Federal state budgetary educational institute of the higher education

«Orenburg state medical university» of Ministry of Health of the Russian Federation»

**INSTRUCTIONS**

**FOR THE INDEPENDENT WORK OF STUDENTS**

**BIOLOGY**

majoring in (specialty)

31.05.01 Medicine

(faculty of foreign students)

It is part of the main professional educational program of higher education majoring in (specialty) 31.05.01 Medicine (faculty of foreign students), approved by the Academic Council of the FSBEI HE ORGMU of the Ministry of Health of Russia

protocol № 8 from 25.03.2016.

Orenburg

1. **Explanatory note**

Independent work is a form of organization of the educational process that stimulates activity, independence, and the cognitive interest of students.

Independent work of students is an obligatory component of the educational process, since it ensures the consolidation of the acquired knowledge by acquiring the skills of comprehending and expanding their content, solving urgent problems of the formation of general cultural (universal), general professional and professional competencies, research activities, preparing for classes and passing the intermediate certification.

Independent work of students is a set of classroom and extracurricular activities and works that ensure the successful development of the educational program of higher education in accordance with the requirements of the Federal State Educational Standard. The form choice of organizing students' independent work is determined by the content of the discipline and the form of organization of training (lecture, seminar, practical lesson, etc.).

**As a result of performing independent work in the discipline "Biology", the student must:**

- to form the ability to identify the basic concepts and categories of the multilevel organization of biological systems, and their functioning; patterns of evolution of the organic world, biosocial nature of man, his subordination to the general biological laws of development;

- to deepen the knowledge of basic biological laws;

- to master the skills of analysis, synthesis and generalization of various theoretical facts and provisions of biological science;

- to form the ability to apply theoretical knowledge in cell cytology, genetics, parasitology, anthropology, ecology to explain the biological characteristics of a living organism (human).

- mastering practical skills (analysis of heredity and variability, analysis of karyotypes, construction and analysis of pedigrees, morphology of parasitological drugs and analysis of results).

**2. Content of students' independent work.**

The content of tasks for independent work of students in discipline is presented in the fund of evaluation tools for current monitoring of progress and intermediate certification in the discipline, which is attached to the work program of the discipline, section 6 "Educational and methodological support for the discipline (module)", in the information system University.

The list of educational, educational and methodological, scientific literature and information resources for independent work is presented in the work program of the discipline, section 8 "List of basic and additional educational literature necessary for mastering the discipline (module)".

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| № | The topics of independent work | The forms of independent work | The forms of independent work control | Contact form of work during current control |
| 1 | 2 | 3 | 4 | 5 |
| *Independent work within the module* | | | | |
|  | *Module «Biology of the cell»* | Work on educational material (textbook, lectures, additional literature) | Testing,  written survey, solving problem-situational tasks and problems in molecular biology. | Extracurricular – control of independent work (CIW) |
| *Independent work in the framework of practical classes module 1*  *"Biology of the cell"* | | | | |
| 1 | Topic “The forms of living organisms. Cell theory. The basic structural components of the cell” | Work on educational material (textbook, lectures, additional literature). | Testing, Recitation, control of assignments in practice notebooks | in-class |
| 2 | Topic “The structure of the cytoplasm. Modern ideas about the structure and functions of membranes”. | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation, control of assignments in practice notebooks | in-class |
|  | Topic “The hereditary apparatus of the cell. The structure and functions of the nucleus. Nucleic acids". | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation, control of assignments in practice notebooks | in-class |
|  | Topic “Gene expression. Protein synthesis”. | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation, problem solving, control of assignments in practice notebooks | in-class |
|  | Topic “Reproduction of organisms.  The cell cycle. Mitosis. Meiosis. Gametogenesis". | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation, problem solving, control of assignments in practice notebooks | in-class |
| *Independent work in the framework of practical classes module 2*  *"Human genetics"* | | | | |
|  | Topic «Basic Concepts in Genetics. Mendel’s Laws». | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation, solving genetic problems, control of assignments in practice notebooks | Extracurricular – CIW |
|  | Topic «Linked inheritance. Sex-linked inheritance. Genetics of sex». | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation, solving genetic problems, control of assignments in practice notebooks | in-class |
| … | Topic « Immunogenetics. Multiple alleles. Inheritance of HLA, ABO, Rh - systems. Interaction of allelic and non-allelic genes». | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation, solving genetic problems, control of assignments in practice notebooks | in-class |
|  | Topic «Variability and hereditary diseases». | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation,  solving genetic and problem-situational tasks, control of assignments in practice notebooks | in-class |
|  | Topic « Medical genetics. Methods for studying human heredity». | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation,  solving genetic and problem-situational tasks, control of assignments in practice notebooks | in-class |
| *Independent work in the framework of practical classes module 3*  *"Ecology. Medical parasitology "* | | | | |
|  | Topic «Basic concepts of parasitology. Protozoa. Phylum Sarcomastigophora». | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation , control of assignments in practice notebooks | in-class |
|  | Topic «Protozoology: Subphylum Sporozoa, Subphylum Ciliophora». | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation, control of assignments in practice notebooks | in-class |
|  | Topic «Helminthology: Trematode infections and Cestoidea infections». | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation, control of assignments in practice notebooks | Extracurricular – CIW |
|  | Topic «Helminthology: Nematoda infections». | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation, control of assignments in practice notebooks | in-class |
|  | Topic «Medical arachnoentomology. Phylum Arthropoda». | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation, control of assignments in practice notebooks | Extracurricular – CIW |
|  | Topic “Basic concepts of ecology” | Work on educational material (textbook, lecture, primary source, additional literature) | Testing, Recitation, control of assignments in practice notebooks | in-class |

**3. Methodical instructions for completing tasks for independent work in the discipline.**

**Methodical instructions for students on preparation**

**to practical training**

Practical training is a form of organization of the educational process, aimed at improving students' practical skills and abilities through group discussion of the topic, educational problem under the guidance of a teacher.

*When developing an oral response in a practical lesson, you can use the classic oratory scheme. This scheme is based on 5 stages:*

1. Selection of the necessary material for the content of the upcoming speech.

2. Drawing up a plan, dismembering the collected material in the necessary logical sequence.

3. "Verbal expression", literary processing of speech, saturation of its content.

4. Memorization, memorization of the text of the speech or its individual aspects (if necessary).

5. Making a speech with the appropriate intonation, facial expressions, gestures.

*Recommendations for building the composition of an oral response:*

1. The introduction should:

- to attract attention, arouse the interest of listeners to the problem, the subject of the answer;

- explain why your judgments about the subject (problem) are authoritative, meaningful;

- to establish contact with listeners by pointing to common views, previous experience.

2. The pre-notifications should:

- reveal the history of the problem (subject) of the speech;

- show its social, scientific or practical significance;

- to reveal previously known attempts to solve it.

3. In the process of argumentation it is necessary:

- to formulate the main point and give, if necessary for its clarification, additional information;

- to formulate an additional point, if necessary, accompanying it with additional information;

- to formulate a conclusion in general terms;

- to point out the disadvantages of alternative positions and the advantages of your position.

4. In conclusion, it is advisable:

- summarize your position on the problem under discussion, your final conclusion and decision;

- justify what the consequences are if you abandon your approach to solving the problem.

*Recommendations for drawing up a detailed response plan*

*to theoretical questions of practical training*

1. When reading the studied material for the first time, divide it into the main semantic parts, highlight the main thoughts and conclusions.

2. When drawing up a detailed outline plan, formulate its points, subparagraphs, determine what exactly should be included in the outline for the disclosure of each of them.

3. The most essential aspects of the studied material (theses) consistently and briefly state in your own words or cite in the form of quotations.

4. In the synopsis include both key points and specific facts and examples, but not describe them in detail.

5. Write individual words and whole sentences in abbreviated form, write out only keywords, instead of citing, make only links to the pages of the cited work, use conventional symbols.

6. Arrange paragraphs in steps, use colored pencils, markers, felt-tip pens to highlight significant places.

**Methodological instructions for monitoring the performance of tasks**

**in a practice notebook.**

Control tasks in the workbook are aimed at identifying and comparing at one stage or another of the training results of students' educational activities with the requirements set by the content of the discipline being studied.

It allows you to check and evaluate the knowledge of students, to determine the degree of their readiness for further education, as well as the level of skills formation, if the tasks are of a practice-oriented nature.

*Algorithm for the task:*

1) read a textbook, study guide or lecture that describes the topic under study;

2) learn basic concepts;

3) view the tasks and algorithms for their implementation in the workbook;

4) complete written assignments: fill in tables, diagrams, draw up drawings;

5) repeat the definitions of concepts, laws without a textbook or notebook.

**Methodical recommendations for solving genetic problems.**

*Algorithm for solving genetic problems*

1) Read the problem statement carefully.

2) Make a short record of the problem statement (which is given by the problem statement).

3) Write down the genotypes and phenotypes of the crossed individuals.

4) Identify and write down the types of gametes that the breeding species form.

5) Identify and record the genotypes and phenotypes of the offspring obtained from the crossing.

6) Analyze the crossing results. To do this, determine the number of classes of offspring by phenotype and genotype and write them down as a numerical ratio.

7) Write down the answer to the problem question.

(When solving problems on certain topics, the sequence of stages can change, and their content can be modified.)

Registration of tasks

1) It is customary to write down the female genotype first, and then the male one (the correct entry is ♀ААВВ х ♂аавв; the wrong entry is ♂aavv x ♀ААВВ).

2) The genes of the same allelic pair are always written side by side (the correct entry is ♀АABB; the incorrect entry is ♀ABAB).

3) When recording a genotype, the letters denoting traits are always written in alphabetical order, regardless of which trait - dominant or recessive - they denote (correct entry - ♀aaBB; incorrect entry -♀ BBaa).

4) If only the phenotype of an individual is known, then when recording its genotype, only those genes are written, the presence of which is indisputable. A gene that cannot be identified by its phenotype is denoted by the symbol "\_" (for example, if the yellow color (A) and smooth form (B) of pea seeds are dominant traits, and the green color (a) and wrinkled form (b) are recessive, then the genotype of an individual with yellow wrinkled seeds is recorded as A\_vb).

5) The phenotype is always written under the genotype.

6) In individuals, the types of gametes are determined and recorded, and not their number

7) Phenotypes and types of gametes are written strictly under the corresponding genotype.

8) The progress of solving the problem is recorded with the justification of each conclusion and the results obtained.

9) When solving problems on di- and polyhybrid crossing, it is recommended to use the Pennet lattice to determine the genotypes of the offspring. The types of gametes from the maternal individual are recorded vertically, and the paternal ones are recorded horizontally. At the intersection of the column and the horizontal line, a combination of gametes corresponding to the genotype of the resulting daughter is recorded.

**Methodical recommendations for solving problem-situational tasks.**

Situational tasks are tasks that allow you to master intellectual operations sequentially in the process of working with information: familiarization - understanding - application - analysis - synthesis - evaluation.

The specificity of a situational task is that it has a pronounced practice-oriented and integrative character, but specific subject knowledge is required to solve it.

*Algorithm for solving a problem-situational tasks:*

1. First, carefully read all the information contained in the task in order to get a complete picture of the situation.

2. Read the information carefully again. Highlight those paragraphs that seem most important to you.

3. Try to first describe the situation orally. Determine what is its essence, what is of primary importance, and what is of secondary importance. Then write down the conclusions in writing.

4. Record all the facts that relate to this problem, (both those that are stated in the situation, and those that you know from literary sources and your own experience) in writing. This will make it easier to find relationships between the phenomena that the situation describes.

5. Formulate the main provisions of the decision, which, in your opinion, needs to be taken regarding the problem outlined

6. Try to find alternative solutions to the problem, if any.

7. Develop a list of practical steps to implement your solution. Try to determine the credibility of achieving success if the solution you proposed is accepted

8. State the results of solving the problem in writing.

**4. Criteria for evaluating the results of assignments for independent work of students.**

Evaluation criteria for completed assignments are presented in the **assessment fund for current progress monitoring and midterm certification of students studying on discipline**, which is attached to the work program of the discipline, section 6 "Teaching and methodological support for the discipline (module)", in the information system of the University.