods. The phenomenon of multiple allelism. Genetics of human blood groups. Inheritance of Rh factor. The concept of human genetic (molecular) diseases. Principles of medical genetic counseling. Gene structure and function.	OPK-10
3.	Ecological and medical-biological foundations of parasitism.	The biological phenomenon of parasitism. Introduction to medical parasitology. Ecological basis of parasitism. Type Protozoa. Protozoa are human parasites. Type Flatworms (Plathelminthes). Class Flukes (Trematodes). Flukes are human parasites. Class Tapeworms (Cestoidea). Tapeworms are parasites of the Roundworm type (Nemathelminthes). The class proper is Roundworms (Nematoda). Roundworms are human parasites. Human. Type Annelides. Phylum Arthropods	OPK-10

		(Arthropoda). Class Arachnoidea. Order Ticks (Acarina). Class Insects (Insecta). Insects are pathogens and carriers of human pathogens.	
4.	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology and biosphere.	Developmental biology. Embryonic development of organisms. Phylogenesis of chordates. Evolution of organs and functional systems. The current state of evolutionary theory. Population genetics. Fundamentals of homeostasis. Modern ideas about regeneration and transplantation. Principles and methods of evolution of organ systems of chordates. Comparative review of vertebrate organ systems. The current state of evolutionary theory. Population structure of humanity. Human ecology. The doctrine of the biosphere. The role of modern biology in medicine. Problems of gerontology. Theories of aging. Theories of aging. Environmental factors that increase life expectancy.	OPK-10

5.2.Thematic plan of lectures

1st semester

No.	Name of discipline section	Lecture topics	Active forms of learning*	Labor intensity (academic hours)
1.	Cell biology.	Structural and functional organization of the cell. Surface apparatus of the cell. Cytoplasm.	LB	2
2.	Cell biology.	Structural and functional organization of the cell. Organoids	LB	2
3.	Cell biology.	Structural and functional organization of the cell. Hereditary apparatus.	LB	2
4.	Cell biology.	Fundamentals of molecular biology.	LB	2
5.	Cell biology.	Cytogenetic bases of reproduction. Cell reproduction	LB	2
6.	Fundamentals of general and medical genetics.	Introduction to genetics. Organization and expression of genes in prokaryotes and eukaryotes. The concept of genetic engineering.	LB	2
7.	Fundamentals of general and medical genetics.	Variability, its forms. Mutagenesis. The significance of variability in ontogenesis	LB	2

		and evolution.		
8.	Fundamentals of general and medical genetics.	Anthropogenetics. Basic methods for studying human heredity.	LB	2
9.	Fundamentals of general and medical genetics.	Hereditary human diseases. Medical genetic counseling.	LB	2
10.	Ecological and medical-biological foundations of parasitism.	The biological phenomenon of parasitism.	LB	2
		TOTAL:		20

LB – lecture-conversation

2nd semester

No.	Name of discipline section	Lecture topics	Active forms of learning*	Labor intensity (academic hours)
1.	Ecological and medical-biological foundations of parasitism.	Introduction to medical parasitology.	LB	2
2.	Ecological and medical-biological foundations of parasitism.	Ecological basis of parasitism.	LB	2
3.	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology and biosphere.	Developmental biology. Individual development of organisms.	LB	2
4.	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology and biosphere.	Fundamentals of homeostasis. Regeneration and transplantation.	LB	2
5.	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology and biosphere.	Principles of transformation of organs of chordates. Comparative review of vertebrate organ systems.	LB	2
6.	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology and biosphere.	Current state of evolutionary theory. Population structure of humanity.	LB	2

No.	Name of discipline section	Lecture topics	Active forms of learning*	Labor intensity (academic hours)
7.	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology and biosphere.	Human ecology.	LD	2
8.	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology and biosphere.	The doctrine of the biosphere. Current state of the biosphere. Noosphere.	LD	2
9.	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology and biosphere.	Problems of gerontology.	LD	2
10.	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology and biosphere.	Theories of aging. Environmental factors that increase life expectancy.	LD	2
		TOTAL:		20

LB – lecture-conversation

LD – Lecture discussion

5.3.Thematic plan for practical classes

1-2nd semester

№ p/p	Name of discipline section	Topics of practical classes	Active forms of learning	Current control forms	Labor intensity (academic hours)
1.	Cell biology.	Microscope. Microscoping.	RI	test questions	4
2.	Cell biology.	Modern methods of studying cells and their use in medicine.	RI	test questions	4
3.	Cell biology.	A cell is a structural and functional unit o a living thing. Biology of the eukaryotic cell.	RI	test questions, test tasks	4
4.	Cell biology.	Fundamentals of molecular biology. Protein biosynthesis.	RI	test questions, test tasks	4
5.	Cell biology.	Cell reproductio	RI	test questions, test tasks	4

№ p/p	Name of discipline section	Topics of practical classes	Active forms of learning	Current control forms	Labor intensity (academic hours)
6.	Cell biology.	Current issues in cytology	RI	control questions, test tasks, situational tasks	4
7.	Fundamentals of general and medical genetics.	Patterns of inheritance. Gene interaction.	GD	control questions, test tasks, situational tasks	4
8.	Fundamentals of general and medical genetics.	Features and methods of studying human heredity. Genealogical and twin methods.	GD	control questions, test tasks, situational tasks	4
9.	Fundamentals of general and medical genetics.	Cytogenetic methods for studying human heredity. Chromosomal diseases. Sex-linked inheritance.	GD	control questions, test tasks, situational tasks	4
10.	Fundamentals of general and medical genetics.	The phenomenon of multiple allelism. Genetic of human blood groups. Inheritance of Rh factor.	GD	control questions, test tasks, situational tasks	4
11.	Fundamentals of general and medical genetics.m	The concept of human genetic (molecular) diseases. Principles of medical genetic counseling. Gene structure and function.	GD	control questions, test tasks, situational tasks	4
12.	Fundamentals of general and medical genetics.	Current issues of genetics.	AC	control questions, test tasks, situational tasks	4

№ p/p	Name of discipline section	Topics of practical classes	Active forms of learning	Current control forms	Labor intensity (academic hours)
13.	Ecological and medical-biological basis of parasitism	Type Protozoa. Protozoa are human parasites.	GD	control questions, test tasks, situational tasks	4
14.	Ecological and medical-biological foundations of parasitism.	Type Flatworms. Class Flukes. Class Tapeworm Flukes and tapeworms are human parasites.	GD	control questions, test tasks, situational tasks	4
15.	Ecological and medical-biological basis of parasitism	Type Roundworms. Class Roundworms (Nematoda). Roundworms are human parasites.	GD	control questions, test tasks, situational tasks	4
16.	Ecological and medical-biological foundations of parasitism.	Phylum Arthropods. Clas Arachnida. Class Insects. Arachnic and insects are pathogens and carriers of huma diseases	GD	control questions, test tasks, situational tasks	4
17.	Ecological and medical-biological foundations of parasitism.	Current issues in medical parasitology.	AC	control questions, test tasks, situational tasks	4
18.	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology ar biosphere.	Embryonic development of organisms.	GD	control questions, test tasks, situational tasks	4

№ p/p	Name of discipline section	Topics of practical classes	Active forms of learning	Current control forms	Labor intensity (academic hours)
19.	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology an biosphere.	Phylogenesis of chordates. Evolution of organs and functional systems. The current state of evolutionary theory. Populatic genetics.	GD	control questions, test tasks, situational tasks	4
20.	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology an biosphere.	Current issues of ecology and biosphere	GD	test questions, test tasks, situational tasks writing an essay	4
TOTAL:					80

RI - role-playing game
GD - group discussion
AS - situation analysis

5.4. Thematic plan of seminars - not provided

5.5. Thematic plan of laboratory work - not provided

5.6. Independent work during theoretical training:

No.	Name of discipline section	Types of independent work*	Current control forms	Labor intensity (academic hours)
1	Cell biology.	Working with lecture material, working with educational literature	test questions, test tasks	15
2	Fundamentals of general an medical genetics.	Working with lecture material, working with educational literature	test questions, test tasks	15
3	Ecological and medical-biological foundations of parasitism.	Working with lecture material, working with educational literature	test questions, test tasks	15

No.	Name of discipline section	Types of independent work*	Current control forms	Labor intensity (academic hours)
4	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology and biosphere.	Working with lecture material, working with educational literature Preparation of abstracts	test questions, test tasks. Writing an abstract	15
			TOTAL:	60
			Exam Preparation:	32

5.6.1. Abstract topics:

1. Achievements and prospects of genetic engineering.
2. Genetic aspects of carcinogenesis.
3. Human proteome.
4. Mechanisms of regulation of mitotic activity of eukaryotic cells.
5. Human hereditary immunity.
6. Vertebrate retroviruses as a factor of genome variability.
7. Realization of hereditary information in human ontogenesis.
8. The role of environmental factors in the development of sexual characteristics.
9. Human epigenetic inheritance.
10. Mobile genetic elements, their role in genome evolution.
11. Dose balance of genes in the genotype.
12. The influence of environmental factors on the developing organism and the role of preventive medicine in the prevention of defects and developmental anomalies in humans.
13. Teaching of Academician E.N. Pavlovsky about natural focal human diseases.
14. Theory of self-regulation of parasitic systems.
15. Factors of host susceptibility to the parasite.
16. Relationships in the parasite-host system at the population level.
17. Forms of interspecific biotic connections in biocenoses.
18. Ecological features of parasitic systems under conditions of anthropopression.
19. Parasitological monitoring, its role in maintaining public health.
20. Possibilities of overcoming tissue incompatibility during organ transplantation.
21. Hereditary polymorphism of human populations, implications for medicine.
22. Differentiation and integration in the evolution of organs.
23. Atavistic developmental defects.
24. Genetic load in the human population, its significance for medicine.
25. Chronological and biological age of a person.
26. Anthropogenic impact on the biosphere and its consequences.
27. Noosphere and ways of its formation.
28. Man and poisonous animals.
29. Ecology of poisonous, edible and medicinal plants
30. The origin of toxicity in the animal world.

6. Guidelines for students on mastering the discipline

Students can get acquainted with the thematic and calendar plans of lectures and practical

classes, methodological instructions and other educational materials that are presented on the department's educational stand and the department's website (http://biomed.szgmu.ru).

Students come to the practical lesson theoretically prepared on the topic under consideration.

A practical lesson, depending on the topic and its features, may consist of the following sections:

a) test control for the initial level of knowledge (a grade is given);

b) an oral survey on this topic (a grade is given);

c) practical work on this topic;

d) test control for the final level of knowledge (a grade is given).

Requirements for completing practical tasks in the workbook

The object under study must be examined under a microscope and sketched from a microscopic specimen.

Explanations for microslides (diagrams and microphotographs on demonstration tables) are a guide to understanding the structure of the object being studied on a microslide, and not a model for their exact copying.

All tasks must be completed carefully and clearly; The drawings in the notebook are as close as possible to the image of the object being studied under a microscope (without artifacts).

All required symbols listed next to the location for the drawing must be indicated on the drawing under the same numbering.

When solving situational problems, answers to all items of the tasks must be given.

Workbooks are signed at each lesson (additions in the form of sticky notes are not allowed).

Material for independent work must be worked through and completed for the final lesson on this section (or directly to the lesson on a similar topic). We recommend that you start doing independent work after considering this topic in the lecture.

Attendance at lectures is mandatory. The group leader marks the attendance of students at the lecture. The lecturer (or a person appointed by him) controls the correct completion of lecture notes. If a discrepancy is detected in the lecture notes, a report is written to the head of the group to the dean's office, and the head is deprived of any preferences existing at the department. For missed lectures, an interview is conducted with the lecturer in the presence of a handwritten abstract of 25 pages on this topic. Without completed lectures on the topic of the test, students are not allowed to attend this colloquium.

During their studies at the department, students pass 4 tests on sections of the course. Students are preparing for a test based on questions for this section (questions are available in the EOIS Moodle). Each test consists of three parts, for each of which a mark is given: a) Test control (or entrance test); b) Theoretical part; c) Practical part. Answers to questions are given in writing.

If there are "unworked out" current unsatisfactory grades or absences (practical classes or lectures), the student is not allowed to take the test until the debt is eliminated.

The debt for the section must be worked out within one month after the final lesson (no more than three attempts). In order to prevent the deepening of academic debt in subsequent sections, the completion of unsubmitted colloquiums during the month is postponed to the pre-session week.

According to Order No. 28 of May 22, 2014 of the Vice-Rector for Academic Affairs, students are prohibited from carrying and using communication equipment (including all types of headphones and other accessories), as well as audio, video and photographic equipment, during the current and intermediate certification. If a student is found to have or use the above devices, the certification result is equivalent to an "unsatisfactory" rating.

Credit for the subject is given in the absence of academic debt.

From the first day of the session, students eliminate academic debt with the permission of the dean's office. During the session, all academic debt is processed by the teacher on duty in

the presence of a grade sheet and grade book; No more than two debts are accepted per day (for more detailed information, see the department stand).

Tutorial

At the discretion of the teacher, a student-tutor (student-consultant) may be appointed in the study group, who advises and checks the performance of "independent work" of other students in the group. Previously, the group teacher checks the independent work of the student-tutor and gives the necessary consultations. Information about tutors who have conscientiously fulfilled their duties is reflected in rating sheets, and they receive individual preferences in rating testing or exams.

Student Scientific Society

The department has a student scientific society (SSS) group. SSS meetings are held during the academic year at least once a month; No more than three reports are heard at one meeting. The best reports are presented at the annual April conference of the SSS. A member of the SSS of the department is considered to be a student who regularly attends meetings (who has attended at least half of the meetings of the SSS) and has made a report. There are several areas of work: 1) abstract section; 2) zoological section; 3) research section on the topic of research work of the department; 4) museum section. Each student works under the guidance of a teacher supervising a specific topic.

Membership in the SSS: 1) it is an opportunity for scientific knowledge of the world; 2) restores the ranking (if there are no more than two academic debts); 3) if the assessment on the exam is ambiguous, it increases it in favor of the student.

Exam

Students take the biology exam in the II semester. The exam is conducted in the form of an answer on a ticket (four questions, one from each section, of which two are theoretical and two practical questions (tasks)).

7. Evaluation materials

Evaluation materials for the discipline for ongoing monitoring of progress and intermediate certification of students include examples of evaluation tools (Appendix A to the work program of the discipline), procedure and assessment criteria.

8. List of educational literature and Internet resources necessary for mastering the discipline

8.1. Educational literature:

Biology: textbook: in 2 volumes. T.1 / ed. V.N. Yarygina. – M.: GEOTAR-Media, 2014. — 736 p. - ISBN 978-5-9704-3028-6 (general).

Biology: textbook: 2 volumes Vol.2. / ed. V.N. Yarygina. – M.: GEOTAR-Media, 2014. — 560 p. - ISBN 978-5-9704-3028-6 (general).

Biology:. In 2 vols. T.1.. / ed. V. N. Yarygin. - M.: GEOTAR-Media, 2012. - 725 p. - ISBN 978-5-9704-2432-2.

Biology: In 2 vols. T.2 / V.N. Yarygin, V.V. Glinkina, I.N. Volkov [and others]; ed. V. N. Yarygin. - GEOTAR-Media, 2012. - 553 p. c. - ISBN 978-5-9704-3028-6 (general).

Yarygina, V. N. Biology. T. 1 / ed. V. N. Yarygina - Moscow: GEOTAR-Media, 2018. - 728 p. - ISBN 978-5-9704-4568-6. - Text: electronic // URL: http://www.studmedlib.ru/book/ISBN9785970445686.html Yarygina, V. N. Biology. T. 2 /

ed. V. N. Yarygina - Moscow: GEOTAR-Media, 2018. - 560 p. - ISBN 978-5-9704-4569-3. - Text: electronic // URL: http://www.studmedlib.ru/book/ISBN9785970445693.html Cell biology: teaching manual / Ministry of Health of Russia. Federation; ed. S. V. Kostyukevich; comp. O. N. Matveeva, E. A. Kazanskaya, O. V. Ivanova [and others]; FSBEI HE North-Western State Medical University named after I.I. Mechnikov, Department of Medical Biology. - 5th ed., add. - St. Petersburg. : North-Western State Medical University Press, 2018. - 88 p. : figure, table

Cell biology: teaching manual / O. N. Matveeva, E. A. Kazanskaya, O. V. Ivanova [etc.]; ed. S. V. Kostyukevich; Ministry of Health of Russia. Federation, FSBEI HE North-Western State Medical University named after I.I. Mechnikov, Department of Medical Biology. - 4th ed., add. - St. Petersburg. : North-Western State Medical University Press, 2017. - 85 p... - (Medical education).

Ivanov, S. M. Cell biology: teaching manual/s. m. Ivanov; ed. S. V. Kostyukevich; FSBEI HE North-Western State Medical University named after I.I. Mechnikov Ministry of Health of Russia. Federation, Department of Medical Biology. - 3rd ed., add. - St. Petersburg: North-Western State Medical University Press, 2016. - 144 p... - (Medical education).

Cell biology: teaching manual / Ministry of Health of Russia. Federation, State Budgetary Educational Institution of Higher Professional Education North-Western State Medical University named after. I. I. Mechnikova, Ministry of Health of the Russian Federation, Department of Medical Biology; ed. S. V. Kostyukevich. - 2nd ed., add. - St. Petersburg. : North-Western State Medical University Press, 2015. - 144 p... - (Medical education).

Cell biology. Educational materials for 1st year students: study guide / V.A. Mironova, O.N. Matveeva, E.A. Kazanskaya [and others]; ed. S. V. Kostyukevich; State Budgetary Educational Institution of Higher Professional Education North-Western State Medical University named after. I.I. Mechnikov Ministry of Health of the Russian Federation. - St. Petersburg. : North-Western State Medical University Press, 2014. - 144 p... - (Medical education).

Genetics: teaching manual / ed. S. V. Kostyukevich; comp. A. I. Shapkina, O. N. Matveeva, N. G. Perevozchikova, O. V. Ivanova; Ministry of Health Care of Russia. Federation, FSBEI HE North-Western State Medical University named after I.I. Mechnikov, Department of Medical Biology. - 5th ed., add. - St. Petersburg. : North-Western State Medical University Press, 2018. - 124 p. : ill., table

Genetics: teaching manual / A. I. Shapkina, O. N. Matveeva, N. G. Perevozchikova, O. V. Ivanova; ed. S. V. Kostyukevich; Ministry of Health Care of Russia. Federation, FSBEI HE North-Western State Medical University named after I.I. Mechnikov, Department of Medical Biology. - 4th ed., add. - St. Petersburg. : North-Western State Medical University named after I.I. Mechnikov, 2017. - 121 p. : ill., table. - (Medical education).

Genetics: teaching manual / Ministry of Health of Russia. Federation, FSBEI HE North-Western State Medical University named after. I. I. Mechnikov Ministry of Health of Russia, Department of Medical Biology htth://.biomed.szgmu.ru; ed. S. V. Kostyukevich; comp. A. V. Shapkina, O. N. Matveeva, N. G. Perevozchikova, O. V. Ivanova. - 3rd ed., add. - St. Petersburg. : North-Western State Medical University named after I.I. Mechnikov, 2016. - 219 p. : ill., table. - (Medical education).

Genetics: educational and methodological manual / ed. prof. S. V. Kostyukevich. — 2nd ed., add. - St. Petersburg: North-Western State Medical University Press, 2015. - 224 p.

Genetics: Educational materials for first-year students: Textbook / S. V. Kostyukevich, N. G. Perevozchikova, E. V. Matveeva [etc.]; ed. S. V. Kostyukevich; State Budgetary Educational Institution of Higher Professional Education North-Western State Medical

University named after. I. I. Mechnikova Ministry of Health of the Russian Federation. - B.m. : North-Western State Medical University Press, 2014. - 213 p... - (Medical education).

Introduction to medical parasitology: teaching manual / ed. S. V. Kostyukevich; comp. V. S. Turitsin, N. G. Perevozchikova, E. A. Kazanskaya [and others]; Ministry of Health of Russia. Federation, FSBEI HE North-Western State Medical University named after I.I. Mechnikov, Department of Medical Biology http://biomed.szgmu.ru. - 6th ed., add. - St. Petersburg. : North-Western State Medical University Press, 2018. - 116 p. : table, illus.

Introduction to medical parasitology. For first year students, training. according to special "Medical and preventive care" (32.05.01): teaching manual / V. S. Turitsin, N. G. Perevozchikova, E. A. Kazanskaya [etc.]; ed. S. V. Kostyukevich, A. F. Nikitin; Ministry of Health of Russia. Federation, FSBEI HE North-Western State Medical University named after I.I. Mechnikov, Department of Medical Biology. - St. Petersburg. : North-Western State Medical University Press, 2017. - 112 p. : table, ill. - (Medical education).

Introduction to medical parasitology: teaching manual / Ministry of Health of Russia. Federation, FSBEI HE North-Western State Medical University named after I.I. Mechnikov Ministry of Health of the Russian Federation; ed. S. V. Kostyukevich, A. F. Nikitin. - 4th ed., add. - St. Petersburg. : North-Western State Medical University Press, 2016. - 208 p. : table, ill. - (Medical education)

Introduction to medical parasitology: study guide / Ministry of Health of the Russian Federation, State Budgetary Educational Institution of Higher Professional Education North-Western State Medical University named after. I. I. Mechnikov Ministry of Health of Russia, Department of Medical Biology; ed. S. V. Kostyukevich, A. F. Nikitin. - 3rd ed., add. - St. Petersburg. : North-Western State Medical University named after I.I. Mechnikov, 2015. - 208 p. : Fig., table. - (Medical education).

Introduction to medical parasitology: study guide / Ministry of Health of the Russian Federation, State Budgetary Educational Institution of Higher Professional Education North-Western State Medical University named after. I. I. Mechnikov Ministry of Health of Russia, Department of Medical Biology; ed. S. V. Kostyukevich, A. F. Nikitin. - 2nd ed., add. - St. Petersburg. : North-Western State Medical University named after I.I. Mechnikov, 2014. - 200 p. : Fig., table. - (Medical education).

Developmental biology. Evolution. Ecology: teaching manual [for first year students, educational. according to special 31.05.01 "Medical business", 32.05.01 "Med.-professional business"] / Ministry of Health of the Russian Federation. Federation, FSBEI HE North-Western State Medical University named after I.I. Mechnikov; ed. S. V. Kostyukevich; comp. M. L. Churkova, N. G. Perevozchikova, O. N. Matveeva [and others]. - 5th ed., add. - St. Petersburg. : North-Western State Medical University Press, 2018. - 88 p. : Fig., table.

Developmental biology, evolution, ecology: teaching manual / Ministry of Health of Russia. Federation, FSBEI HE North-Western State Medical University named after I.I. Mechnikov; ed. S. V. Kostyukevich; comp. N. G. Perevozchikova, O. N. Matveeva, G. N. Rossolko [and others]. - 4th ed., add. - St. Petersburg. : North-Western State Medical University Press, 2017. - 89 p. : Fig., table. - (Medical education).

Developmental biology, evolution, ecology: teaching manual / Ministry of Health of Russia. Federation, FSBEI HE North-Western State Medical University named after. I. I. Mechnikov of the Ministry of Health of Russia; G. N. Rossolko; ed. S. V. Kostyukevich; comp. N. G. Perevozchikova, O. N. Matveeva, M. Yu. Levinskaya [and others]. - 3rd ed., add. - St. Petersburg. : North-Western State Medical University Press, 2016. - 163 p. : ill. - (Medical education).

Developmental biology, evolution, ecology: teaching manual / Ministry of Health of Russia. Federation, State Budgetary Educational Institution of Higher Professional Education North-Western State Medical University named after. I. I. Mechnikova Ministry of Health of Russia. Federation; ed. S. V. Kostyukevich; comp. N. G. Perevozchikova, O. N. Matveeva, G.

N. Rossolko [and others]. - 2nd ed., add. - St. Petersburg. : North-Western State Medical University Press, 2015. - 160 p. : table - (Medical education).

Developmental biology, evolution, ecology: teaching manual / Ministry of Health of Russia. Federation, State Budgetary Educational Institution of Higher Professional Education North-Western State Medical University named after. I. I. Mechnikova Ministry of Health of Russia. Federation, Department of Medical Biology; ed. S. V. Kostyukevich; comp. S. V. Kostyukevich, V. A. Mironova, O. N. Matveeva [and others]. - St. Petersburg. : North-Western State Medical University Press, 2014. - 154 p. : ill. - (Medical education).

Developmental biology, evolution, ecology: textbook. materials for 1st year students / Ministry of Health of the Russian Federation. Federation, State Budget Educational Institution of Higher Professional Education North-Western State Medical University named after I. I. Mechnikova; ed. S. V. Kostyukevich. - 10th ed., revised. and additional - St. Petersburg. : North-Western State Medical University Press, 2013. - 154 p.

Workbook on the sections “Cell Biology”, “Genetics” for practical classes of first-year students studying in the specialty “General Medicine” (31.05.01): educational and methodological manual / ed. Dr. Ramed. sciences, prof. S. V. Kostyukevich. - St. Petersburg: North-Western State Medical University Press, 2018. - 80 p.

Workbook on the sections “Parasitology”, “Developmental Biology”, “Evolution”, “Ecology” for practical classes and independent work of first-year students studying in the specialty “General Medicine” (31.05.01): educational and methodological manual / ed. Dr. med. sciences, prof. S. V. Kostyukevich. - St. Petersburg: North-Western State Medical University Press, 2018. - 80 p.

Biology: textbook: in 2 volumes / ed. V.N. Yarygina. – M.: GEOTAR-Media, 2021. – T.1 – 725 p.

Biology. T. 1.: textbook: in 2 volumes / ed. V. N. Yarygina. - Moscow: GEOTAR-Media, 2023. - 736 p. - ISBN 978-5-9704-7494-5. - Text: electronic // Electronic Library System "Student Consultant": [website]. - URL : https://www.studentlibrary.ru/book/ISBN9785970474945.html

Biology: textbook: in 2 volumes / ed. V.N. Yarygina. – M.: GEOTAR-Media, 2021. – T.2 – 553 p.

Biology. T. 2.: textbook: in 2 volumes / ed. V. N. Yarygina. - Moscow: GEOTAR-Media, 2023. - 560 p. - ISBN 978-5-9704-7495-2. - Text: electronic // Electronic Library System "Student Consultant": [website]. - URL : https://www.studentlibrary.ru/book/ISBN9785970474952.html

Introduction to genetics: educational method. aid for students / S. V. Kostyukevich, O. N. Matveeva, N. G. Perevozchikova [and others]; Ministry of Health of Russia. Federation FSBEI HE North-Western State Medical University named after. Mechnikov, Department of Medical Biology. - St. Petersburg. : North-Western State Medical University Press, 2024. - 127 p.
https://sdo.szgmu.ru/pluginfile.php/881573/mod_resource/content/1/%D0%9A%D0%BE%D1%81%D1%82%D1%8E%D0%BA%D0%B5%D0%B2%D0%B8%D1%87_%D0%92%D0%B2%D0%B5%D0%B4%D0%B5%D0%BD%D0%B8%D0%B5_%D0%B2_%D0%B3%D0%B5%D0%BD%D0%B5%D1%82%D0%B8%D0%BA%D1%83.pdf

8.2. Resources of the Internet information and telecommunications network:

Name of Internet resource	Email address of the resource
Journal of medical Internet research	http://www.jmir.org
World Health Organization	http://www.who.int

9. List of information technologies used to master the discipline, including a list of software, professional databases and information reference systems

9.1. List of information technologies used in the educational process:

No.	Name of discipline section	Information technology
1	Cell biology.	posting of educational materials in EIEE FSBEI HE North-Western State Medical University named after. I.I. Mechnikov of the Ministry of Health of Russia https://moodle.szgmu.ru/course/view.php?id=36&section=8
2	Fundamentals of general and medical genetics.	
3	Ecological and medical-biological foundations of parasitism.	
4	Evolution of the organic world. Phylogeny of vertebrate organ systems. Developmental biology. Ecology and biosphere.	

9.2. List of software used in the educational process (licensed and freely distributed software, including domestically produced):

No.	Software product name	License validity period	Documents confirming right to use software products
licensed software			
1.	ESET NOD 32	1 year	Government contract № 07/2020
2.	MS Windows 8 MS Windows 8.1 MS Windows 10 MS Windows Server 2012 Datacenter - 2 Proc MS Windows Server 2012 R2 Datacenter - 2 Proc MS Windows Server 2016 Datacenter Core	Unlimited	State contract No. 30/2013-O; Government contract No. 399/2013-OA; Government contract No. 07/2017-EA.
3.	MS Office 2010 MS Office 2013	Unlimited	Government contract No. 30/2013-OA; Government contract No. 399/2013-OA.
4.	Academic LabVIEW Premium Suite (1 User)	Unlimited	Government contract № 02/2015
licensed software of domestic production			
1.	Anti-plagiarism	1 year	Government contract № 2409
2.	“WEBINAR (WEBINAR)” VERSION 3.0	1 year	Contract No. 347/2020-M
3.	"3KL e-learning environment"	1 year	Contract No. 348/2020-M
4.	TrueConf Enterprise	1 year	Contract No. 396/2020-EA
free software			
1.	Google Chrome	Unlimited	Open License Agreement

			GNU GeneralPublicLicense
2.	NVDA	Unlimited	Open License Agreement GNU GeneralPublicLicense
freely distributed software of domestic production			
1.	Moodle	Unlimited	Open License Agreement GNU GeneralPublicLicense

9.3. List of professional databases and information reference systems:

No.	Name software product	License validity period	Documents confirming right to use software products	Mode access for disabled students and persons with limited health capabilities
1.	Consultant Plus	1 year	Agreement No. 655/2020-EA	-
2.	EBS “Student Consultant”	1 year	Contract No. 307/2020-EA	http://www.studmedlib.ru/
3.	EMB “Doctor Consultant”	1 year	Contract No. 281/2020-EA	http://www.rosmedlib.ru/
4.	EBS "Ibooks.ru/ibooks.ru"	1 year	Contract № 06/2020	https://ibooks.ru
5.	EBS “IPRBooks”	1 year	Contract No. 08/2020-ZK	http://www.iprbookshop.ru/special
6.	Electronic library system “Bukap”	1 year	Contract № 05/2020	https://www.books-up.ru/
7.	EBS "Lan Publishing House"	1 year	Contract No. 395/2020-EA	https://e.lanbook.com/

10. Material and technical support of discipline

Classrooms for conducting lecture-type training sessions, group and individual consultations, ongoing monitoring of progress and intermediate certification of students, St. Petersburg, Piskarevsky Prospekt, 47, lit. R (building 9), room. No. 1,2,3,4,5,6, FSBEI HE North-Western State Medical University named after. I.I. Mechnikov of the Ministry of Health of Russia; equipped with equipment and technical means of training:
Equipment: board (chalk); teacher's table, student's table, four-seater;
Technical teaching aids: multimedia projector, teacher’s laptop, system unit, monitor.
Special technical teaching aids: Roger Pen (Roger personal wireless transmitter in the form of a pen), Roger MyLink (Roger Pen system signal receiver) (for students with hearing impairments); IntelliKeys (wired keyboard with Russian Braille with a matte black finish), (St. Petersburg, Piskarevsky Prospekt, 47, lit. R (building 9), room No. 18.19, Federal State Budgetary Educational Institution of Higher Education North-Western State Medical University named after I.I. Mechnikov of the Ministry of Health of Russia).

Classrooms for conducting seminar-type training sessions, group and individual consultations, ongoing monitoring of progress and intermediate certification of students, St. Petersburg, Piskarevsky Prospekt, 47, lit. R (building 9), room. No. 1,2,3,4,5,6, FSBEI HE North-Western State Medical University named after. I.I. Mechnikov of the Ministry of Health of Russia; equipped with equipment and technical means of training:

Equipment: board (chalk); teacher's table, student's table, four-seater;
Technical training aids: MIKMED-5 microscopes, terminal stations.

Special technical teaching aids: Roger Pen (Roger personal wireless transmitter in the form of a pen), Roger MyLink (Roger Pen system signal receiver) (for students with hearing impairments); IntelliKeys (wired keyboard with Russian Braille with a matte black finish), (St. Petersburg, Piskarevsky Prospekt, 47, lit. R (building 9), room No. 18.19, Federal State Budgetary Educational Institution of Higher Education North-Western State Medical University named after I.I. Mechnikov of the Ministry of Health of Russia).

Premises for independent work of students, equipped with computer equipment with the ability to connect to the Internet and provided with access to the electronic information and educational environment of the University: St. Petersburg, Piskarevsky Prospekt, 47, lit. AE (building 32),
aud. No. 1, lit. R (building 9), room. No. 18.19 FSBEI HE North-Western State Medical University named after. I.I. Mechnikov of the Russian Ministry of Health.

Appendix A

Ministry of Health of the Russian Federation

federal state budgetary educational institution
higher education
"North-Western State Medical University
named after I.I. Mechnikov"
Ministry of Health of the Russian Federation

(Federal State Budgetary Educational Institution of Higher Education North-Western State Medical University named after I.I. Mechnikov of the Ministry of Health of Russia)

EVALUATION MATERIALS

(for ongoing monitoring of progress and intermediate certification of students)

Specialty: 31.05.01 General medicine
Focus: Organization and provision of primary health care to the adult population in medical organizations
Name of discipline: Biology
Implementation language: Russian, English

St. Petersburg – 2021

1. List of planned learning outcomes in the discipline

Competency achievement indicator code	Learning outcomes (assessment indicators)	Evaluation tools
ID-1-OPK-10.1.	**Knows** Basic medical and biological terminology. The biological essence of processes occurring in a living organism. The structure of cells in interaction with their function. Basic processes occurring in cells at the molecular level. Structure and biological role of nucleic acids in the storage and implementation of genetic information. Basic methods of cell reproduction. Features of the structure and activity of bacteria and viruses, their role in medicine. General patterns of the origin and development of life. Basic patterns and periods of ontogenesis, their features. Biological and genetic significance of the fertilization process. Stages of embryogenesis, their essence. Basic hypotheses of aging. Problems of gerontology. Aging is a natural stage of ontogenesis. Morphophysiological indicators of the aging process. Types of old age and their characteristics. Pathological old age. Examples. Age-related changes in the structures of the human maxillofacial apparatus. Basic patterns of heredity and variability. Basic concepts of genetics. Hereditary and non-hereditary variability. The concept of mutations. The main hereditary human diseases, their diagnosis and prevention. The biological phenomenon of parasitism, its significance for medicine. Pathogens of the main human parasitoses, their morphology, localization, development cycles. Ecological basis for the prevention and diagnosis of parasitic diseases. Biological aspects of human ecology. Anthropogenic factors and their role in the biosphere. The main scientific directions of modern research in medicine and biology. Modern direction of development of biological sciences. The biological essence of processes occurring in a living organism at the subcellular, cellular level.	test questions, test tasks situational tasks abstract
	Can Apply modern information technologies, search for information on the Internet. Use medical and biological terms. Use educational literature. Install and study permanent and temporary preparations under the “dry magnification” of a microscope. Identify the indicated cell structures, name their structure and function. Characterize the ultrastructural components of a cell in an electron diffraction pattern. Learn about eukaryotic, prokaryotic cells and viruses in diagrams, drawings, photographs.	

	Identify the structural components of pro- and eukaryotes on the diagram. Indicate the features of their structure and functions.	
ID-2 OPK-10.2.	**Knows** Basic medical and biological terminology. The biological essence of processes occurring in a living organism.	test questions, test tasks situational tasks
	Can Maintain confidentiality when working with patient information databases	

2. Examples of assessment tools and assessment criteria for ongoing monitoring

2.1. Examples of incoming control

(testing of residual knowledge in previous disciplines).

ID-1 OPK-10.1.

1. Non-cellular life forms. Diversity of viruses, their structure, reproduction. Medical significance of viruses.
2. General plan of the structure of a eukaryotic cell. Cytoplasm; its structural components and their meaning.
3. Morphology of representatives of the order Sporozoans. The development cycle of malarial plasmodium, laboratory diagnosis of malaria.
1. Human karyotype, methods of obtaining and studying. Types of classification of human chromosomes. Karyogram. Gene mapping capabilities.
2. Cellular life forms: prokaryotes, eukaryotes. Similarities and differences between their organizations. Diversity of representatives.
3. Core; structural components of the nucleus. Surface apparatus. Regulatory role of the nucleus in the cell

ID-2 OPK-10.2

1. Regeneration and its types. The importance of regeneration for organisms. Structural levels of regeneration.
2. Molecular diseases, causes and mechanisms of their development. Variety of molecular pathologies. Types of inheritance of molecular diseases.
3. Average and maximum life expectancy. Species life span limit.
1. Hereditary human diseases. Classification. Examples. The concept of multifactorial diseases. Examples.
2. Analysis of the influence of environmental factors on the embryonic development of anomalies and malformations in humans.
3. Features of the action of elementary evolutionary factors in human populations.

Evaluation criteria, grading scale pass/fail

Rating	Description
"passed"	Demonstrates a thorough understanding of the problem. All requirements for the task have been met
"not accepted"	Demonstrates a lack of understanding of the problem. Many requirements for the assignment have not been met. No answer.

2.2. Examples of test tasks:

ID-1 OPK-10.1.

Question title: Question No. 1

Protein synthesis occurs in:

a) nucleus

б) **polysomes**
в) Golgi apparatus
г) mitochondrial cristae

Question name: Question No. 2

Functions of ribosomes:

а) mRNA synthesis
б) tRNA
в) protein synthesis
г) amino acid synthesis

ID-2 OPK-10.2.

Question title: Question No. 1

RH (-) phenotype of a child is possible with the genotypes of the husband and wife:

а) P: ♀ Rhrh - ♂ Rhrh
б) P: ♀ RhRh - ♂rhrh
в) P: ♀ rhrh - ♂RhRh
г) P: ♀ Rhrh - ♂RhRh

Question name: Question No. 2

Genotype of a child with hemolytic disease:

а) Rhrh
б) rhrh
в) XhXh
г) XhY

Question title: Question No. 1

Genotype of a person of blood group IV:

а) I^AI^B
б) IAIA
в) I^BI^B
г) I^B I0

Question name: Question No. 2

Genotype of a person of blood group IV:

а) I^AI^B
б) IAIA
в) I^BI^B
г) I^B I0

Question title: Question No. 1

The ability of the host to respond to the introduction of a parasite with one or another reaction directed against a specific parasite:

Choose one answer:

а) Virulence
б) Allergenicity
в) Pathogenicity
г) Susceptibility

Question name: Question No.

The causative agent of nematode disease is:

а) Fasciola hepatica

б) Taeniarhynchus saginatus
в) Diphyllobothrium latum
г) Enterobius vermicularis

Evaluation criteria, test assignment grading scale

Rating		**Description**
"excellent"	5	Completed in full – 90%-100%
"good"	4	Not fully implemented – 80%-89%
"satisfactory"	3	Completed with deviation – 70%-79%
"unsatisfactory"	2	Partially completed – 69% or less correct answers

2.3. Examples of situational tasks

ID-1 OPK-10.1.

Task

The human immunodeficiency virus (HIV) has invaded the cell. What processes and in what sequence will occur in the cell (shown diagrammatically)? What protein will be synthesized if the viral RNA has the following nucleotide sequence?
A U G G C A G A C C G G U C A G A C G G U C A A
1.....
2.....
3.....
4.....

Task

A resident of a fishing village in Karelia complains of pain along the small intestine, lack of appetite, and significant weight loss over the past few months. During examination at the clinic, he was found to have anemia.

1) What helminthiasis can be suspected?
2) How to confirm the diagnosis?
3) How did the infection occur?
4) Does the patient pose a danger to others?
5) What preventive measures are needed

ID-2 OPK-10.2.

Task

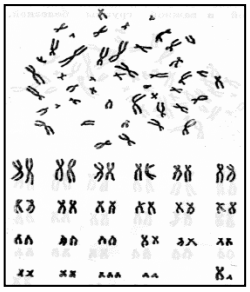
In some geographic areas, the majority of the population has an enlarged thyroid gland (goiter).

1) What is this connected with?
2) How to prevent this phenomenon?
3) What are these geographical areas called from an autecological point of view?
4) Can a person who recently moved to this region experience a similar pathology?
5) What is meant by the concepts: environmental factor, autecology?

Task

1) Define karyotype and karyogram.
2) Define the type of chromosome classification.

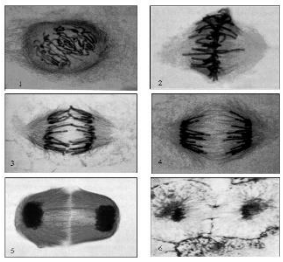
3) Determine the number of autosomes, sex chromosomes, and the total number of chromosomes.



4) Indicate the name of the syndrome and write down the karyotype formula.
5) Name the mechanism of occurrence of this pathology.

Task

1) Name the process.
2) Define the process.
3) List the phases of the process.
4) Name the structures involved.
5) Determine what kind of cell it is: animal or plant, justify it.



Evaluation criteria, rating scale for situational tasks

Rating		**Description**
"excellent"	5	Demonstrates a thorough understanding of the problem. All requirements for the task have been met.
"good"	4	Demonstrates significant understanding of the issue. All requirements for the task have been met.
"satisfactory"	3	Demonstrates partial understanding of the problem. Most of the requirements for the task have been met.
"unsatisfactory"	2	Demonstrates a lack of understanding of the problem. Many requirements for the task have not been met. No answer. There was no attempt to solve the problem

2.4. Examples of essay topics

ID-1 OPK-10.1.

1. Achievements and prospects of genetic engineering.
2. Genetic aspects of carcinogenesis.
3. Human proteome.
4. Mechanisms of regulation of mitotic activity of eukaryotic cells.
5. Human hereditary immunity.
6. Vertebrate retroviruses as a factor of genome variability.
7. Realization of hereditary information in human ontogenesis.
8. The role of environmental factors in the development of sexual characteristics.
9. Human epigenetic inheritance.
10. Mobile genetic elements, their role in genome evolution.

Evaluation criteria, abstract grading scale

Rating		**Description**
"excellent"	5	All requirements for writing and defending an abstract are met:

Rating		Description
		the problem is identified and its relevance is justified, a brief analysis of various points of view on the problem under consideration is made and one's own position is logically presented, conclusions are formulated, the topic is fully disclosed, the scope is maintained, the requirements for external design are met, the correct answers to additional questions are given
"good"	4	The basic requirements for the abstract and its defense have been met, but there are some shortcomings; in particular, there are inaccuracies in the presentation of the material; there is no logical consistency in judgments; the scope of the abstract is not maintained; there are omissions in design; Incomplete answers were given to additional questions during the defense
"satisfactory"	3	There are significant deviations from the abstracting requirements; in particular: the topic is only partially covered; there were factual errors in the content of the abstract or in answering additional questions; no output during protection
"unsatisfactory"	2	The topic of the abstract is not disclosed, a significant misunderstanding of the problem is revealed, or the abstract is not presented at all

2.5. Sample checklist

ID-1 OPK-10.1. Performs standard professional tasks in accordance with basic information security requirements

1. Medical genetic counseling, its stages and significance.
2. The concept of multifactorial diseases. Features of inheritance and development. The role of genotype and environment.
3. General concept of variability, its forms. Significance in ontogenesis and evolution.

Uses medical and biological terminology, information and communication technologies, including physiological, mathematical (or other) concepts and research methods to solve standard problems of professional activity

1. Features of anthropogenetics. Biological and social - ethical characteristics of a person.
2. Cytogenetic methods for studying human heredity.
3. Transcription as a matrix process. The concept of a cistron.

ID-2 OPK-10.2. Applies basic physical and chemical concepts and research methods to solve professional problems

1. Modern methods for studying living and fixed cells.
2. Features of the organization of the hereditary apparatus of viruses. Retroviruses.
3. Environmental factors. The effect of environmental factors on organisms. Limits of species stability. The concept of steno- and eurybionts.

Uses information, bibliographic resources, methods of processing text and graphic information, searches for information on the Internet to solve standard problems of professional activity

1. Comparison of structural features and gene expression in prokaryotes and eukaryotes.
2. Comparison of structural features and gene expression in prokaryotes and eukaryotes.
3. Comparison of structural features and gene expression in prokaryotes and eukaryotes.

Evaluation criteria, assessment scale for control questions

Rating		Description
"excellent"	5	Knows all the educational material, understands it perfectly and has thoroughly mastered it. Gives correct, conscious and confident answers to questions (within the program). In oral answers he uses literary correct language and does not make mistakes.
"good"	4	Knows all the required educational material, understands it well and has mastered it firmly. Answers questions (within the program) without difficulty. In oral answers he uses literary language and does not make gross mistakes
"satisfactory"	3	Knows basic educational material. Answers questions (within the limits of the program) with difficulty. In oral answers, he makes mistakes when presenting the material and in constructing his speech.
"unsatisfactory"	2	Does not know most of the educational material, answers, as a rule, only to the teacher's leading questions, hesitantly. Makes frequent and serious mistakes in oral answers

3. Current control procedure

Current monitoring of progress in the discipline is carried out in the form of: testing, answering test questions, solving situational problems and writing an essay.

4. Examples of assessment tools and assessment criteria for intermediate certification

4.1. Sample checklist of questions to prepare for the exam:

ID-1 OPK-10.1. Performs standard professional tasks in accordance with basic information security requirements

1. Medical genetic counseling, its stages and significance.
2. The concept of multifactorial diseases. Features of inheritance and development. The role of genotype and environment.
3. General concept of variability, its forms. Significance in ontogenesis and evolution.

ID-2 OPK-10.2. Uses medical and biological terminology, information and communication technologies, including physiological, mathematical (or other) concepts and research methods to solve standard problems of professional activity

1. Features of anthropogenetics. Biological and social - ethical characteristics of a person.
2. Cytogenetic methods for studying human heredity.
3. Transcription as a matrix process. The concept of a cistron.

Applies basic physical and chemical concepts and research methods to solve professional problems

1. Modern methods for studying living and fixed cells.
2. Features of the organization of the hereditary apparatus of viruses. Retroviruses.
3. Environmental factors. The effect of environmental factors on organisms. Limits of species stability. The concept of steno- and eurybionts.

Uses information, bibliographic resources, methods of processing text and graphic information, searches for information on the Internet to solve standard problems of

professional activity

1. Comparison of structural features and gene expression in prokaryotes and eukaryotes.
2. A population is an elementary unit of species and evolution. Population genetics.
3. Classification of parasites and parasitic diseases

Evaluation criteria, assessment scale for control questions

Rating		Description
"excellent"	5	Knows all the educational material, understands it perfectly and has thoroughly mastered it. Gives correct, conscious and confident answers to questions (within the program). In oral answers he uses literary correct language and does not make mistakes.
"good"	4	Knows all the required educational material, understands it well and has mastered it firmly. Answers questions (within the program) without difficulty. In oral answers he uses literary language and does not make gross mistakes
"satisfactory"	3	Knows basic educational material. Answers questions (within the limits of the program) with difficulty. In oral answers, he makes mistakes when presenting the material and in constructing his speech.
"unsatisfactory"	2	Does not know most of the educational material, answers, as a rule, only to the teacher's leading questions, hesitantly. Makes frequent and serious mistakes in oral answers

4.2. Examples of situational tasks:

ID-1 OPK-10.1. Performs standard professional tasks in accordance with basic information security requirements

Task 1

A 4-year-old child developed itching in the perianal area and sleep disturbance.

1. What disease can be suspected?
2. What parasite is the causative agent of this disease?
3. How does infection occur?
4. How to confirm the diagnosis?
5. Why did the doctor not allow the child to attend kindergarten?

Uses medical and biological terminology, information and communication technologies, including physiological, mathematical (or other) concepts and research methods to solve standard problems of professional activity

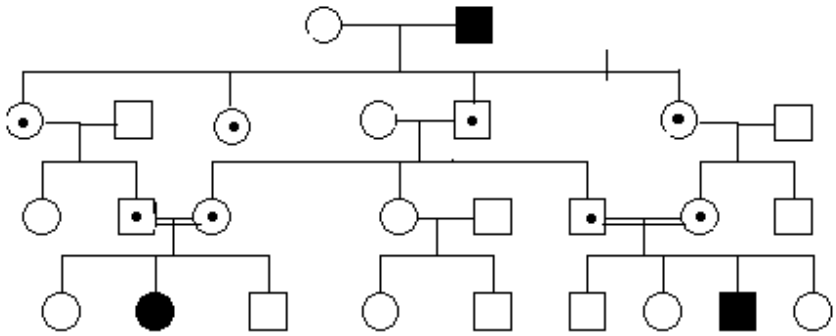
Task 1

Alkaptonuria is inherited in an autosomal recessive manner and occurs with a frequency of 1:10,000.

1) Formulate the Hardy-Weinberg law.
2) Describe what is encrypted, according to the Hardy-Weinberg law, in the expression: $p+q=1$.
3) What is the practical significance of the Hardy-Weinberg law in healthcare.
4) Name the symbol that indicates the frequency of occurrence of individuals in the population that phenotypically exhibit this pathology.
5) Determine the percentage saturation of a population of 600,000 people with heterozygotes.
6)

ID-2 OPK-10.2. Applies basic physical and chemical concepts and research methods to solve professional problems

Task 1



Analyze the circuit.

1 Give the circuit a name.

2 Define and justify the type of inheritance

3 Determine the genotypes of all members of the pedigree, indicating the unambiguous genotypes.

4. Name the probability of manifestation of the analyzed trait in possible marriages.

5 Give examples of traits (normal and pathological) inherited according to this type.

Uses information, bibliographic resources, methods of processing text and graphic information, searches for information on the Internet to solve standard problems of professional activity

Task 1

A Rh-positive woman of blood group II, whose father was Rh-negative with blood group I, married a Rh-negative man of group I.

1.Write the Rhesus-sex genotypes. and Rh-negative people

2. Determine the possible genotypes of women and men.

3Write down the genetic blueprint for the marriage.

4 Determine the possible phenotypes and genotypes of all children. 5. Determine the probability that the child will inherit both characteristics of the father.

Evaluation criteria, rating scale for situational tasks

Rating		**Description**
"excellent"	5	Explanation of the process of solving a situational problem is detailed, consistent, competent, with theoretical justifications, with the necessary schematic images and visual demonstrations, with correct and fluent use of terminology; answers to additional questions are correct and clear
"good"	4	Explanation of the process of solving a situational problem is detailed, but not logical enough, with isolated errors in details, some difficulties in theoretical justification, schematic images and visual demonstrations, answers to additional questions are correct, but not clear enough
"satisfactory"	3	Explanation of the process of solving a situational problem is insufficiently complete, inconsistent, with errors, weak theoretical justification, with significant difficulties and errors in schematic

		images and visual demonstrations, answers to additional questions are not clear enough, with errors in details
"unsatisfactory"	2	The explanation of the process of solving a situational problem is given incompletely, inconsistently, with gross errors, without theoretical justification, without the ability to provide schematic images and visual demonstrations or with a large number of errors, answers to additional questions are incorrect or missing

Evaluation criteria, final grading scale

Rating		**Description**
"excellent"	5	The student answered the theoretical question(s) correctly. Demonstrated excellent knowledge of the training material. Completed the practical task(s) correctly. Demonstrated excellent skills and proficiency in applying acquired knowledge and skills when solving problems within the framework of the educational material. Answered all additional questions
"good"	4	The student answered the theoretical question(s) with minor inaccuracies. Demonstrated good knowledge of the training material. Completed the practical task(s) with minor inaccuracies. Demonstrated good skills and proficiency in applying acquired knowledge and skills when solving problems within the framework of the educational material. Answered most additional questions
"satisfactory"	3	The student answered the theoretical question(s) with significant inaccuracies. Demonstrated satisfactory knowledge of the course material. Completed the practical task(s) with significant inaccuracies. Demonstrated satisfactory skills and abilities to apply the acquired knowledge and skills when solving problems within the framework of the educational material. Made many inaccuracies when answering additional questions
"unsatisfactory"	2	The student, when answering the theoretical question(s) and performing the practical task(s), demonstrated an insufficient level of knowledge and skills in solving problems within the educational material. There were many incorrect answers when answering additional questions.

5. Intermediate assessment procedure

Intermediate assessment in the discipline is carried out in the form of an exam. The exam includes: answering test questions and solving situational problems.