Appendix to the working program

Federal State Budgetary Educational Institution of Higher Education
"Privolzhsky Research Medical University"
Ministry of Health of the Russian Federation

BANK OF ASSESSMENT TOOLS FOR DISCIPLINE

BIOLOGY

Training program (specialty): **31.05.01 GENERAL MEDICINE**

Department: **BIOLOGY**

Mode of study **FULL-TIME**

Nizhniy Novgorod
2023

1. Bank of assessment tools for the current monitoring of academic performance, mid-term assessment of students in the discipline / practice

This Bank of Assessment Tools (BAT) for the discipline "BIOLOGY" is an integral appendix to the working program of the discipline " BIOLOGY ". All the details of the approval submitted in the WPD for this discipline apply to this BAT.

(Banks of assessment tools allow us to evaluate the achievement of the planned results stated in the educational program.

Assessment tools are a bank of control tasks, as well as a description of forms and procedures designed to determine the quality of mastering study material by students.)

2. List of assessment tools

The following assessment tools are used to determine the quality of mastering the academic material by students in the discipline/ practice:

No.	Assessment tool	Brief description of the assessment tool	Presentation of the assessment tool in the BAT
1	Test №1	A system of standardized tasks that allows you to automate the procedure of measuring the level of knowledge and skills of a student	Bank of test tasks
2	Case - task	A problem task in which the student is offered to comprehend a real professionally-oriented situation necessary to solve this problem.	Tasks for solving cases
3	Solving sets of tasks	The following tasks are distinguished : a) of reproductive level, allowing to evaluate and diagnose knowledge of factual material (basic concepts, algorithms, facts) and the ability to correctly use special terms and concepts, recognition of objects of study within a certain section of the discipline; b) of reconstructive level, allowing to evaluate and diagnose the ability to synthesize, analyze, summarize factual and theoretical material with the formulation of specific conclusions, the establishment of cause-and-effect relationships; c) of creative level, allowing to evaluate and diagnose skills, integrate knowledge of various fields, argue your own point of view	A set of multi-level tasks

3. A list of competencies indicating the stages of their formation in the process of mastering the educational program and the types of evaluation tools

Code and formulation of competence*	Stage of competence formation	Controlled sections of the discipline	Assessment tools
UC-1 (Able to carry out a critical analysis of	Entry, Current, Mid-term	Cell Biology	On-line tests Case-task Multi-level tasks and tasks

problem situations based on a systematic approach, develop an action strategy) GPC-10 (Able to understand the principles of modern information technologies and use them to solve the tasks of professional activity)	Entry, Current, Mid-term	Fundamentals of medical parasitology -Medical protozoology -Medical Helminthology -Arthropoda and human diseases	On-line tests Case-task Multi-level tasks and tasks
	Entry, Current, Mid-term	Molecular bases of heredity	On-line tests Case-task Multi-level tasks and tasks
	Entry, Current, Mid-term	Classical genetics Mendelian Genetics. Morgan's theory. Chromosome theory.	On-line tests Case-task Multi-level tasks and tasks
	Entry, Current, Mid-term	Ontogenesis and phylogenesis	On-line tests Case-task Multi-level tasks and tasks

* - *not provided for postgraduate programs*

4. The content of the assessment tools of entry, current control

Entry /current control is carried out by the discipline teacher when conducting classes in the form of: assessment tool 1, assessment tool 2, assessment tool 2,

Assessment tools for current control.

Assessment tool 1

1. ACCORDING TO WHICH PRINCIPLES DOES THE REPLICATION PROCESS SYNTHESIS OF NEW CHAINS TAKE PLACE?

complementarity

antiparallelism

transcriptional principle

parallelism

directional principle

2. ARE AMINO ACIDS BUILDING BLOCKS OF?

lipids

proteins

carbohydrates

nucleic acids

endoplasmic reticula

3. ARE ORGANIC MOLECULES THAT HAVE THE FUNCTION OF STARTING AND REGULATING CHEMICAL REACTIONS?

carbohydrates

lipids

enzymes

endoplasmic reticula

nucleic acids

4. BY THE WHICH ORDER AND TYPE IS THE STRUCTURE OF PROTEINS DETERMINED?

nitrogen bases

pyrimidines

amino acids
nucleotides
peptones

5. IN THE DNA DOUBLE HELIX, COMPLEMENTARY BASE PAIRS ARE HELD TOGRTHER BY .....

hydrogen bonds
N-glycosidic bonds
ionic bonds
peptide bonds
phosphodiester bonds

6. THE HUMAN BODY IS COMPOSED MOSTLY OF.....

calcium, iron, phosphorus, and zinc
oxygen, hydrogen, calcium, and iron
oxygen, nitrogen, hydrogen, and carbon
sulfur, nitrogen, hydrogen, and carbon
phosphorus, nitrogen, hydrogen, and carbon

7. WHAT ARE COMPONENTS OF DNA?

nitrogen base
ribose sugar
aminoacid
deoxyribose sugar
peptide

8. WHAT ARE PYRIMIDINES IN THE STRUCTURE OF RNA?

adenine
cytosine
thymine
guanine
uracil

9. WHAT HAPPENS DURING TRANSCRIPTION?

a new polypeptide is created
RNA is scanned by a ribosome
a new copy of DNA is produced
a complementary copy of RNA is made
a complementary copy of DNA is made

10. BECAUSE DNA- POLYMERASE III CAN ONLY ACT FROM 5' to 3', CONTINUOUS STRAND GROWTH CAN BE ACHIEVED ONLY ALONG ONE OF THE TEMPLATE STRANDS (LEADING STRAND) AND STRAND GROWTH ALONG THE OTHER STRAND MUST OCCUR DISCONTINUOUSLY RESULTING IN THE PRODUCTION...

replicon fragments
okazaki fragments
klenow fragments
klenow segments
none of the above

11. A MAN HAS BLOOD TYPE A. HIS WIFE HAS BLOOD TYPE B. WHAT BLOOD TYPES DO CHILDREN HAVE?

AB
A or B
A or B or AB
A or B or AB or O
A

12. A MAN HAS BLOOD TYPE B. HIS WIFE HAS BLOOD TYPE AB. WHAT BLOOD TYPES DO CHILDREN HAVE?

AB
A or B
A or B or AB
A or B or AB or O
A

13. AN ORGANISM'S EXPRESSED PHYSICAL TRAIT, SUCH AS SEED COLOR OR POD SHAPE. HOW IS IT CALLED?

genotype
phenotype
gamete
gene
cytosol

14. HOW MANY DIFFERENT KINDS OF GAMETES WILL THE INDIVIDUAL WITH GENOTYPE AAbb PRODUCE?

1 (ONE)
2 (TWO)
3 (THREE)
4 (FOUR)
6 (SIX)

15. HOW MANY DIFFERENT KINDS OF GAMETES WILL THE INDIVIDUAL WITH GENOTYPE Aabb PRODUCE?

1 (ONE)
2 (TWO)
3 (THREE)
4 (FOUR)
6 (SIX)

16. HUMAN BODY (SOMATIC) CELLS CONTAIN ..... CHROMOSOMES; AND THE GAMETES (SEX CELLS) CONTAIN ..... CHROMOSOMES

23; 46
46; 23
46; 46
23; 23
92; 46

17. IF THE ALLELE FOR GREEN POD COLOR (G) IS DOMINANT OVER THE ALLELE FOR YELLOW POD COLOR (g), WHICH OF THE FOLLOWING GENOTYPES WOULD A PLANT WITH YELLOW PODS HAVE?

GG
Gg
gG
gg
GGgg

18.ROUND SEED IS DOMINANT OVER WRINKLED SEED IN PEA. IF HOMOZYGOUS ROUND SEEDED PEAS ARE CROSSED WITH WRINKLED SEEDED PEAS THE OFFSPRING WILL BE?

all round
all wrinkled
50 % round + 50% wrinkled
75 % round + 25% wrinkled
25 % round + 25% wrinkled

19. WHAT ARE ALLELES?

homologous chromosomes
chromosomes that have crossed over
alternate forms of gene
linked genes
nonhomologous chromosomes

20. WHAT ARE THREE IMPORTANT LAWS OF HEREDITY PROPOSED BY MENDEL?

linkage
segregation
independent assortment
dominance recessiveness
crossing over

21. ..... BEGINS WHEN PAIRS OF SISTER CHROMATIDS ALIGN IN THE CENTER OF THE CELL.

anaphase
interphase
metaphase
prophase
telophase

22. ASEXUAL REPRODUCTION .....

is limited to plants
leads to a loss of genetic material
produces offspring that are genetically identical to the parent
produces offspring that always look exactly like the parent
is limited to single-celled organisms

23. AT THE END OF TELOPHASE I OF MEIOSIS AND CYTOKINESIS, THERE ARE .....

4 haploid cells.
2 diploid cells.
4 diploid cells.
1 haploid ovum and 3 polar bodies.
2 haploid cells

24. CYTOKINESIS IS THE .....

exchange of homologous regions of nonsister chromatids
formation of tetrads
independent assortment of chromosomes
transfer of genetic material involving sex pili
division of one cell into two

25. DURING WHAT STAGE OF DEVELOPMENT DO THE THREE PRIMARY TISSUE LAYERS FIRST APPEAR?

cleavage
blastulation
neurulation
fertilization
gastrulation

26. MANY CHROMATIDS DOES A DUPLICATED CHROMOSOME HAVE?

one
two
three
four
six

27. IN EARLY STAGES OF VERTEBRATE CLEAVAGE, SUCCESSIVE BLASTOMERES .....

are equal in size to that of the original zygote
become smaller and smaller
grow larger and larger
migrate to positions of future development
begin immediate differentiation

28. IN TELOPHASE OF MITOSIS, THE MITOTIC SPINDLE BREAKS DOWN AND THE CHROMATIN UNCOILS. THIS IS ESSENTIALLY THE OPPOSITE OF WHAT HAPPENS IN .....

prophase
interphase.
metaphase
S phase
anaphase

29. WHAT ARE THE PLACENTA FUNCTIONS?

excretory organ
respiratory organ

endocrine organ
reproductive organ
none of the above

30. WHAT DOES THE TERM "HOMOLOGOUS CHROMOSOMES" MEAN?

refers to replications of the same chromosome
is another name for sister chromatids
must be haploid
means a pair of chromosomes of the same kind, such as X sex chromosomes
must be diploid

31. FOR WHICH PARASITE IS THE HABITAT THE LARGE INTESTINE?

Leishmania tropica
Lamblia intestinalis
Entamoeba histolytica
Trichomonas vaginalis

32. ORGANISMS THAT MOVE BY MEANS OF PSEUDOPODIA BELONG TO THE GROUP .....

algae
sarcodina
diatoms
euglenoids
dinoflagellates

33. WHICH OF THE FOLLOWING IS NOT A GROUP USED IN THE TEXT TO CLASSIFY PROTISTS?

Mastigophora
Sarcodina
Sporozoa
Infuzoria
Cestoda

34. WHICH OF THE FOLLOWING LISTS CONTAINS A LOCOMOTOR MECHANISM NOT POSSESSED BY PROTISTS?

pseudopodia
flagella
tube feet
cilia

35. PARASITES WHICH LIVE INSIDE THE BODY ARE TERMED

Endoparasites
Ectoparasites
Autoparasites
Seudoparasites

36.HOW IS A LIFE CYCLE STAGE WHERE PARASITE CAN INITIATE AN INFECTION IN A HOST CALLED?

invasion stage
diagnostic stage
intermediate stage
definitive stage
general stage

37. MALARIA RESULTS FROM A MOSQUITO INJECTING THE ..... OF PLASMODIUM INTO THE HUMAN BLOOD STREAM.

sporocyst
glycoprotein coat
merozoites
gametocytes
sporozoites

38. TO WHICH ONE OF THE FOLLOWING GROUPS DOES THE ORGANISM THAT CAUSES MALARIA BELONG?

flagellates
sarcodines
ciliates
zoomastigotes
none of the above

39. WHAT ARE MECHANISMS OF TRANSMISSION OF TOXOPLASMOSIS?

blood transfusion or organ transplantation
consuming undercooked, infected meat
consuming undercooked, infected fish
consuming undercooked, infected crabs
mother-to-child transmission

40. WHAT IS THE SPECIMEN FOR THE DIAGNOSIS OF TRICHOMONAS VAGINALIS INFECTION?

prostatic secretions
vaginal discharges
urine
blood
sputum

41. CESTODES OBTAIN NUTRIENTS FROM HOST THROUGH .....

vacuole
the digestive tract
the mounth
the whole body
the intestine

42. THE PARASITES THAT INFECTS PEOPLE WHO EAT UNDERCOOKED PORK ARE .....

Schistosoma species
Enterobius vermicularis
Taenia solium
Fasciola hepatica
Hymenolepis nana

43. WHAT DO TREMATODES USUALLY HAVE?

two suckers
head
scolex
strobila
hooks

44. WHICH PARASITE CAN CAUSE PERIANAL PRURITUS (ITCHING)?

Ascaris lumbricoides
Enterobius vermicularis
Trichuris trichiura
Trichinella spiralis
Strongyloides stercoralis

45. ..... IS THE CESTODE THAT PARASITIZES HUMANS WITHOUT REQUIRING AN INTERMEDIATE HOST, WHOLE LIFE CYCLE MAY BE ONLY IN THE HUMAN BODY

Hymenolepis nana
Taenia saginata
Echinococcus granulosus
Echinococcus multilocularis
Diphyllobothium latum

46. "SCOTCH TEST" IS USED FOR THE DIAGNOSIS OF INFECTION, WHICH IS CAUSED BY .....

Ascaris lumbricoides
Enterobius vermicularis
Trichiurus trichura
Trichinella spiralis
Loa-loa

47. CYSTICERCOSIS IS CAUSED BY .....

Taenia saginata
Enterobius vermicularis
Fasciola hepatica
Taenia solium
Hymenolepis nana

48. HOW IS HUMAN INFECTED BY FASCIOLA HEPATICA?

by eating raw fish
by eating raw pork

by eating raw beef
by eating raw caviar
by eating raw fresh-water grass

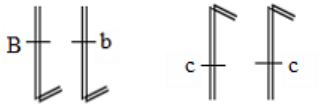
49. HYDATID DISEASE IS CAUSED BY .....

Diphyllobothrium latum
Echinococcus granulosus
Taenia saginata
Loa-loa

4.1. Tasks for the assessment of competence " UC-1"*:*

Task 1. Individual genotype is AaBbGG. Genes are in different chromosome pairs. Locate the genes in chromosomes (draw). Observe these chromosomes in the mitotic cycle.

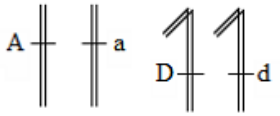
Task 2. The primary spermatocyte has:



Write down number of chromosomes and genes in primary, secondary spermatocytes and sperms. Draw the chromosomes and genes in the sperms.

Task 3. Individual genotype is BBHhYy. Genes are in different chromosome pairs. Locate the genes in chromosomes (draw). Observe these chromosomes in the mitotic cycle.

Task 4. The primary oocyte has:



Write down number of chromosomes and genes in secondary oocytes and ova. Draw the chromosomes and genes in the secondary oocytes.

Task 5. The structure of DNA is AAAGCTTTCCGAGTCGGATGCCAA.
What is the length of this segment? What is the structure of protein?

Task 6.The base sequence of a segment of single stranded DNA is: A-A-G-T-C-T-A-C-G-T-A-C.Write down the sequence of a segment of double stranded DNA.What is the length of this segment? How many amino acids are coded by this fragment?

Task 7. Genes are inherited independently. The crossing given is AaeeFf x AaEeff. Write down the genotypic and phenotypic ratio. How many different genotypes and phenotypes appear in this crossing?

Task 8. The hereditary disease is caused by autosomal dominant gene A. The mother is heterozygous, the father is healthy. The first child is sick, the second is healthy. What is the probability of a third healthy child birth?

Task 9. A color blind is a recessive sex-linked trait in humans. A normal vision woman marries a man who is color blind. What is the probability that a daughter will be color blind?

Task 10. A woman with A (II), Rh+ blood group is married to a man with AB (IV), Rh+ blood group. His first child has B (III) and Rh- blood group. What is the probability of second child birth with B (III) and Rh- blood group?

Task 11. Arachnodactyly (spider fingers) is inherited as an autosomal dominant trait with 30% penetrance. Determine the probability of occurrence of anomalies in children in a family where both parents are heterozygous for this gene and they have already given birth to a child with spider fingers.

Task 12.The results of crossing of pumpkins are
P: ♀ yellow x ♂ white
F_1: white
F_2: 204 white : 53 yellow : 17 green
Explain these results. Determine the type of heredity. Write down the scheme of crossing. Write down the genotypes of all individuals.

Task 13. Genes are inherited independently. The crossing given is:
P: ♀ AABb CC Dd x ♂ aa Bb Cc dd
a) Write down the genotypic and phenotypic ratio.
b) How many different genotypes and phenotypes appear in this crossing?

Task 14. The individual genotype is AaBb. The crossingover between A and B is 20%. Locate the genes in the chromosomes. Write down the scheme of crossingover, gametes and the ratio of gametes.

Tasks for the assessment of competence "GPC-10"*:*

Task 1. Which method can identify the Sickle cell anemia? Why?

Task 2. Which method can identify the phenylketonuria? Why?

Task 3. Imagine that you are a doctor. The analysis has showed that activity of enzymes of the patient is not found. Make a conclusion. Write down examples of diseases

Task 4. Which method can identify gene mutations? Give a classification of gene mutatios

Task 5. What is a phenylketonuria? What are the main features of the disease?

Task 6. Imagine that you are a doctor. We found the abnomal structure of DNA sequence. But we can not find abnomal proteins. How can we explain it?

Task 7. Imagine that you are a doctor. We found the abnomal structure of DNA sequence which codes the normal protein? But we can not find this proteins in the person metabolism. How can we explain it?

4.2. Control work for the assessment of competence " UC-1 "*:*
Variant 1

Task 1. Who introduced the binominal nomenclature? What does this term mean?

Task 2. What organelles of a plant cell surrounded by a double membrane do you know? Name their functions.

Task 3. What types of partnership between two organisms do you know? What is parasitism?

Task 4. Define the species of Protozoa in the photograph. Write down the classification of the parasite, which is illustrated in the photo.

Task 5. Give definitions of a definitive host and an intermediate host. Write down the examples.

Task 6. Is Lamblia intestinalis a geoprotist or a bioprotist? Why?

Task 7. What species causes African sleeping disease? What is the mechanism and mode of invasion?

Task 8. What is the location of the parasite which causes skin leishmaniasis in the human body? What is the laboratory diagnosis of the disease?

Task 9. What is the invasion stage of Toxoplasma gondii for human? Write down the preventive maintenance for toxoplasmosis.

Task 10. Describe the life cycle of Balantidium coli.

Variant 2

Task 1. Write down the Latin name and the classification of a parasite which causes cysticercosis.

Task 2. What is a natural focus disease? Give the examples of worms.

Task 3. Write down the main morphological features of Nematodes.

Task 4. Is Opistorchis felineus a geohelminth or a biohelminth? Why?

Task 5. What species causes Trichuriasis? Write down the laboratory diagnosis of this disease.

Task 6. How is human infected with hydatid disease (write down mechanisms and modes of invasion)? What is the invasion stage for human?

Task 7. What is the preventive maintenance of Diphyllobothriasis?

Task 8. Compare the morphological features of Opistorchis felineus and Dicrocoelium dendriticum (adults).

Task 9. What is the location of Schistosoma haematobium in the human body? Explain the laboratory diagnosis of this disease.

Task 10. Describe the life cycle of Taenia solium.

Variant 3

Task 1. What species causes scabiesis? Write down its Latin name and the classification of the species.

Task 2. Give the definition of a type of parasitic disease: «invasion». Write down the examples of human diseases of this type.

Task 3. Is African sleeping sickness a natural focus disease? If it is correct, write down the components of the natural focus for the disease.

Task 4. What is the medical importance of Pediculus humanus? How can human be infected with these diseases (the mechanisms and modes of transmission)?

Task 5. What are the main features of phylum Arthropoda?

Task 6. What are the mechanism and mode of transmission of bubonic plague?

Task 7. Describe the life cycle of Ornithodoros papillipes. Does the species develop with complete or incomplete metamorphosis?

Task 8. Give the definition of an ectoparasite. Give the examples (Latin names of human parasites).

Task 9. What is an obligate- vector borne disease? Give examples of human obligate- vector borne diseases.

Task 10. Draw the schemes of the mouth part of male Anopheles and male Culex mosquitoes.

Variant 4

Task 1. Name the experiments demonstrating the genetic role of DNA as the hereditary substance. Explain Griffith's experiment.

Task 2. When does the DNA replication occur in the life cycle of cells? Describe the principles of replication.

Task 3. What is Okazaki fragment? Why is the Okazaki fragment formed?

Task 4. Name the enzymes and its functions involved in dark DNA-repair.

Task 5. Explain why the genetic code is specific.

Task 6. What is processing? In which cells does post-transcriptional processing take place? Enumerate the stages of this process.

Task 7. Describe the processes occurring in the elongation of translation.

Task 8. What is a promoter? What is the place and the function of promoter in the operon?

Task 9. Enumerate the stages of a recombinant DNA technology or a DNA cloning.

Task 10. The base sequence of a segment of single stranded DNA is: A-A-G-T-C-T-A-C-G-T-A-C. Write down the sequence of a segment of double stranded DNA.
What is the length of this segment? How many amino acids are coded by this fragment?

Variant 5

Task 1. What are Hox Genes?

Task 2. Give a definition of the cell cycle.

Task 3. Describe a metaphase and an anaphase of mitosis.

Task 4. Describe the process of cleavage. What is formed after cleavage? Draw the structure of this stage.

Task 5. The diploid number of chromosomes AaBb (2n2c) is located in different chromosome pairs. Locate the genes in chromosomes for a primary spermatocyte. What is the set of chromosomes and genes?

Variant 6

Task 1. Genes are inherited independently. The crossing given is:
P: ♀ AA bb Cc Dd x ♂ aa Bb Cc dd
a) Write down the genotypic and phenotypic ratio.
b) How many different genotypes and phenotypes appear in this crossing?

Task 2. The hereditary disease is caused by autosomal dominant gene D. Brown eyes are dominant to blue eyes. The mother is ill and heterozygous, the father is healthy and brown-eyed. The first child is sick and blue eyed. What is the probability of a healthy blue-eyed child birth?

Task 3. The results of crossing of pumpkins are
P: ♀ yellow x ♂ white
F1: white
F2: 204 white: 53 yellow : 17 green
Explain these results. Determine the type of heredity. Write down the scheme of crossing. Write down the genotypes of all individuals.

Task 4. A young woman accused a man of being the father of her child. The father had AB blood groups, mother had A blood group, the child had 0 blood group. What are the possible genotypes of these people? Could this man be the father of this child? Why?

Task 5. A young woman accused a man of being the father of her child. The father had AB blood groups, mother had B blood group, the child had A blood group. What are the possible genotypes of these people? Could this man be the father of this child? Why?

Task 6. A young woman accused a man of being the father of her child. The father had A blood groups, mother had A blood group, the child had 0 blood group. What are the possible genotypes of these people? Could this man be the father of this child? Why?

Task 7. A young woman accused a man of being the father of her child. The father had B blood groups, mother had B blood group, the child had 0 blood group. What are the possible genotypes of these people? Could this man be the father of this child? Why?

Task 8. Which method can identify the Sickle cell anemia? Why?

Task 9. What are mutagens? What kind of mutagens types do you know?

4.3. Tasks (assessment tools) for the exam/credit

The full package of examination tasks/tasks is given *(UC-1, GPC-10):*

Exam questions

1. Properties of life. Levels of organization of living things.
2. Hierarchy of life. Bacteria, archaea, eukarya. Prokaryotes and eukaryotes. The Domains of the living organisms.
3. Discovery of DNA genetic role. Griffith's, Macleod, MaCarty, Avery, Hershey-Chase experiments.
4. DNA primary structure. Nucleotide structure. Linkage of nucleotides. DNA secondary structure. Complementary base pairing. Main principles of the Watson and Crick's model for DNA structure.
5. Levels of DNA package. Chromosome. Heterochromatin and euchromatin.

6. Nucleic acids. Levels of organization: gene level, chromosomal level, genome level. Types of nucleic acids. DNA genetic role. RNA genetic role.
7. Nucleic acids. RNA structure. Major classes of RNA and its characteristics. Role of RNAs.
8. Central dogma of molecular genetics. Expression of genetic information.
9. The genetic code and its characteristics. Codon and anticodon.
10. Stages of DNA replication. Enzymes which take part in replication. Leading and lagging strand synthesis. Direction of synthesis. Prokaryotic and eukaryotic replication.
11. DNA repair. Direct repair, excision repair: enzymes which take part in repair. Human diseases: result of defect of DNA repair processes.
12. Expression of the genetic information. Central dogma of molecular genetics.
13. Stages of transcription. Posttranscriptional RNA processing.
14. Central dogma of molecular genetics. Translation of mRNA. Components necessary for protein synthesis. Ribosomal structure. Charging t-RNA. Activation of amino acids: formation of aminoacyl-transfer RNA.
15. Translation in Eukaryotes. Translation steps. Polyribosomes. Posttranslational modification.
16. Regulation of gene expression in prokaryotes. Operon model for the regulation of gene expression in prokaryotes: lac-operon, trp-operon.
17. The structure of eukaryotic chromosomes. Morphology of chromosomes.
18. Types of chromosomes. Chromatin and chromosomes. Rules of chromosomes. Characteristics of a normal human karyotype.
19. Biology of development. Types of development. Ontogenesis. Periods of ontogenesis. Stages of embryonic period.
20. Types of reproduction. Asexual reproduction: fission, spore formation, budding, fragmentation. Advantages and disadvantages of asexual reproduction. Parthenogenesis.
21. Biological aspects of human reproduction. Gametogenesis. Stages of spermatogenesis and oogenesis. Differences between spermatogenesis and oogenesis.
22. Sexual reproduction in mammals. Alternation of haploid and diploid stages in the life cycle. The structure of sperm and ovum. External and internal fertilization. Advantages and disadvantages of sexual reproduction.
23. Cell cycle. Phases of the cell cycle. Three types of cell cycle.
24. Meiosis. The main stages. The importance of meiosis in variation.
25. Mitosis. Stages of mitosis. Number of chromosomes and DNAs in mitotic stages. The role of mitosis.
26. Mendel's laws of heredity. Gene, phenotype, genotype, allele, homozygous, heterozygous, monohybrid cross.
27. Sex determination. Types of sex determination. Sex linkage. Inheritance of sex-linked diseases.
28. Gene interaction. Non-allelic gene interaction.
29. Gene interaction. Allelic gene interaction.
30. Mutagens. Classification of mutations. Spontaneous and induced mutations. Gametic and somatic mutations. Gene mutation.
31. Classification of mutations. Chromosomal mutations. The role of chromosomal mutations in the development of human diseases.
32. Genome mutations. Classification of genome mutations. The role of genome mutations in plants and animals. Human diseases as a result of genome mutations.
33. Genetic variation. Types and characteristics of genetic variation. Sources of genetic variation.
34. Forms of interactions between organisms. Symbiosis. Commensalism.
35. Mutualism. Parasitism. Adjustment between parasite and host. Parasitic adaptations. Parasites and humans.
36. Parasite and host relations. Adaptations to parasitism. Effect of parasite on the host. Effect of host on the parasite.
37. Kingdom Protista. Latin classification. Characteristic features of Protista. Medical importance.

38. Entamoeba histolytica. Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis. Prevention.
39. Lamblia intestinalis. Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis. Prevention.
40. Leishmania tropica. Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis. Prevention.
41. Leishmania donovani. Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis. Prevention.
42. Trichomonas vaginalis. Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis. Prevention.
43. Trypanosoma brucei. Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis. Prevention.
44. Trypanosoma cruzi. Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis. Prevention.
45. Toxoplasma gondii. Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis. Prevention.
46. Plasmodium vivax. Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis. Prevention of malaria.
47. Classification of helminthes. Characteristic features of Phylum Platyhelminthes. Medical importance.
48. Classification of helminthes. Characteristic features of Phylum Nemathelminthes. Medical importance.
49. Fasciola hepatica. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
50. Opisthorhis felineus. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
51. Paragonimus westermani. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
52. Schistosoma species (blood flukes). Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
53. Taenia saginata. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
54. Taenia solium. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
55. Diphyllobothium latum. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
56. Hymenolepis nana. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
57. Echinococcus granulosus. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
58. Ascaris lumbricoides. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.

59. Enterobius vermicularis. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
60. Trichuris trichiura. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
61. Trichinella spiralis. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
62. Strongyloides stercoralis. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
63. Ancylostoma duodenale. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
64. Dracunculus medinensis. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
65. Filaria. Classification (kingdom, phylum, class). Geographic distribution.
66. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.
67. Classification of arthropods. Characteristic features of Phylum Arthropoda. Medical importance of arthropods.
68. Classification of insects. Characteristic features of class Insecta.
69. Development of arthropods: complete and incomplete (gradual) metamorphosis. Medical importance of insects.
70. Ixodes persulcatus. Classification (kingdom, phylum, subphylum, class, order). Geographic distribution. Characteristic features of hard ticks. Medical importance.
71. Ornithodoros papillipes. Classification (kingdom, phylum, subphylum, class, order). Geographic distribution. Characteristic features of soft ticks. Medical importance.
72. Sarcoptes scabiei. Classification (kingdom, phylum, subphylum, class, order). Geographic distribution. Characteristic features of mites. Medical importance. Preventive methods.
73. Phthirus pubis. Classification of lice. Characteristic features of lice. Medical importance of lice.
74. Pediculus humanus capitis and Pediculus humanus humanus. Classification of lice. Characteristic features of lice. Medical importance of lice.
75. Xenopsylla cheopis and Pulex irritans. Classification of fleas. Characteristic features of fleas. Medical importance of fleas.
76. Triatoma infestans and Cimex lectularius. Classification of bed bugs. Characteristic features of bed bugs. Medical importance of bugs.
77. Anopheles mosquitoes. Classification of mosquitoes. Characteristic features of Anopheles mosquitoes (eggs, larvae, pupa, wings, and mouth parts). Medical importance of Anopheles mosquitoes.
78. Phlebotomus sandflies. Latin classification. Geographic distribution. Medical importance of Phlebotomus species.
79. Culex mosquitoes. Classification of mosquitoes. Characteristic features of

Culex mosquitoes (eggs, larvae, pupa, wings, and mouth parts). Medical importance of Culex mosquitoes.

80. Mechanical vectors: cockroaches and houseflies. Classification. Characteristic features. Medical importance.
81. Theory of natural foci of vector-borne (transmissible) diseases. Components of natural focus of vector-borne diseases (biotic and abiotic factors). Obligate and optional vector-borne diseases.

82. The concept of natural focus diseases (Pavlovsky Y. N.) Components of natural focus of non-vector-borne diseases (biotic and abiotic factors).
83. Important groups of human parasites. Life cycles of geo-, bio- and contagious parasites.
84. Biological vectors: ticks and lice. Classification. Characteristic features. Medical importance.
85. Ectoparasites and endoparasites. Examples. Classification. Medical importance.
86. Infection, invasion, and infestation: definitions, examples of diseases.
87. Pathogens of infections, invasion and infestations, classification of the pathogens.

And then the tasks are specified for all competencies provided for this discipline.

5. The content of the assessment tools of mid-term assessment

Mid-term assessment is carried out in the form of **an exam.**

The bank of assessment tools for conducting current control and mid-term assessment of students in this discipline is presented on the Educational Portal of the PRMU - https://sdo.pimunn.net/course/view.php?id=3991

5.1 The list of control tasks and other materials necessary for the assessment of knowledge, skills and work experience *(the teacher indicates only those tasks and other materials that are used within the framework of this discipline)*

5.1.1. Questions for the discipline exam *_BIOLOGY*

Question	UC-1, GPC-10
1	Central dogma of molecular genetics. Expression of genetic information.
2	Biological vectors: ticks and lice. Classification. Characteristic features. Medical importance.

Question	UC-1, GPC-10
1	Sexual reproduction in mammals. Alternation of haploid and diploid stages in the life cycle. The structure of sperm and ovum. External and internal fertilization. Advantages and disadvantages of sexual reproduction.
2	Mechanical vectors: cockroaches and house-flies. Classification. Characteristic features. Medical importance.

Question	UC-1, GPC-10
1	DNA repair. Direct repair, excision repair: enzymes which take part in repair. Human diseases: result of defect of DNA repair processes.
2	Phthirus pubis. Classification of lice. Characteristic features of lice. Medical importance of lice.

Question	UC-1, GPC-10
1	Meiosis. The main stages. The importance of meiosis in variation.
2	Trichinella spiralis. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.

Question	UC-1, GPC-10
1	Types of reproduction. Asexual reproduction: fission, spore formation, budding, fragmentation. Advantages and disadvantages of asexual reproduction. Parthenogenesis.
2	Dracunculus medinensis. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.

Question	UC-1, GPC-10
1	Biological aspects of human reproduction. Gametogenesis. Stages of spermatogenesis and oogenesis. Differences between spermatogenesis and oogenesis.
2	Ancylostoma duodenale. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.

Question	UC-1, GPC-10
1	Sexual reproduction in mammals. Alternation of haploid and diploid stages in the life cycle. The structure of sperm and ovum. External and internal fertilization. Advantages and disadvantages of sexual reproduction.
2	Trypanosoma brucei. Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis. Prevention.

Question	UC-1, GPC-10
1	Cell cycle. Phases of the cell cycle. Three types of cell cycle.
2	Classification of helminthes. Characteristic features of Phylum Platyhelminthes. Medical importance.

Question	UC-1, GPC-10
1	Mitosis. Stages of mitosis. Number of chromosomes and DNAs in mitotic stages. The role of mitosis.
2	Plasmodium vivax. Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis. Prevention of malaria.

Question	UC-1, GPC-10
1	Mendel's laws of heredity. Gene, phenotype, genotype, allele, homozygous, heterozygous, monohybrid cross.
2	Strongyloides stercoralis. Classification (kingdom, phylum, class). Geographic distribution. Morphology of the parasite. Life cycle. Mechanisms and modes of invasion. Laboratory diagnosis, prevention.

6. Criteria for evaluating learning outcomes

For the exam (example)

Learning outcomes	**Assessment of competence developed**			
	unsatisfactory	**satisfactory**	**good**	**excellent**
Completeness of knowledge	The level of knowledge is below	The minimum acceptable level	The level of knowledge in	The level of knowledge in the

Learning outcomes	Assessment of competence developed			
	unsatisfactory	**satisfactory**	**good**	**excellent**
	the minimum requirements. There were bad mistakes	of knowledge. A lot of light mistakes were made	the volume corresponding to the training program. A few light mistakes were made	volume corresponding to the training program, without errors
Availability of skills	Basic skills are not demonstrated when solving standard tasks. There were bad mistakes	Basic skills are demonstrated. Typical problems with light mistakes have been solved. All tasks have been completed, but not in full.	All basic skills are demonstrated. All the main tasks have been solved with light mistakes. All tasks have been completed, in full, but some of them with shortcomings	All the basic skills were demonstrated, all the main tasks were solved with some minor shortcomings, all the tasks were completed in full
Availability of skills (possession of experience)	Basic skills are not demonstrated when solving standard tasks. There were bad mistakes	There is a minimal set of skills for solving standard tasks with some shortcomings	Basic skills in solving standard tasks with some shortcomings are demonstrated	Skills in solving non-standard tasks without mistakes and shortcomings are demonstrated
Characteristics of competence formation*	The competence is not fully formed. The available knowledge and skills are not enough to solve professional tasks. Repeated training is required	The formation of competence meets the minimum requirements. The available knowledge and abilities are generally sufficient to solve professional tasks, but additional practice is required for most practical tasks	The formation of competence generally meets the requirements, but there are shortcomings. The available knowledge, skills and motivation are generally sufficient to solve professional tasks, but additional practice is required for some professional tasks	The formation of competence fully meets the requirements. The available knowledge, skills and motivation are fully sufficient to solve complex professional tasks
The level of competence formation*	Low	Below average	Intermediate	High

For testing:
Mark "5" (Excellent) - points (100-90%)

Mark"4" (Good) - points (89-80%)
Mark "3" (Satisfactory) - points (79-70%)
Less than 70% – Unsatisfactory – Mark "2"

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Date "_____" _____ 202__