APPROVED
at a meeting of the Academic Council of
NJSC “KazNU named after al-Farabi"
Protocol No. ___ from _____ y.

# The program of the entrance exam for applicants to the PhD for the group of educational programs «D134 Fishery»

## 1. General provisions.

1. The program was drawn up in accordance with the Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 600 “On Approval of the Model Rules for Admission to Education in Educational Organizations Implementing Educational Programs of Higher and Postgraduate Education” (hereinafter referred to as the Model Rules).
2. The entrance exam for doctoral studies consists of writing an essay, passing a test for readiness for doctoral studies (hereinafter referred to as TRDS), an exam in the profile of a group of educational programs and an interview.

| Block | Points |
|---|---|
| 1. Interview | 30 |
| 2. Essay | 20 |
| 3. Exam according to the profile of the group of the educational program | 50 |
| Total admission score | 100/75 |

3. The duration of the entrance exam is 3 hours 10 minutes, for admission he writes an essay, and is responsible for the electronic examination ticket. The interview is conducted at the university premises before the entrance exam.

## 2. Procedure for the entrance examination.

1. Applicants for doctoral studies in the group of educational programs D134 - «Fishery» write a problematic / thematic essay. The volume of the essay is at least 250-300 words.
2. The electronic examination card consists of 3 questions.

### The essence of the topic:

1. The main issues of the development of fisheries in Kazakhstan

2. The main problems of the development of genetic research in fisheries

3. The main problems of the development of the science of ichthyopathology in the fisheries sector of Kazakhstan

4. Portrait of a scientist researcher through your eyes

5. The history of scientists and researchers of Kazakhstan who contributed their work to the formation of fisheries science

6. Achievements and problems of aquaculture feed production

7. The planned topic of scientific research, relevance, purpose and objectives

8. Dynamics of aquaculture development in Kazakhstan over the past 10 years: innovations, problems, achievements

9. The problem of developing new aquaculture facilities and ways to solve them

10. Problems of biotechnology development in fish farming

**Topics for exam preparation according to the profile of the group of the educational program.**

**Discipline Patterns of hydrobiont development**

Problems of phylogeny and phylogenetic relationships between modern and fossil jawless animals. Systematics, structure and life cycles of unicellular animals, free-living and parasitic invertebrates. Comparative analysis of the organization of arthropods. Problems of the origin of maxillofacies. Organization, behavior, and lifestyle of cartilaginous and bony fish. Organization and origin of amphibians. Representatives of ancient lobe-finned fishes. Morphobiology and systematics of roundworms. Features of the physiology of vertebrates. Biology and phylogeny of commercial fish species. Organizations and lifestyle of reptiles. Comparative analysis of anamnias and amniotes. Taxonomy and peculiarities of the organization of representatives of the bird class. The main stages of the development of ichthyogeography. Basic terminological concepts of ichthyogeography. Characteristics of the process of settling fresh water by fish. Environmental factors affecting the distribution and fauna of fish. The processes of zoogeographic zoning of land, the main zoogeographic selections.

**Discipline Biotechnology in fisheries**

Physical and chemical properties of water in natural reservoirs. Methods of environmental impact assessment. State environmental expertise of water bodies. Water hydrochemistry, basic parameters. Capture and fixation of hydrobionts. Methods of studying the biology and morphology of fish. Ichthyological methods of fish nutrition research. Theory of fish stock formation. Classification of net tools for commercial fishing. Growth and development of hydrobionts. Methods of fish population research. Study of biological productivity of water bodies. Size and age structure of fish. Field and laboratory methods of hydrobiont research. Cage fish farming. Technology of reproduction of valuable objects of aquaculture. Diseases and prevention of hydrobionts. Industrial fish farming. Warm-water fishing. Industrial fishing on natural reservoirs. Sturgeon breeding. Trout farming. Carp farming. Catfish farming. Farm fish farming. Selection and bonitirovka. Selection

and culling. Incubation shop. Reproduction processes of warm-water fish. The process of reproduction of cold-water fish. Valuable feed, combined feed. Feeding valuable fish species. Feed ratio

**Discipline: Sustainable management of water bioresources**

Problems of sustainable development of fisheries and aquaculture. Ecosystem approach and concepts of sustainable fisheries development. The current state of fisheries in Kazakhstan. Analysis of the state of the biological criteria of the species. Fisheries significance of water bodies in Kazakhstan. Recreational fishing. Problems of providing the industry with scientific personnel. Analysis of pathology in fish farming. Resource potential of the Caspian Sea. Resource potential of lakes and reservoirs in Kazakhstan. The state of biodiversity of water bodies in Kazakhstan. The current state of the world ocean and its biological resources The concept of a minimum viable population. Theory of natural population management and conservation of hydrobiont species diversity. Basic treatises on ecological expertise of water bodies. The place and role of biotesting and bioindication in the environmental assessment of water bodies. Primary production of reservoirs. Principles of the International Code of Zoological Nomenclature. Species diversity of the organic world, international network of Protected areas. Analysis of species extinction. The impact of fishing on the natural resources of water systems.

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