

JSC «Mukhamedzhan Tynyshpayev ALT University»

APPROVE

Chairman of the Academic Council
of ALT University
M. Zharmagambetova
Decision of the Academic Council of ALT
«30» April 2026 year (protocol №8)



**ENTRANCE EXAMINATION PROGRAM FOR DOCTORAL
STUDIES (PhD)
Field of Specialization**

D310 Transport Structures

Educational program
8D07170 Transport facilities

Almaty, 2026

The Entrance Examination Program was discussed and approved at the meeting of the Department of architecture and Civil Engineering, Minutes № 9 dated «15» April 2026.

**Head of the Department of architecture
and Civil Engineering**



G.B. Murzalina

The Entrance Examination Program was reviewed and recommended for approval at the meeting of the Council of the Institute of transport and construction, Minutes No. 8 dated «24» April 2026.

**Chairperson of the Council of the Institute
of transport and construction**



N.Z. Suleyeva

CONTENTS

1	Purpose of the Entrance Examination	4
2	Format and Procedure of the Entrance Examination	4
3	Assessment Components and Evaluation Criteria	4
3.1	Assessment Criteria for Responses to the Electronic Examination Questions	4
3.2	Interview Assessment Criteria	5
3.3	Letter of Recommendation from an Enterprise or Organization	5
4	Content of the Examination Materials	6
4.1	List of Subjects Included in the Entrance Examination	6
4.2	Content of the Examination Blocks	6
4.3	Interview Questions	7
5	Recommended Literature	8
5.1	Core Literature	8
5.2	Supplementary Literature	8

1. PURPOSE OF THE ENTRANCE EXAMINATION

The purpose of the entrance examination is to assess the applicant's level of theoretical and practical preparation and to determine whether their knowledge, skills, and competencies meet the admission requirements for the relevant field of study.

The entrance examination for admission to the Doctor of Philosophy (PhD) program consists of the following components:

- 1) an interview with the applicant conducted by the Examination Committee;
- 2) responses to profile-specific examination questions related to the Educational Program Group;
- 3) submission of a Letter of Recommendation from an Enterprise or Organization.

2. FORMAT AND PROCEDURE OF THE ENTRANCE EXAMINATION

The duration of the entrance examination is 2 hours and 30 minutes, during which the applicant participates in an interview and responds to an electronic examination paper consisting of three questions. The examination questions are generated randomly.

The maximum score for the entrance examination is 80 points, distributed as follows: profile examination for the Educational Program Group – 50 points; interview – 30 points.

3. ASSESSMENT COMPONENTS AND EVALUATION CRITERIA

3.1. Assessment Criteria for Responses to the Electronic Examination Questions

The profile examination for the Educational Program Group consists of three question blocks, where: Question 1 assesses the applicant's level and systematic understanding of theoretical knowledge; Question 2 evaluates the degree of development of functional competencies; Question 3 is intended to assess the applicant's systemic competencies. The **maximum score** for the profile examination is 50 points.

The **electronic examination paper** consists of **three questions**:

Question Block	Question Type	Points
Question 1	Theoretical – assesses the applicant's level and systematic understanding of theoretical knowledge.	10
Question 2	Practical – evaluates the degree of development of functional competencies, including the ability to apply methods, technologies, and techniques within the relevant field of study.	20
Question 3	Assesses the applicant's systemic understanding of the subject area and specialized knowledge of research methodology (systemic competencies).	20
TOTAL		50

Assessment Criteria for Responses to the Electronic Examination Questions:

Question	Assessment Criteria	Points
Question 1	Demonstrates knowledge of the fundamental concepts and processes within the relevant field of study; provides a comprehensive and in-depth response to the question.	5

	Expresses personal viewpoints on the issue under discussion in a logical and coherent manner.	3
	Demonstrates proficiency in the conceptual framework and scientific terminology of the discipline.	2
	Subtotal	10
Question 2	Applies appropriate methods, techniques, and technologies to solve problems within the relevant field of study.	7
	Provides well-reasoned arguments; compares, classifies, and interprets phenomena, events, and processes; draws conclusions and generalizations based on practical skills and experience.	7
	Analyzes information obtained from various sources.	6
	Subtotal	20
Question 3	Critically analyzes and evaluates theoretical and practical developments, scientific concepts, and current trends in the advancement of the discipline.	7
	Synthesizes methodological approaches to interpret key issues within the field of study.	7
	Identifies cause-and-effect relationships in the analysis of processes, phenomena, and events.	6
	Subtotal	20
	TOTAL	50 баллов

3.2. Interview Assessment Criteria

№	Assessment Criterion	Descriptors	Points
1.	Motivation	Provides a well-reasoned justification for pursuing doctoral studies in the selected Educational Program and for choosing the particular university. Demonstrates a clear vision of future professional and personal development upon completion of the doctoral program.	5
2	Research Competence	Demonstrates research knowledge, skills, and experience required for conducting scientific research in the relevant field of study.	10
3.	Creativity	Demonstrates originality of thinking, creativity, and the ability to apply innovative and alternative approaches to solving problems and case-based tasks.	10
4.	Communication Skills	Clearly, concisely, logically, and persuasively presents ideas, draws sound conclusions and generalizations, and demonstrates proficiency in the language(s) of communication.	5
Maximum Score			30

3.3. Letter of Recommendation from an Enterprise or Organization

For admission to the profile-oriented doctoral program, a Letter of Recommendation from an Enterprise or Organization must be prepared on the organization's official letterhead, contain

specific and well-substantiated information, and confirm the organization's interest in the applicant's doctoral studies.

4. CONTENT OF THE EXAMINATION MATERIALS

4.1. List of Subjects Included in the Entrance Examination

The entrance examination materials for admission to the doctoral program, including the essay topics and profile-specific examination questions, are prepared in three languages: Kazakh, Russian, and English.

The examination questions are based on selected sections of the curricula for the cycles of study included in the Educational Program Group D310 – Transport Structures.

№	Course Titles
1	Scientific research methods
2	Diagnostics and testing of transport facilities
3	Inspection and testing of transport facilities
4	Research of scientific experiments
5	Study of the stress-strain state of transport structures
6	Development of new structures and structural elements of transport facilities

4.2. Content of the Examination Blocks

Block 1. Design, Construction, and Operation of Transport Structures

Section Content:

- Current state and development prospects of transport infrastructure.
- Theoretical foundations of the design of highways, bridges, overpasses, viaducts, and transport interchanges.
- Loads and actions affecting transport structures.
- Fundamentals of structural strength, stability, and reliability analysis of transport structures.
- Engineering geological and hydrological investigations.
- Construction technologies for highways and bridge structures.
- Operation, maintenance, and rehabilitation of transport structures.
- Methods for inspection, diagnostics, and technical condition assessment.
- Life-cycle management of transport structures.
- Safety and sustainability issues in transport infrastructure.

Block 2. Road Construction Materials and Innovative Technologies

Section Content:

- Modern road construction materials and quality requirements.
- Asphalt concrete, cement concrete, and composite materials.
- Modified bitumen and polymer additives.
- Geosynthetic materials in transport construction.

- Testing methods and quality control of construction materials.
- Durability of construction materials and pavement structures.
- Resource-efficient and environmentally sustainable technologies.
- Recycling and reuse of construction materials.
- Innovative materials for bridge construction and road pavements.
- International experience in the application of advanced materials and technologies.

Block 3. Research, Digitalization, and Transport Infrastructure Management

Section Content:

- Research methodology in transport construction.
- Quantitative and qualitative research methods.
- Planning and organization of scientific research.
- Academic ethics and principles of research integrity.
- Digital technologies in transport construction.
- Building Information Modeling (BIM) and digital twins of transport structures.
- Artificial intelligence and big data in infrastructure management.
- Geographic Information Systems (GIS) and automated monitoring.
- Evaluation of the effectiveness of investment and infrastructure projects.
- International standards, technical regulation, and regulatory framework for transport construction.
- Commercialization of research outcomes and technology transfer.

4.3. Interview Questions

1. What are the most significant scientific challenges in the field of transport infrastructure?
2. What constitutes scientific novelty in research related to roads, bridges, and interchanges?
3. What modern methods are used to study the durability of transport structures?
4. How do BIM, digital twins, and artificial intelligence influence transport infrastructure development?
5. What factors have the greatest impact on the service life of roads and bridges?
6. What are the current trends in road construction materials development?
7. Which methods of diagnostics and monitoring are most effective for transport structures?
8. How does scientific research contribute to infrastructure safety and reliability?
9. What transport infrastructure development priorities are most important for Kazakhstan?
10. What are the advantages of quantitative and qualitative research methods in engineering science?
11. How is the effectiveness of innovative technologies evaluated?
12. Which international standards in transport infrastructure are you familiar with?
13. What are the key stages of conducting doctoral research?
14. How can the results of your future dissertation research be applied in practice?
15. What is the role of a researcher and educator in training future engineers?
16. What contemporary scientific approaches are employed to enhance the resilience of transport structures to climatic and anthropogenic impacts?
17. Which emerging research areas in the field of life-cycle management of transport structures do you consider the most relevant, and why?
18. What role do Big Data technologies, Geographic Information Systems (GIS), and remote sensing play in the design, operation, and monitoring of transport infrastructure?

19. What scientific challenges arise in the design and construction of transport structures under complex engineering-geological and climatic conditions, and what solutions would you propose to address them?
20. How do interdisciplinary research approaches involving civil engineering, materials science, digital technologies, environmental science, and economics contribute to the development of modern transport infrastructure?
21. How can climate change adaptation and mitigation strategies be integrated into the planning, design, construction, and operation of transport infrastructure?
22. What are the advantages and limitations of using advanced numerical modeling and simulation methods in the analysis and design of transport structures?
23. How can sustainability assessment and environmental impact assessment be incorporated into transport infrastructure projects throughout their life cycle?
24. What role do international standards, technical regulations, and best engineering practices play in improving the quality, safety, and competitiveness of transport infrastructure projects?
25. In your opinion, what are the most promising research directions in transport infrastructure engineering over the next decade, and what scientific contribution would you like to make in this field through your doctoral research?

5. SUPPLEMENTARY LITERATURE

5.1 Core Literature

1. Teltayev B.B. Road Construction Materials. – Almaty: Kazakh Road Research Institute, latest editions.
2. Teltayev B.B. Theory and Practice of Pavement Design. – Almaty: Kazakh Road Research Institute, latest editions.
3. Babkov V.F., Andreev O.V. Highways. – Moscow: Transport Publishing House.
4. Birulya A.K. Highway Design. – Moscow: Transport Publishing House.
5. Kruchinkin A.G., Zolotarev V.A. Highway Maintenance and Operation. – Moscow: Transport Publishing House.
6. Efimov P.P., Popov V.A. Bridges and Transportation Tunnels. – Moscow: Higher School Publishing House.
7. Sergeev I.N. Reinforced Concrete and Steel Bridges. – Moscow: ASV Publishing House.
8. Gibshman E.E. Design of Highway Interchanges. – Moscow: Transport Publishing House.
9. Road Engineer's Handbook. In 2 Volumes. – Moscow: Transport Publishing House.
10. Kuznetsov I.N. Fundamentals of Scientific Research. – Moscow: Dashkov & Co.
11. Novikov A.M., Novikov D.A. Methodology of Scientific Research. – Moscow: Librokom Publishing House.
12. Codes of Practice (SP RK) and Construction Norms (SN RK) of the Republic of Kazakhstan regulating the design, construction, and operation of highways and bridge structures.
13. GOST, ST RK, ASTM, and AASHTO standards related to the testing of road construction materials and the design of transport structures.

5.2 Supplementary Literature

1. Huang Y.H. Pavement Analysis and Design. – Pearson Education.
2. Yoder E.J., Witczak M.W. Principles of Pavement Design. – John Wiley & Sons.

3. Khanna S.K., Justo C.E.G., Veeraragavan A. Highway Engineering. – Nem Chand & Bros.
4. Law of the Republic of Kazakhstan “On Highways”.
5. Construction Norms of the Republic of Kazakhstan (SN RK).
6. Codes of Practice of the Republic of Kazakhstan (SP RK).
7. Technical Regulations in the Field of Construction and Transport Infrastructure