

APPROVED
at a meeting of the Academic
Council of NJSC “KazNU named
after al-Farabi”
Protocol №11 from 11.06.2024 y.

**Program of the entrance exam for applicants to doctoral programs for
the group of educational programs**

D015 “Teacher Training in Natural Science Disciplines” - Biology

I. General Provisions

1. The program is made in accordance with the Order of the Minister of Education and Science of the Republic of Kazakhstan from October 31, 2018 № 600 “On approval of the Model Rules for admission to training in educational organizations implementing educational programs of higher and postgraduate education” (hereinafter - Model Rules).

2. Entrance examination in doctoral studies consists of an Interview, Essay writing and Examination on the profile of the group of educational programs.

Block	Scores
1. Interview	30
2. Essay writing	20
3. Examination on the profile of the group of educational programs	50
Total/Passing level	100/75

3. The duration of the entrance examination is 3 hours and 10 minutes, during which the applicant writes an essay and answers the electronic examination ticket. The interview is held on based of the university before the entrance exam.

II. Procedure for Conducting the Entrance Examination

1. Entrants to the doctoral program group of educational programs D015 Teacher Training in Natural Science Disciplines - “Biology” write a problem / thematic essay. The volume of the essay is not less than 250 words. The purpose of the essay is to determine the level of analytical and creative abilities expressed in the ability to build their own argumentation on the basis of theoretical knowledge, social and personal experience.

2. The electronic examination ticket consists of 3 (three) questions.

Essay topics:

1. Proteins: chemical composition, properties, and significance for the human body
2. Why is research about the evolution of life important to our understanding of the past.
3. How Do Cells Adapt to Environmental Changes.
4. The importance of cell theory for the development of biology as a science
5. The importance of discoveries in genetics for the progress of biology as a life science
6. The importance of homeostasis mechanisms in sustaining the integrity of the organism
7. Advantages and disadvantages of creating a continuous learning environment
8. Natural science worldview as part of functional biological literacy of modern man
9. The importance of science teaching in shaping an investigation mindset
10. What are most important functions of membranes in cells.

Topics for preparation for the exam on the profile of the group of the educational program:

Discipline “Selected Chapters of Biology”

Introduction and development of biological concepts. Classification of biological concepts. General biological (cross-cutting), special and local concepts. Essence and concept of biological species.

Chapter: Cytology. Basic tenets of the cell theory as the chief proof of the unity of the organic world; structure of the cell. Types of cell division. Cell theory.

Chapter: Histology. General picture. Histology of man, relation to medicine. Diversity of life forms, taxonomy, classification in biology. Laws of individual development of organisms on the example of man. Ways of reproduction in the organic world.

Chapter: Photosynthesis and Respiration. Energy metabolism in the cell. Energy conversion.

Chapter: Genetics. Formation of knowledge about genetic concepts and laws. The laws of Mendel and Morgan. Actual questions of human genetics. Heredity. Basic laws. Examples of heredity. Law of homologous series of hereditary variability.

Chapter: Molecular Biology. Biological cell membrane. Current biological models for the study of diseases and disorders.

Chapter: Evolutionary Biology. Diversity of organic life forms on Earth - current research and advances. The structure of the plant and animal cell. The pathway of energy consumption - from plants to animals.

Chapter: Breeding and Biomedicine. Reproduction of living organisms - models of scientific research. Chromosomally inherited human diseases. Heredity and Variability.

Chapter: Developmental Physiology. Control and regulation of functional systems in the human body. Transport of substances across membranes. Movement in non-muscular tissues. Brain and Nerve Regulation. Adaptation and homeostasis - evolution in action.

Chapter: Interdisciplinary Connections. The interrelationship of research on the origin of Life on Earth. Ethical aspects of biological scientific research.

Discipline “**Methodology of Educational Process Management**”

1. Prerequisites and general provisions in the management of the learning process.

Pedagogical management - business processes and communications. Education and upbringing - the main objectives of the methodology of management of the educational process as a project. Criteria and principles of selecting the content of the educational process - as part of the development of management methodology. The concept of “management” function. The main stakeholders of the process. The principle of building a risk map and models of an ideal learning process. General Provisions of the State Educational Standards for the organization of the learning process. Structural and functional components of process management. Objectives of Management. Modular system of the organization of the learning process: goals and objectives. Prospects and achievements. Pedagogical analysis. Goal setting and mission.

2. Constituents of learning process management.

Pedagogical technologies and collaborative ways of learning. Planning. Motivation for self-discovery as part of the GCSE. Intensive methods and means of guidance and control. Decision-making. Constituent parts of planning. Basic rules of planning. Principles in developing decisions. “Kaleidoscope” thinking, role-playing, internship, and real life. What is needed to organize innovative learning. What core competencies an organization must have to successfully implement a learning process. Delegation of authority - basic principles. A model of a “three-step” algorithm for delegating a task. Punishment and Stimulation - equivalent tools of effective management. Evaluation of manager's performance, feedback - the key to finding problematic issues. Motivation concepts as a management tool. Compliance requirements, corporate ethics and reputation of the institution. Discipline. Values of the person, values of the teacher, values of the learner - a field for joint growth and interaction.

3 Areas of application of the learning management methodology

Practical applicability of the methodology of educational process management in organizations of different legal entity. Pedagogical monitoring - functionality. Types, system, technology. Direction of pedagogical monitoring, development of the personality of the student, teacher, management activity, learning activity. Work with underachievers, underachievers. Principles of business approach in the management of the educational process: analysis, goal setting, planning, decision-making, organization and control, motivation and delegation, marketing. Variety

and flexibility of formats and models of training as the basis for the development of methods of learning process management. Pedagogical marketing. Tasks of marketing in the educational process. Marketing tools. Innovative approaches applicable to the process of educational process management.

Discipline “**Theoretical Biology**”

The system of the organic world. The law of unity and diversity of life, or St. Hilaire's law. The law of globalism of life, or Vernadsky's first law. Biological evolution. The law of organic expediency or Aristotle's law. The law of natural selection or Darwin's law.

Individual development of an organism. Law of ontogenetic aging and renewal, or Krenke's law. The law of integrity of ontogenesis, or Drish's law.

The physiological and biochemical essence of life. The law of chemical composition of living matter, or Engels' first law. Law of systemic organization of biochemical processes, or Bertalanffy's law.

Genetic and cybernetic essence of life. The law of informational conditioning of biological systems, or Waldington's law. The law of discreteness and continuity of biological information, or Morgan-Efrussi's law.

Man and the life of the planet. The law of the leading role of labor in the formation and development of man, or Engels' second law. The law of the biosphere role of mind, or Vernadsky's second law.

III. List of References

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