APPROVED
at the meeting of the Academic Council of NJSC Al-Farabi Kazakh National University
Protocol №14 dated 16.06.2026

Entrance Examination Program for Applicants to Doctoral Studies in the Educational Program Group «D123-Geodesy»

I. General Provisions

1. This program is developed in accordance with the Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018, No. 600 "On the Approval of Standard Rules for Admission to Education in Organizations Implementing Educational Programs of Higher and Postgraduate Education" (hereinafter referred to as the Standard Rules).

2. The doctoral entrance examination consists of an interview, writing an essay, and a subject-specific examination.

№	Component	Points
1.	Interview	30
2.	Essay	20
3.	Examination in the profile of the educational program group	50
	Total / Passing score	100/75

3. The duration of the entrance examination is 3 hours and 10 minutes, during which the applicant writes an essay and answers questions from an electronic examination ticket. The interview is conducted at the university prior to the entrance exam.

II. Procedure for the Entrance Examination

1. **Applicants to the doctoral program** in the educational program group «**D123-Geodesy»** are required to write **a problem-based / thematic essay**. The essay must be **at least 250 words** in length.

Purpose of the essay:

To assess the level of analytical and creative thinking, expressed through the ability to construct independent arguments based on theoretical knowledge, social, and personal experience.

Types of essays include:

• Motivational essay revealing the applicant's incentives for engaging in research;

• Scientific-analytical essay justifying the relevance and methodology of the planned research;

• Problem-based / thematic essay reflecting various aspects of scientific knowledge within the subject area.

2. The **electronic** examination ticket consists of **3 questions**.

Topics for preparation for the profile entrance exam in the educational program group:

1. 2. Main requirements and functions of professionals in geodetic support of design.

Justification of the geodetic layout framework for construction through sign surveying methods.

3. Methods of creating and updating engineering topographic plans, considering the survey of underground utilities.

4. Justification of engineering surveys for preparing design tasks in construction and reconstruction.

5. Control and restoration of the geodetic layout framework in case of sign loss.

6. Methods of adjusting the geodetic leveling network on a construction site using stabilized working benchmarks.

7. Methods of adjusting the geodetic leveling network on a construction site using permanent benchmarks.

8. Geological and engineering-geological processes relevant to solving design problems.

9. Reasons for conducting engineering-hydrometeorological and engineering-environmental surveys during design.

10. Organization of engineering-environmental surveys in the construction area.

11. Subject domain, object of study, and system of interdisciplinary linkages of geoinformatics as a scientific discipline.

12. Theoretical foundations of spatial data models: formal principles of vector and raster representations of geospatial information.

13. Structural and functional organization of geographic information systems and methodological foundations of spatial analysis.

14. Spatio-temporal modelling in geoinformatics and the methodology of predictive (scenario-based) analysis of geosystems.

15. Theoretical and methodological foundations of multisensor integration of remote sensing and UAV-derived data in geoinformatics.

16. Geospatial data infrastructure, data standardization and openness, and ethical aspects of the use of geoinformation technologies.

17. Geoinformatics and artificial intelligence: paradigms of machine learning and pattern recognition based on spatial data.

18. Geoinformatics within the Big Data paradigm: streaming models of geodata processing and real-time spatial analytics.

III. List of References Used

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Supplementary Sources::

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11. Esri. Geospatial Artificial Intelligence (GeoAI): Concepts and Applications. – Redlands: Esri Press, 2023. – 120 p.