JSC "ALT University named after Mukhamedzhan Tynyshpayev"

APPROVING IT
Chairmanof the Management Board of ALT University JSC
_____ M. S. Zharmagambetova

Decision of the Academic Councilof ALT University JSC
from "30" 05 2025 year (protocol no. 10)

program
ENTRANCE EXAM FOR DOCTORAL STUDIES

Gruppe of educational programs
D210-Backbone networks and infrastructure

Almaty, 2025

The program of the entrance exam was discussed and received a positive decision at the meeting of the Department ofTransport Construction, Protocol No. 10 of 13 June 13, 2025.

Head of the Department
"Transport construction " _____ **G. B. Karibayeva**

The program of the entrance exam was reviewed and recommended at the meeting of the Council of the Institute of Transport and Construction, Protocol No.6 of 23 June 23, 2025.

Chairman of the Institute of
Transport and Construction _____ **Sh. A. Abdreshov**

CONTENT

1 The purpose of the entrance exam for a group of educational programs

The purpose of the entrance exam for groups of educational programs is to determine the theoretical and practical readiness of the applicant for doctoral studies, the level of compliance of knowledge, skills and abilities with the requirements of doctoral studies in the field of training.

The entrance exam for doctoral studies consists of writing an essay and an exam for the profile of a group of educational programs.

2. Regulations for conducting the entrance exam for doctoral studies in a group of educational programs

The duration of the entrance exam is 3 hours and 30 minutes, during which the applicant passes an interview, writes an essay, passes a test of readiness for doctoral studies, and answers an electronic exam ticket consisting of 3 questions. The list of questions and the subject of the essay are formed in random order. The maximum score for the entrance exam is 100 points, including an interview – 30 points, an essay-20 points, and an exam on the GOP profile-50 points.

3. Types and evaluation criteria

3.1 Types and criteria of essay evaluation

Types of essays	**Description**	**of the scope of the essay**
Motivational	Argumentation of thespeaker about the motivating motives for research activities (research statement)	**At least 250 words**
of Scientific and analytical	Justification for incoming relevance and methodology of the proposed research (research proposal)	
Problem-thematic	presentation of the author's position on topical aspects of subject knowledge	

Criteria	**Descriptors**	**Scores**
Depth of topic disclosure	the problem is disclosed at the theoretical level, with correct use of scientific terms and concepts	4
	own point of view (position, attitude) is presented when disclosing the problem	4
Argumentation, evidence base	the presence of arguments from scientific literature and sourcescorresponding to the topic of the essay	4
Compositional integrity and logic of presentation	the presence of compositional integrity, structural components essays are logically linked	4
Speech culture	demonstration of a high level of academic writing (vocabulary, knowledge of scientific terminology, grammar, stylistics)	4

Maximum number of points	20

3.2 Criteria for evaluating answers to questions on the electronic exam card

The exam for the profile of a group of educational programs includes 3 blocks of questions, of which: the 1st question determines the level and consistency of theoretical knowledge; the 2nd question reveals the degree of formation of functional competencies; the 3rd question is aimed at determining system competencies. The maximum number of points is 50.

The electronic exam card consists of 3 questions:

Blocks	Type of question	Number of points
1st question	theoretical-determines the level and consistency of theoretical knowledge	10
2nd question	practical-reveals the degree of formation of functional competencies (the ability to apply methods, technologies and techniques in the subject area)	20
3rd question	reveals a systematic understanding of the subject area being studied, specialized knowledge in the field of research methodology (systematic knowledge of competencies)	20
TOTAL		**50**

Criteria for evaluating answers to questions on an electronic exam card:

Question	Evaluation criteria	Number of points
1st question	demonstrates knowledge of the main processes of the subject area under study; depth and completeness of the question	5
	logically and consistently expresses its own opinion on the problem	under discussion 3
	owns the conceptual and categorical apparatus, scientific terminology	2
	Total	**10**
2nd question	question applies methods, techniques, technologies to solve problems in the subject area	7
	argues, compares, classifies phenomena, events, processes; draws conclusions and generalizations based on practical skills	7
	analyzes information from various sources	6
	Total	**20**
3rd question	critically analyzes and evaluates theoretical and practical developments, scientific concepts and current trends in the development of science	7
	synthesizes methodological approaches in the interpretation of the main problems of subject knowledge	7
	identifies causal factors that affect the development of scientific knowledge.investigative relationships in the analysis of processes, phenomena, events	6
	Total	**20**

	TOTAL	**50 points**

3.3 Interview evaluation criteria

№	Criteria	Descriptors	Scores
1.	**Motivation**	Argumentation of motives for studying for a doctoral degree in the chosen OP and entering a certain university. Vision of professional and personal growth prospects upon completion of training.	5
2	**Research competence**	Possess the research skills and experience required for research activities in a particular subject area.	10
3.	**Creativity**	Unconventional thinking, creative and alternative approaches to solving problems, situational problems.	10
4.	**Communication**	skills The ability to briefly, representatively, logically, and argumentatively express one's point of view, make generalizations, and draw conclusions. Language proficiency.	5
Maximum number of points30			**30**

4. Content of examination materials

4.1. Content of the Essay topic

№	Essay Topic
1	Ensuring the safety of transport infrastructure facilities, organizational and technical approaches
2	Justification for the choice of a research object in transport engineering
3	Innovative approaches to the design of main roads
4	Improving the reliability of transport infrastructure elements
5	Problems and prospects for servicing main facilities
6	International transport corridors: integration potential
7	Assessment of the stability of main systems in the context of climate change
8	Modern technologies engineering requirements for the reconstruction of highways
9	Digital technologies in the management of trunk infrastructure
10	Reliability and durability of transport infrastructure

11	Energy-efficient solutions in the operation of railway infrastructure
12	Methods for modeling trunk systems
13	Fast and efficient construction of highways using digital solutions
14	Reliability of bridges and tunnels as elements of trunk networks
15	Monitoring the state of transport facilities using digital technologies

4.2. The content of the sections on the blocks submitted for the entrance exam

Exam materials for entrance exams to doctoral studies in groups of educational programs that include the subject of essays, exam questions on the profile are made in three languages: Kazakh, Russian and English.

The subjects of the exam questions correspond to the selected sections from the training programs of the cycles provided for the group of the Educational Program "D210 Backbone Networks and Infrastructure":

№	Name of disciplines
1	Construction of a railway track
2	Research and design of railway infrastructure.
3	Railway track maintenance and repair

4.3 The content of the sections on the blocks submitted for the entrance exam

Block 1

1.1. Theoretical and constructive foundations of the path structure.

General information about the railway track. Purpose and classification of a railway track. Basic elements of the upper structure of the path. Rails and rail fasteners. Rail types, markings, and their main parameters. Rail connection: linings, welding, bolted connections. Intermediate and butt joints: purposes, structures. Sleepers and bars. Sleeper materials: wooden, reinforced concrete, plastic. Design, dimensions and service life.

1.2. Track technology and operation

Ballast layer and roadbed. Purpose, ballast materials, stowage. Roadbed construction, drainage and reinforcement. Construction and maintenance of a railway track.

Block 2

2.1. Engineering surveys for artificial structures

Goals and objectives of engineering surveys in the design of bridges and tunnels. Geodetic and geological surveys for structures. Analysis of the terrain and engineering and geological features of the site. Assessment of the stability of foundations and selection of the location of structures. Feasibility study of options for placing objects. Design of survey documentation for artificial structures

2.2. Design of artificial railway structures

Classification and purpose of artificial structures (bridges, tunnels, culverts, retaining walls, etc.). Basic calculation of bridges: spans, supports, load. Structures and materials used in bridge

construction. Design of tunnels and engineering crossings. Consideration of seismic and climatic conditions in the design process.

Block 3

3.1. Railway track maintenance and repair

Purpose and tasks of the path content. Classification of the technical condition of the track. Frequency of inspections and diagnostics of the route. Organization and types of current path content. Maintenance of rails, sleepers and the ballast layer. Prevention of path deformations. Use of track equipment for current content. Traffic safety and content requirements.

3.2.Railway track repairs

Types of track repairs: capital, medium, alignment. Technology of repair work production. Machines and mechanisms used for repairs. Planning and organization of repair work. Improve repair efficiency and save resources. Modern technologies and materials in track repair. Quality control and acceptance after repairs.

4.4 Interview questions

1. What are your academic strengths?
2. What are your academic shortcomings and how did you deal with them?
3. What are your most significant scientific achievements to date?
4. What are your research interests?
5. What are your professional goals?
6. What attracted you to this area in the first place?
7. What is your motivation for obtaining this degree (PhD)?
8. What do you think are the most significant trends in your field of research?
9. What interests you if you want to participate in our program?
10. What do you consider your most significant achievement?
11. What are the goals and objectives of the railway industry?
12. What is the main purpose of railway infrastructure?
13. What are the criteria for the reliability of railway infrastructure?
14. What are the main engineering network design features?
15. What is the role of engineering surveys in the design of backbone networks?

5. Recommended literature

5.1 Basic literature

1. Tsytovich N. A. Soil mechanics. Moscow: Librocom Publishing House, 2013, 272 p.
2. Unaibaev B. Zh., Arsenin V. A., Mardenov Zh. A. and others. Foundation construction on saline soils. Ekibastuz : EITI Publ., 2012, 184 p.
3. Bokarev, S. A. Maintenance of artificial structures using information technologies. textbook / S. A. Bokarev, S. S. Pribytkov, A. N. Yashnov. - Moscow: UMTS po obrazovaniyu na zh / d transport, 2008. - 195s. - (Higher professional education).
4. G. M. Borovik. Textbook. Artificial structures on railways. Khabarovsk. 2013 DVGUPS Publishing House
5. Khasenov S. S., Kvashnin M. Ya., Abiev B. A., Bondar I. S. "Rules for the construction and maintenance of artificial structures in the railway transport of the Republic of Kazakhstan". 2015 No. 1288.
6. Ashpiz E. S. "Railway way". Moscow: 2013

5.2 Additional literature

1. Fundamentals of technical operation of transport equipment: a textbook for students, undergraduates and doctoral students / S. Zh. Kabikenov [et al.]. - Almaty : Evero, 2018. - 311 p.
2. Fundamentals of technical operation of transport equipment / S. Zh. Kabikenov, M. M. Kirievsky, V. V. Shalaev; Karaganda State Technical University. Karaganda: KSTU Publishing House, 2014. -261 p.
3. Көлік техникасын техникалық пайдалану негіздері. Оқу құралы/Kopenov B. T.- Almaty, 2011. - 110 p.
4. NTD "Rules for the construction and maintenance of artificial structures in railway transport of the Republic of Kazakhstan". 2015 No. 1288. Khasenov S. S., Kvashnin M. Ya., Abiev B. A., Bondar I. S.
5. Kadyrov A. S. Fundamentals of scientific research. Monograph / A. S. Kadyrov, I. A. Kadyrova. - Karaganda: KSTU Publishing House, 2015.