**Al-Farabi Kazakh National University**

**Faculty of Biology and Biotechnology**

**Department of Molecular Biology and Genetics**

**Final exam program by discipline**

MNI 7202 " Research methodology"

Educational program in the specialty “8D05101 - Biology”

Doctor’s degree, 1 course, autumn semester 2021-2022 academic year

**2021 y.**

The program of the final exam of the discipline MNI 7202 " Research methodology" of the specialty “8D05101 - Biology” was compiled by Amirova Aigul Kuzembayevna, candidate of biological sciences.

Reviewed and approved at a meeting of the Department of Molecular Biology and Genetics

From "20" October 2021, protocol No. 5

Head of Department \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Zhunusbaeva Zh.K.

**The form of the final exam on the discipline** – Oral / Zoom

**The purpose of the assignment** is to assess the students' knowledge and understanding of the topics covered in this discipline; to recreate the conditions under which they will be able to assess the problem, analyze ways to solve the problem and apply the knowledge gained in practice; Test their ability to reason for their answers.

**Type of options -** tickets.

**Evaluation criteria:** Block I - 30 points, Block II - 30 points, Block III - 40 points.

A (90-100%) - the student carefully studied the educational material; consistently and comprehensively answers the questions posed; freely applies the acquired knowledge in practice.

B (75-89%) - the student knows the educational material; does not make serious mistakes when answering; he can apply the acquired knowledge in practice.

С (60-74%) - the student knows only the basic material, does not always give an answer clearly and completely.

D (50-59%) - the student has separate ideas about the material being studied; cannot fully and correctly answer the questions posed, when answering, he makes gross mistakes.

**Exam program**

**Block I**

1. Introduction. Goals and tasks of the discipline Research methodology
2. Science as a system of knowledge.
3. Scientific Research Methods.
4. Theoretical research work. Theoretical framework of a dissertation.
5. Empirical and theoretical levels scientific knowledge.
6. Experimental research work. Design and structure of experimental research work.
7. Organization research process. The purpose and importance of experimental research work.
8. Direction and stages scientific research.
9. Explain the classification of types of research according to its purpose: theoretical research and applied research.
10. Theoretical research methods (induction, concretization, analogy, comparison, classification, analysis, synthesis).

**Block II**

1. The structure of the study. Observation technique.
2. Descriptive or analytical scientific research features.
3. Essence, structure and functions of cognition.
4. Theoretical and applied research work.
5. Classification the research according to its descriptive or analytical features.
6. Regression analysis. Planning Regression experiments.
7. Methods of naturalistic observation. Methods of data collection data in observational research.
8. Metrological support experimental research. Classification, types and objectives of the experiment.
9. Objectives of the experiment: general and specific objectives.

**Block III**

1. Computational experiment. Graphic methods processing the results of the experiment.
2. Dispersion (factorial) and covariance analyzes.
3. Correlation and regression analyzes.
4. Functions and significance of science. The role of science in society.
5. Types of scientific hypotheses. Experiment as a method of scientific research. The role and importance of theory.
6. Experiment design with independent quantitative factors. Planning experiment with qualitative factors.
7. Basic concepts of mathematical planning of an experiment. Factors. Criteria optimality.
8. Diagnostics in scientific research. Groups of control used in experiment: negative control and positive control.
9. System analysis in scientific research: main types and stages.

**RECOMMENDED LITERATURE**

1.Космин, В. В. Основы научных исследований (Общий курс) [текст] : учеб. пособие . - 2-е изд. - M. : Риор, 2014. - 214 с.

2. Герасимов, Борис Иванович. Основы научных исследований. - Москва ; Москва : Издательство "ФОРУМ" : ООО "Научно-издательский центр ИНФРА-М", 2013. - 272 с.

3. Леонова, Ольга Владимировна. Основы научных исследований. - 1. - Москва : Московская государственная академия водного транспорта (МГАВТ), 2015. - 72 с.

4. Шкляр, Михаил Филиппович. Основы научных исследований. - Москва : Издательско-торговая корпорация "Дашков и К", 2018. - 208 с.

5. Shanti Bhushan Mishra and Shashi Alok Handbook of research methodology. – India 2017. – 28 p.

6. В. А. Бакулев, Н. П. Бельская, В. С. Берсенева Основы научного исследования. - Екатеринбург : Изд-во Урал. ун-та, 2014. – 64 c.

***Internet resources:***

1) http://elibrary.kaznu.kz/ru

2)https://www.researchgate.net/publication/319207471\_HANDBOOK\_OF\_RESEARCH\_METHODOLOGY

3) https://www.goodreads.com/

4) https://www.coursera.org/

5) https://www.edx.org/

6) https://ed.ted.com/

7) https://elar.urfu.ru/bitstream/10995/28683/1/978-5-7996-1118-7\_2014.pdf