



**School of transport engineering and logistics named after M. Tynyshpayev
«Transportation Engineering» Direction**

EDUCATIONAL PROGRAM

7M07149 – «Transport infrastructure: certification and technical expertise»

Code and classification of the field of education:	7M07 – Engineering, manufacturing and construction industries
Code and classification of training directions:	7M071 – Engineering and Engineering affairs
Group of educational programs:	M210 – Transmission system and infrastructure
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Level based on IQF:	7
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Educational program 7M07149 – «Transport infrastructure: certification and technical expertise» was developed by Academic committee based on direction 7M071 – Engineering and Engineering affairs

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List of abbreviations and designations

KazNRTU named after K.I. Satbayev – Kazakh national research technical university named after K.I. Satbayev;

EP – Educational program;

TE – Transport Engineering

WC – Working curricula

SDG – Sustainable Development Goals;

LO – Learning outcomes;

USDD – Unified System of Design Documentation;

ESG – Environmental, Social, Governance;

IP – intellectual property;

LTCRM- lifting-transport, constructive and road machines;

CES – catalog of elective subjects;

UC – university component;

CC – component of choice;

NQF – National Qualifications framework;

SQF – Sectoral Qualifications Framework;

BTR – between-train repairs;

EAEU – Eurasian Economic Union;

CAB – Conformity Assessment Body;

QMS – quality management system;

IQF – Industry Qualifications Framework.

1. Description of educational program

The educational program «7M07149 – «Transport infrastructure: certification and technical expertise», within the training area «7M071 – Engineering and Engineering affairs», is aimed at preparing competent experts in the scientific and pedagogical field. These specialists are capable of conducting scientific research on current issues in the field of transport infrastructure, based on modern theoretical, methodological, and technological achievements in science and engineering. They are fully aware of their professional responsibility to society, the environment, and future generations.

In alignment with the concept of sustainable development, this educational program is designed according to three core principles of achieving sustainable human development and integrates the key Sustainable Development Goals (SDGs).

The following key goals can be highlighted:

«Quality Education»

The program is focused on developing in-depth knowledge and research skills necessary for conducting scientific research and solving complex issues in the field of sustainable transport infrastructure. The integration of international standards and a practice-oriented approach ensures high-quality education and contributes to the training of competent professionals who are in demand in the labor market. (SDG 4)

«Industry, Innovation, and Infrastructure»

The program fosters the development of the following competencies among master's students: the ability to motivate their environment toward a transition to more sustainable and resilient forms of transport infrastructure; the ability to implement innovative technologies to minimize environmental impact and promote energy-efficient consumption; and the ability to assess the effects of transport systems and technological processes on human health and the environment due to harmful emissions and acoustic pollution. (SDG 9)

«Responsible Consumption and Production»

The program supports the development of the following competencies among master's students: the ability to make technical, organizational-economic, and managerial decisions based on sustainable development goals; and the ability to promote sustainable production models. (SDG 12)

The educational program has been developed in accordance with the following Professional Standards:

- Conformity Assessment of Railway Infrastructure;
- Quality Management;
- Quality Control of Products, Processes, and Services;
- Training of Specialists in the Field of Technical Regulation;
- Production Manager in Construction;
- Educator (faculty of higher and/or postgraduate education institutions).

Graduates of this educational program correspond to Level 7 of the National Qualifications Framework (NQF) and the Sectoral Qualifications Framework (SQF).

They are qualified to work as managers (with relevant work experience), specialists, and technical personnel in enterprises involved in the production, operation, and maintenance of locomotives and multiple-unit rolling stock.

Professional Field:

Railway Transport, Transport Engineering and Technologies.

The professional activity objects of the graduate include:

- Departments of industrial enterprises involved in the production, operation, maintenance, and repair of locomotives and multiple-unit rolling stock;
- Departments of government institutions responsible for the operation, repair, and maintenance of locomotives and multiple-unit rolling stock;
- Departments of design organizations engaged in the development, manufacturing, and technical support of innovative rolling stock;
- Research institutions conducting studies in the field of production, operation, maintenance, and repair of locomotives and multiple-unit rolling stock;
- Educational institutions and other related entities.

Types of professional activity:

- Production and technological;
- Organizational and managerial;
- Service and operational;
- Maintenance and repair;
- Scientific and pedagogical;
- Quality assessment;
- Research activity.

Positions according to Professional Standards:

- Expert in Railway Infrastructure Conformity Assessment;
- Head of Quality Control Department;
- Quality Control Inspector (products, processes, services);
- Quality Engineer;
- Inspector for Quality and Acceptance of Construction and Installation Works;
- Head of Quality Control Inspection;
- Repair and Construction Group Supervisor;
- Site Supervisor;
- Supervisor of Construction and Installation Works;
- Head of Advanced Training Center (in the field of technical regulation);
- Head of Training Unit;
- Education Manager;

– Assistant, Lecturer at higher and professional education institutions.

Functions and Key Competencies of Professional Activity are presented in Tables 1–6:

Table 1. Labor Functions, Professional Skills, and Competencies according to the Professional Standard «Conformity Assessment of Railway Infrastructure»

Occupation Card 1: «Expert in Conformity Assessment of Railway Infrastructure»		
Occupation:	Expert in Conformity Assessment of Railway Infrastructure	
Purpose of Activity:	Provision of professional services in expert support for conformity assessment activities related to products (objects and elements of railway and high-speed railway infrastructure) in accordance with the technical regulations of the EAEU and the legislation of the Republic of Kazakhstan in the field of technical regulation.	
Job Functions:	Mandatory Job Functions:	1. Conducting conformity assessment 2. Managing the resources of the Conformity Assessment Body (CAB) 3. Ensuring the implementation of accreditation (re-accreditation) procedures for the Conformity Assessment Body of railway infrastructure, as well as internal certification
Job Function 1: Conformity Assessment	Task 1: Decision-making on Certification Applications and Registration of Declarations of Conformity	Skills:
		1. Systematize and analyze information from certification applications and declarations of conformity and accompanying documents for completeness and proper formatting; assess the accuracy of completed declarations of conformity. 2. Assess the conformity of the certification/declaration scope of railway transport infrastructure objects and elements (including high-speed transport) with the applicant's request and the scope of accreditation of the Conformity Assessment Body (CAB). 3. Determine the scope of certification/declaration, standardization procedures, and documents to be used in the certification/declaration process. 4. Establish communication and reach an agreement with the applicant on the further certification/declaration process. 5. Evaluate whether the CAB has sufficient resources and the ability to carry out the work within the applicant's preferred time frame. 6. Make decisions on acceptance/rejection of the application, select the conformity assessment scheme for product certification. 7. Issue decisions on the applications for conformity assessment procedures.
	Task 2: Analysis and Evaluation of Materials (Initial Data) and Products	Skills:
		1. Develop an evaluation action plan including all necessary activities; draw up and approve the production audit program; set timelines and conditions for the audit..

	for Conformity Assessment	2. Verify the correct identification of railway and high-speed rail infrastructure objects and elements. 3. Determine key product characteristics and criteria for classification into infrastructure subsystems and elements of railway transport; document the identification results in special CAB documents (conclusion, identification protocol). 4. Visually identify direct and indirect signs of modifications in the product design (composition). 5. Assess the economic efficiency of evaluation stages and optimize the evaluation process by minimizing resource costs for both CAB and applicant; allocate CAB and testing laboratory resources in cases of combined/separated certification testing and production testing. 6. Select product samples in accordance with established requirements; prepare a sample selection report. 7. Analyze data obtained from product testing, as well as presented certificates/declarations of conformity for individual components and their design drawings. 8. Systematize and analyze production data; identify nonconformities and assess the manufacturer's ability to maintain consistent product compliance with technical regulations and standardization documents; determine the need and deadlines for corrective actions. 9. Prepare and verify documents for all stages of the conformity assessment procedure. 10. Provide recommendations to the applicant (manufacturer) on follow-up control of certified products based on production audit data. 11. Apply analytical, computational, and experimental programs and methods; perform or interpret computational studies to support conformity assessment of railway and high-speed rail infrastructure objects and elements. 12. Propose adjustments to acceptable safety indicators for innovative products and forward proposals to EAEU member state authorities responsible for railway transport policy and regulatory development. 13. Use information resources of authorized bodies in the field of technical regulation and electronic databases related to conformity assessment processes and products.
	Task 3: Documentation of Conformity Assessment Results	Skills: 1. Systematize test data, draw conclusions, and prepare a statement on issuing a certificate of conformity to the applicant for a batch of innovative products.

		2. Systematize data from product evaluation, draw conclusions, and prepare a statement on the possibility of issuing a certificate or denying it, and justify the reasons for such refusal. 3. Systematize collected data, draw conclusions, and prepare a statement on the possibility of registering a declaration of conformity or denying the registration, and justify the reasons for such refusal.
		Knowledge:
		1. ГОСТ ISO/IEC 17065 «Conformity assessment — Requirements for bodies certifying products, processes and services» — in terms of decision-making on certification, documentation of certification results, and maintaining a registry of certified products. 2. Requirements of the technical regulation «Conformity Assessment Procedures» — in terms of the process for preparing and issuing a decision to the applicant on granting or refusing a certificate of conformity, and the procedure for registering a declaration of conformity. 3. Rules for conformity assessment.
		Skills:
	Task 4: Conducting Inspection Control	1. Determine the scope, frequency, content, and procedure for conducting inspection control; develop an inspection program and form the inspection control team. 2. Make decisions on conducting unscheduled inspections, including product sampling and/or examination of production conditions. 3. Analyze incoming information about certified products. 4. Check compliance with conditions necessary to ensure consistent product quality. 5. Analyze product test results. 6. Prepare a report based on the results of inspection control. 7. Draw conclusions on the need to suspend or cancel the certificate of conformity based on the inspection results and formalize the decision according to the established procedure. 8. Assess the relevance of corrective actions taken by the certificate holder and monitor their implementation.
		Skills:
		1. Assess the competence of CAB personnel and determine the scope of assessment tasks based on the results of such assessment. 2. Plan the work of the assessment team. 3. Monitor compliance of CAB personnel with assessment procedures.
		Skills:
Job Function 2: Management of Conformity Assessment Body (CAB) Resources	Task 1: Management of the Assessment Team	Skills:
		1. Assess the competence of CAB personnel and determine the scope of assessment tasks based on the results of such assessment. 2. Plan the work of the assessment team. 3. Monitor compliance of CAB personnel with assessment procedures.
		Skills:

	Task 2: Updating the Repository of Normative Documents and Test Methods for Products Subject to Conformity Assessment	1. Use information resources of authorized bodies in the field of technical regulation. 2. Conduct regular analysis of normative documents and quality management system (QMS) documents used in assessment activities, taking into account quality policy and objectives. 3. Identify the need for documentation and standards for conformity assessment required for assessment activities. 4. Develop recommendations for improving CAB operations and directions for further development of the QMS and related documentation.
	Task 3: Improvement of CAB's Technical and Material Resources	Skills: 1. Identify the CAB's needs for control and diagnostic tools, testing equipment, and other means necessary to test objects within the CAB's scope of accreditation. 2. Create appropriate working conditions for the assessment team and staff in accordance with established regulations. 3. Determine personal and team needs for premises, computing equipment, office equipment, software, tools, and materials required for performing conformity assessment tasks.
Job Function 3: Ensuring the Implementation of Accreditation (Reaccreditation) Procedures of the Conformity Assessment Body (CAB) for Railway Infrastructure, and Personal Expert Certification	Task 1: Preparing the CAB for the Accreditation Procedure	Skills: 1. Analyze the staffing capacity of the CAB. 2. Analyze the technical and material resources of the CAB. 3. Form a pool of specialized outsourced services, including laboratory services, to carry out the CAB's activities within the declared scope of accreditation. 4. Develop short-term and long-term forecasts of the CAB's activities. 5. Apply updates and changes in the current legislation of the EAEU and the Republic of Kazakhstan in the field of CAB accreditation.
	Task 2: Confirmation of Expert Status	Skills: 1. Prepare and submit reports on the expert's activities in the declared field of certification, in accordance with approved formats. 2. Enhance professional qualifications in the declared area through systematic self-education, short-term and long-term training courses, or education at relevant institutions. 3. Prepare the required set of documents for certification as an expert and submit them to the authorized body, including through electronic document management systems.

Table 2. Job functions, professional skills and competencies according to the Professional Standard «Quality Management»

Occupation Card 2: Chief Quality Manager		
Purpose of activity:	Development and implementation of a quality management system for products (services) within the organization.	
Job functions:	Mandatory job functions:	Development and implementation of a product (service) quality management system.
Job Function 1: Development and implementation of a product (service) quality management system	Task 1: Development of the Structure of the Product (Service) Quality Management System	Skills: 1. Defining the scope and boundaries of the implementation of the product (service) quality management system. 2. Conducting a systemic analysis of quantitative and qualitative performance indicators of the organization's subsystems. 3. Developing methodological guidelines for the implementation of the product (service) quality management system. 4. Analyzing and assessing resource provision for the implementation of the product (service) quality management system. 5. Providing documentation support for the implementation process of the product (service) quality management system. 6. Organizing audits of the organization's processes and its subsystems.
	Task 2: Organizing the Product (Service) Quality Management System	Skills: 1. Applying planning methods in developing the implementation plan of the quality management system for products (services). 2. Conducting business communication within the working groups during the development and implementation of the product (service) quality management system. 3. Coordinating the activities of working groups during the development and implementation of the product (service) quality management system. 4. Developing supporting documentation. 5. Conducting business correspondence and negotiations with counterparties.
	Task 3: Monitoring the Implementation of the Product (Service) Quality Management System	Skills: 1. Monitoring and evaluating the performance indicators of organizational subsystems and employees. 2. Controlling the quality of documentation development for the product (service) quality management system. 3. Analyzing technical and administrative documentation. 4. Identifying deviation factors in the performance indicators of subsystems and employees, and evaluating their significance.

		5. Coordinating the activities of working group members.
	Task 4: Risk Management During the Implementation of the Product (Service) Quality Management System	Skills: 1. Identifying risks related to the implementation of the product (service) quality management system. 2. Determining the degree of influence of risks on the quality of the management system. 3. Developing risk mitigation mechanisms. 4. Preparing a risk mitigation action plan. 5. Monitoring the implementation of the action plan. 6. Coordinating the activities of working group members.

Table 3. Job Functions and Professional Skills/Competencies According to the Professional Standard «Product, Process, and Service Quality Control»

Job Title: Quality Control Inspector (Products, Processes, Services)		
Qualification Level (NQF):	7	
Primary Objective:	Provision of professional inspection services (first-party, second-party, third-party) at various production stages (products, processes, services) in compliance with the technical regulations of the Republic of Kazakhstan.	
Job Functions:	Job Functions:	1. Inspection monitoring of certified products, services, and processes 2. Conducting inspections at production and design stages 3. Operational process inspections 4. Technical management, risk control, and quality assurance during inspections
Job Function 1: Conducting Inspection Monitoring of Certified Products, Services, and Processes	Task 1: Analysis of Incoming Information About Certified Products/Services /Processes	Skills: 1. Utilize relevant information sources 2. Analyze inspection standards/requirements and internal regulatory documents of the inspection body 3. Process information and formulate analytical conclusions 4. Apply qualimetric analysis methods. 5. Plan inspection monitoring for products/processes/services 6. Critically evaluate complaint/claim information 7. Operate electronic databases
	Task 2: Verification of Compliance with Stable Quality Production Requirements	Skills: 1. Analyze regulatory, design, and technological documentation 2. Assess implemented manufacturing process parameters 3. Identify root causes of defects 4. Determine production stages affecting product characteristics 5. Evaluate product quality stability through complaint/claim analysis 6. Verify compliance of product specifications with regulatory/technical documents

		7. Assess resource impact on product quality
	Task 3: Product Testing and Result Analysis	Skills: 1. Select samples for quality/safety testing 2. Analyze source data/documentation per applicable methodologies 3. Choose appropriate testing methods 4. Operate measurement equipment for laboratory quality control 5. Compare defect levels with permissible standards 6. Maintain occupational safety during testing (especially for children's goods) 7. Perform calculations using specialized software 8. Prepare quality/safety test reports
	Task 4: Quality Assessment of Certified Services/Processes	Skills: 1. Analyze data and formulate conclusions 2. Apply service/process qualimetric analysis 3. Define quality/safety criteria for services/processes 4. Conduct observational evaluation of services/processes 5. Utilize computerized quality control tools 6. Access relevant information sources 7. Operate electronic databases
	Task 5: Documentation of Results and Decision-Making	Skills: 1. Utilize relevant information sources 2. Analyze data and draw evidence-based conclusions 3. Identify quality-impacting factors 4. Apply ISO/IEC 17020 and relevant regulations 5. Make decisions based on test results 6. Document service/process evaluation results 7. Archive inspection case files
Job Function 2: Conducting Inspections at Key Stages: Production and Design	Task 1: Quality Control at All Production Process Stages	Skills 1. Analyze regulatory, design, and technical documentation. 2. Identify production stages with the highest impact on product quality. 3. Apply measurement and control methods to assess product characteristics. 4. Verify compliance of raw materials, semi-finished goods, and finished products with regulatory standards. 5. Determine calibration/verification deadlines for measurement instruments. 6. Perform statistical analysis of inspection and measurement results.

	Task 2: Quality Control of Design-Estimate and Permitting Documentation	Skills 1. Assess effectiveness of design solutions; review cost estimates for all relevant work types. 2. Detect and oversee correction of defects in design-estimate documentation. 3. Identify threats and evaluate associated risks. 4. Evaluate technical condition of facilities based on design-estimate and permitting documentation.
Job Function 3: Operational Process Inspection	Task 1: Conducting Inspections	Skills: 1. Analyze regulatory, design, and technical documentation. 2. Evaluate research and testing data. 3. Determine appropriate methods, equipment, technologies, and procedures for specific objects. 4. Perform core technical diagnostics operations. 5. Conduct calculations to assess technical condition. 6. Evaluate and interpret research/test results.
	Task 2: Threat Identification and Risk Assessment	Skills: 1. Analyze source data and documentation using relevant methodologies. 2. Review technical procedures (work instructions/flowcharts) for condition monitoring and diagnostics. 3. Identify threats specific to objects and their operational conditions. 4. Perform risk analysis using standardized methods and calculate potential damage from identified threats. 5. Conduct necessary calculations using specialized software. 6. Execute control measures, evaluate results, and issue reports on technical condition and test outcomes. 7. Develop and adapt risk assessment methodologies.
Job Function 4: Technical Management, Risk Control, and Quality Assurance During Inspections	Task 1: Monitoring the Internal Quality Control System for Inspection Services	Skills: 1. Summarize results and draw conclusions about the effectiveness of the internal quality control system. 2. Analyze and evaluate the adequacy of work performed against specific task requirements and inspection stages per GOST ISO/IEC 17020. 3. Review and objectively assess complaints and claims. 4. Prepare and document reports for inspection body management on quality control system performance. 5. Utilize information, communication, and digital technologies.
	Task 2: Oversight of Inspection Personnel	Skills: 1. Identify and evaluate factors affecting inspector performance and reporting accuracy. 2. Apply diverse monitoring methodologies for individuals/teams across inspection stages. 3. Observe and assess inspector performance (individually and in groups).

		4. Resolve operational issues during inspections promptly. 5. Evaluate inspector competencies and professional conduct. 6. Justify conclusions using ГОСТ ISO/IEC 17020 and relevant regulations. 7. Prepare internal audit reports for management. 8. Detect/immediately mitigate threats to impartiality or conflicts of interest. 9. Train staff on principles of: – Impartiality – Independence – Ethical conduct – Confidentiality 10. Interpret ГОСТ ISO/IEC 17020 and sector-specific regulations for inspection teams. 11. Maintain professional and ethical workplace relationships.
Job Profile: «Head of Quality Control Inspection»		
Qualification Level:	7	
Main Objective of the Activity:	Provision of information regarding the conformity of inspection objects (products, processes, services) with regulations, standards, technical specifications, inspection schemes, and contract terms.	
Job Functions:	Mandatory Job Functions:	1. Organization of inspection activities for products, processes, and services 2. Ensuring the quality of inspection activities for products, processes, and services
	Additional Job Functions:	1. Ensuring occupational health and safety
Job Function 1: Organization of Inspection Activities for Products, Processes, and Services	Task 1: Planning and Organizing the Work of the Inspection Body	Skills: 1. Collect and systematize information from various sources. 2. Select and organize inspection or other related procedures. 3. Identify and evaluate factors that may affect the inspection body's operations. 4. Develop strategies for executing the inspection body's activities. 5. Integrate diverse skills and knowledge to solve non-standard problems. 6. Develop new methods for delivering inspection services based on client needs. 7. Balance stakeholder interests while minimizing risks in inspections. 8. Forecast the consequences of decisions. 9. Identify real and potential risks in inspection activities. 10. Communicate effectively with stakeholders through various channels.

	Task 2: Operational Management and Monitoring of Inspection Activities	Skills: 1. Plan and conduct evaluations of internal control and risk management systems. 2. Clearly define and explain tasks and execution requirements to inspection staff. 3. Coordinate individual and team work plans and projects. 4. Align the efforts of employees and teams. 5. Assess the professional competencies of inspection personnel. 6. Identify and anticipate risks of varying severity in inspection operations. 7. Prevent and resolve conflicts. 8. Use computers, office equipment, and legal reference systems.
	Task 3: Resource Management for the Inspection Body	Skills: 1. Determine short- and long-term resource needs. 2. Allocate resources based on workload and efficiency. 3. Identify and assess factors that may affect the effective use of the inspection body's resources. 4. Apply various methods and approaches to personnel management and task control. 5. Analyze and evaluate the efficiency of resource utilization and develop measures to improve it. 6. Collect feedback and organize communication with employees regarding the implementation of inspection activities. 7. Combine different skills and areas of knowledge to solve non-standard problems. 8. Find ways to maintain a balance of interests while minimizing risks in inspection activities.
Job Function 2: Quality Assurance of Inspection Services	Task 1: Organization and Execution of Quality Management Activities	Skills: 1. Develop quality planning and improvement plans for inspection services. 2. Monitor the implementation of quality plans for inspection services. 3. Identify and evaluate factors that may affect the quality of the inspection body's services. 4. Detect real and potential risks in inspection activities. 5. Develop risk mitigation strategies. 6. Integrate diverse skills and knowledge to solve non-standard quality issues. 7. Apply qualimetric analysis methods.

Table 4. Job Functions and Professional Skills/Competencies According to the Professional Standard «Production Manager in Construction»

Job Title: Site Foreman	
Qualification Level (NQF):	7

Primary Objective:	Management of a production unit/site	
Job Functions:	Mandatory Job Functions:	1. Management of a production site. 2. Organization of advanced production methods and rationalization of construction technologies.
	Additional Job Function:	Participation in testing of technological equipment.
Job Function 1: Production Unit Management	Task 1: Operational Leadership of Production Unit	Skills:
		1. Manage operations in compliance with current legal regulations. 2. Ensure timely completion of production targets (output volume). 3. Reduce labor costs through: – Optimal equipment utilization – Maximizing technical capabilities 4. Improve equipment shift ratios and conserve resources: – Raw materials – Fuel/energy – Cost reduction initiatives 5. Prepare production workflows and assign personnel. 6. Monitor process adherence – promptly identify/rectify deviations. 7. Contribute to: – New process development – Existing process optimization – Production scheduling 8. Verify output quality (products/services).
	Task 2: Workforce Productivity Support	Skills:
		1. Submit proposals to management regarding: – Worker grade assignments – Team composition (size/skill mix) 2. Provide crews with: – Tools – Work aids
Job Function 2: Implementation of Advanced Production Methods and Construction Technology Optimization	Task 1: Operational Implementation of Advanced Methods & Technology Rationalization	Skills:
		1. Organize adoption of innovative work techniques 2. Ensure workforce meets productivity benchmarks 3. Optimize utilization of: – Production floor space – Machinery/equipment – Technical tooling systems 4. Form specialized work crews

	Task 2: Work Crew Coordination	Skills: 1. Assign tasks to crews/individual workers per approved: – Production plans – Work schedules 2. Conduct mandatory work instruction briefings. 3. Implement occupational safety protocols 4. Enforce: – Equipment safety standards – Industrial hygiene requirements 5. Oversee equipment/tool maintenance programs
Additional Function: Technological Equipment Testing Participation	Task: Execute equipment testing procedures	Skills: 1. Perform experimental equipment validation 2. Master newly designed technological processes

Table 5. Job Functions, Professional Skills and Competencies According to the Professional Standard «Training of Specialists in the Field of Technical Regulation»

Job Title: Director of Professional Development Center (Technical Regulation)		
Qualification Level (NQF):	7	
Primary Objective:	To establish and manage a center for training specialists in technical regulation, including: 1) Education, certification, and accreditation of personnel in: – Conformity assessment experts; – Accreditation evaluators; – Metrology equipment verifiers; – Standardization/technical experts. 2) Ensuring operational excellence and growth of the educational institution	
Job Functions:	Core Job Functions:	1. Management of the Center's Activities (training, retraining, and advanced training in the field of technical regulation) 2. Management of Development and Quality within the Organization (training, retraining, and advanced training in the field of technical regulation)
Job Function 1: Management of Center Operations (Training, Retraining)	Task 1: Organizational Planning	Skills: 1. Analyze market needs to identify relevant training programs in technical regulation. 2. Plan the development, updating, and implementation of training programs.

& Upskilling in Technical Regulation)		3. Delegate tasks and form project teams for program development. 4. Monitor lesson planning and delivery. 5. Apply legal norms governing training program development in technical regulation. 6. Evaluate market demands to prioritize training initiatives. 7. Assess program implementation processes and outcomes. 8. Benchmark national/international best practices in technical regulation training.
	Task 2: General Organizational Leadership	Skills: 1. Implement legal frameworks for training program compliance. 2. Align programs with market demands and regulatory updates. 3. Evaluate training effectiveness through KPIs. 4. Adopt quality-enhancing educational management methods. 5. Utilize ICT tools for blended learning solutions. 6. Facilitate collaboration among educators, trainees, and stakeholders. 7. Apply diverse personnel management techniques. 8. Develop market-driven professional curricula. 9. Oversee teaching materials development and program assessment tools. 10. Maintain compliance documentation. 11. Foster staff professional development. 12. Solve complex problems through interdisciplinary approaches. 13. Build partnerships with employers, unions, and international institutions.
	Task 3: Resource Management	Skills: 1. Prepare financial/administrative documents and obtain approvals. 2. Allocate resources based on workload and efficiency metrics. 3. Monitor operational deliverables within authority limits. 4. Evaluate process effectiveness through PDCA cycles. 5. Forecast short/long-term resource needs. 6. Identify and mitigate resource utilization risks. 7. Develop risk minimization strategies. 8. Coordinate individual/team training projects.

		9. Optimize resource efficiency through continuous improvement. 10. Troubleshoot operational bottlenecks proactively.
Job Function 2: Organizational Development & Quality Management (Technical Regulation Training Programs)	Task 1: Quality Management Implementation	Skills: 1. Collect and systematize data from multiple sources. 2. Analyze information and formulate evidence-based conclusions. 3. Develop quality assurance tools for educational services. 4. Identify factors affecting service quality. 5. Detect risks in educational operations. 6. Implement risk mitigation strategies. 7. Monitor quality improvement plans. 8. Apply qualimetric analysis methods.
	Task 2: Quality Enhancement Program Development	Skills: 1. Assess competitive positioning and define: – Organizational mission – Economic impact – Corporate social responsibility policies 2. Ensure legal compliance in operations. 3. Conduct performance monitoring: – Trend analysis – Risk evaluation – Program outcomes 4. Design quality parameters for current/future services. 5. Create action plans for: – Quality planning – Service improvement 6. Oversee implementation of quality initiatives. 7. Select management approaches for: – Service excellence – Risk resilience 8. Build leadership teams by: – Delegating authority – Assessing staff potential – Resolving conflicts 9. Foster partnerships with: – Employers – Industry associations – Government agencies 10. Communicate professionally in Kazakh, Russian, and English.
	Task 3: External Stakeholder Engagement	Skills: 1. Develop interaction frameworks with: – Regulatory bodies – Training partners

		2. Define objectives/expected outcomes for collaborations. 3. Advocate for organizational interests. 4. Maintain stakeholder relations. 5. Evaluate engagement effectiveness. 6. Utilize ICT tools for multilingual communication.
Additional Job Function: Maintenance of the Occupational Health and Safety System	Task: Organization of a Safe Learning Environment	Skills: 1. Apply occupational health and safety instructions. 2. Organize safe conditions for the learning process. 3. Assess risks and take preventive measures to maintain a safe learning environment.

Table 6. Job Functions and Professional Skills/Competencies According to the Professional Standard «Educator (Faculty) of Higher and/or Postgraduate Education Institutions»

Job Profile: Lecturer/Assistant in Higher and Postgraduate Education		
Position Title:	Lecturer/Assistant in Higher and Postgraduate Education	
Primary Objective:	To conduct academic, research, methodological, and social activities within higher and postgraduate education institutions.	
List of work functions	Core Job Functions:	1. Teaching 2. Research 3. Methodological Work 4. Student Socialization
Description of Job functions		
Job Function 1: Teaching	Skill 1: Ensuring Required Level of Academic Competencies	Abilities: 1. Organize and conduct student-centered classes (excluding lectures) using modern assessment methods. 2. Develop teaching materials that integrate education, science, and innovation. 3. Provide feedback to undergraduate students using digital tools (LMS, online quizzes, forums).
	Skill 2: Ensuring Required Level of Professional Competencies	Abilities: 1. Adapt teaching methods to align with industry-specific requirements of the degree program. 2. Incorporate the latest professional innovations into the curriculum (e.g., AI in IT programs, green tech in engineering).
Job Function 2: Conducting Scientific Research	Skill 1: Integration of Science, Higher Education, and Labor Market	Abilities: 1. Participate in research and development (R&D) projects or creative industry initiatives (e.g., tech startups, applied engineering solutions).

		2. Enhance research productivity (publications in Scopus/WoS, patents, conference presentations). 3. Utilize national & international databases (Springer, IEEE Xplore, Google Scholar, eLIBRARY.KZ).
	Skill 2: Developing Students' Research Skills	Abilities: 1. Assess undergraduate students' research competencies (e.g., via research methodology tests, project evaluations). 2. Implement strategies to boost student research engagement, such as: – Supervising thesis/dissertation work – Organizing student research circles – Encouraging publications in student academic journals
Job Function 3: Scientific-Methodological Work	Skill 1: Methodological Support for Higher Education Processes	Abilities: 1. Develop teaching materials and enhance methodological expertise. 2. Continuously improve professional qualifications (attending conferences, advanced training). 3. Integrate pedagogical psychology and subject-matter knowledge in bachelor's seminars/practical classes. 4. Apply innovative teaching technologies, including: – Digital tools (LMS, VR simulations) – Active learning methods (flipped classroom, project-based learning)
Job Function 4: Student Socialization	Skill 1: Promoting Social Values in Student Communities	Abilities: 1. Foster an inclusive educational environment aligned with institutional policies. 2. Encourage civic engagement (volunteering, debates) and professional initiatives (student clubs, hackathons). 3. Uphold academic integrity (anti-plagiarism, ethical research practices).
	Skill 2: Instilling Professional Values	Abilities: 1. Cultivate student passion for their field (e.g., industry guest lectures, case competitions). 2. Adhere to anti-corruption principles (transparent grading, fair assessment).
Additional Function: Stakeholder Engagement in Higher Education	Skill 1: Internal Stakeholder Collaboration	Abilities: 1. Communicate effectively with students, faculty, and staff. 2. Work collaboratively in academic teams (e.g., curriculum development committees).
	Skill 2: External Stakeholder Engagement	Abilities: 1. Facilitate student participation in youth organizations (e.g., "Jas Otan").

		2. Partner with employers for: – Internships – Advisory boards – Joint research 3. Design professional development programs for industry upskilling. 4. Publish expert articles in media/social networks to bridge academia and society.
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2. Purpose and objectives of educational program

Purpose of EP: Training of competent experts in the scientific and pedagogical direction to support the activities of conformity assessment and technical expertise of railway infrastructure facilities in the field of technical regulation in order to ensure the safety and quality of life of citizens.

Tasks of EP:

1. Deepening of Professional Knowledge and Skills: Ensuring in-depth study of the theoretical and practical aspects of technical expertise, quality assessment, and current maintenance of railway infrastructure facilities.
2. Development of Analytical Skills: Enhancing the ability of master's students to analyze and interpret data obtained during the inspection and monitoring of railway infrastructure conditions.
3. Study of Innovative Technologies: Familiarizing students with advanced technologies and methods used in technical expertise and maintenance of railway infrastructure to ensure their effective practical application.
4. Conducting Scientific Research: Training students in research methods aimed at solving current problems in railway infrastructure, and preparing them to carry out scientific and research projects.
5. Development of Management Skills: Forming competencies necessary for managing processes related to technical expertise, quality control, and maintenance of railway infrastructure facilities.
6. Practical Training: Providing opportunities for internships and participation in real projects in collaboration with industry-specific organizations and enterprises to consolidate theoretical knowledge in practice.
7. Interdisciplinary Approach: Developing interdisciplinary skills and integrating knowledge from various fields for a comprehensive approach to solving problems in railway infrastructure.
8. Development of Recommendations and Solutions: Training students in developing well-grounded proposals and recommendations aimed at improving the quality, reliability, and safety of railway infrastructure facilities.
9. Study of Principles and Practices of Sustainable Development: Introducing students to the concepts and strategies of sustainable development in the railway sector; developing and implementing solutions that reduce environmental impact.
10. Conducting Research in the Field of Sustainable Development: Training in research methods aimed at increasing the sustainability and environmental safety of railway facilities; developing innovative solutions and technologies to enhance environmental performance.
11. Development of Teaching and Pedagogical Skills: Ensuring understanding of modern pedagogical approaches and teaching methods; developing curricula and teaching materials in the fields of technical expertise and sustainable development; training in effective teaching practices and knowledge transfer to students.

Key Competencies:

1. Expert Evaluation (KC1): Ability to conduct technical examination of railway infrastructure facilities, including condition diagnostics and assessment of compliance with regulatory requirements.
2. Quality Analysis and Control (KC2): Proficiency in methods and technologies for analyzing and controlling the quality of railway infrastructure and its components.
3. Technical Regulation (KC3): Application of regulatory and legal frameworks and standards governing activities in the field of railway infrastructure.
4. Development of Recommendations (KC4): Ability to develop proposals and recommendations aimed at improving the quality and safety of railway infrastructure facilities.
5. Maintenance and Repair of Transport Infrastructure Facilities (KC5): Mastery of methods and technologies for routine maintenance and servicing of railway tracks.
6. Diagnostics and Repair of Transport Infrastructure Facilities (KC6): Ability to carry out diagnostics and repair work to ensure the operational condition of railway tracks.
7. Monitoring and Control (KC7): Organization of monitoring and control of the condition of railway tracks to promptly identify and eliminate defects.
8. Innovative Maintenance Technologies (KC8): Application of modern technologies and tools for efficient maintenance and repair of railway tracks, aimed at reducing the negative environmental impact of railway infrastructure.
9. Scientific Research (KC9): Conducting scientific research in the field of technical expertise and quality assessment of railway infrastructure facilities.
10. Data Analysis (KC10): Proficiency in statistical analysis methods and data processing obtained during research.
11. Sustainability Expertise (KC11): Conducting technical assessments of railway infrastructure facilities in terms of their environmental impact and sustainability.
12. Environmental Safety Analysis (KC12): Mastery of methods and technologies for analyzing the environmental safety of railway infrastructure and its components.
13. Development of Environmentally Efficient Solutions (KC13): Ability to develop proposals and recommendations to improve the environmental efficiency and sustainability of railway infrastructure.
14. Pedagogical Activity (KC14): Capability to plan and organize the educational process, develop curricula and instructional materials.
15. Teaching Skills (KC15): Ability to effectively transfer knowledge to students using modern pedagogical methods and technologies.

3. Requirements for evaluating the educational program learning outcomes

The educational program 7M07149 – «Transport Infrastructure: Certification and Technical Expertise» ensures that all students achieve the intended learning outcomes required for professional activity. Upon completion of the program, master's students will be able to:

LO1 – To apply a system of fundamental knowledge to identify, formulate and solve technical and technological problems in the field of technical expertise, conformity assessment and quality of transport infrastructure facilities.

LO2 – To carry out the examination of technical documentation, supervision and control of the condition, operation, current maintenance and repair of transport infrastructure and technological equipment.

LO3 – To establish the causes of malfunctions and deficiencies in operation in order to take measures to eliminate them and improve the efficiency of using transport infrastructure facilities.

LO4 – To put into practice key concepts and theories in the field of production and repair site management, technical expertise, quality assessment and sustainable development of railway infrastructure

LO5 – To apply the regulatory framework and standards governing activities in the field of railway infrastructure operation and repair and sustainable development

LO6 – To develop management solutions in the field of technical expertise, operation and repair of railway infrastructure using innovative technologies

LO7 – To analyze and control the quality of railway facilities, taking into account environmental and sustainable aspects

LO8 – To carry out scientific research aimed at the sustainable development of railway infrastructure based on innovative technologies

LO9 – To apply modern innovative technologies and tools to improve the efficiency and sustainability of railway facilities

LO10 – To develop and implement environmentally efficient solutions in the field of railway infrastructure

LO11 – To carry out computational and experimental studies for technical expertise and assessment of compliance of transport infrastructure facilities with safety requirements

LO12 – To use modern methods and technologies of scientific communication, including in foreign languages

LO13 – To develop scientific and methodological documents taking into account new technologies in the field of higher education and the profile of the educational program

The main principles of learning outcomes assessment are as follows:

- Objectivity, reliability, and transparency in providing information;
- Focus on improving teaching and the learning process;
- Alignment of assessment tools with the learning outcomes defined in the State and subject standards;

- Compliance of norms, requirements, and indicators of students' educational achievements with their abilities, interests, social demands, and personality development needs;
- Systematic analysis of interim and final assessment results of students' academic performance;
- Adherence to key ethical standards during the assessment process.

Three types of assessment are used to measure learning outcomes (LOs): diagnostic, formative, and summative assessment.

Diagnostic assessment is used to evaluate a student's progress — throughout the academic semester, the instructor compares the student's initial level of competence with the results achieved. The outcomes of diagnostic assessment serve as a basis for making adjustments and improving the learning process by setting instructional objectives for the teacher and learning tasks for the student.

Formative assessment is applied to monitor the learner's progress while taking into account individual characteristics of material assimilation (pace of work, methods of mastering the topic, etc.). It is also used to provide recommendations for success. The instructor uses formative assessment to make timely adjustments to teaching and lesson planning, while students use it to improve the quality of their work.

Student progress is defined as the achievement of specific results set in the learning goals within subject areas, based on actual work completed by the student. The teacher records observations on individual student progress in the electronic gradebook.

Summative assessment is used to determine the degree to which the student has achieved the intended learning outcomes at each stage of education. It consists of ongoing (current), midterm (interim), and final assessments.

Current assessment of individually completed assignments is carried out based on assessment norms (number of correct solutions, number of errors, adherence to formatting rules, etc.) and criteria defined by the teacher and/or students. The teacher considers the student's individual learning characteristics when conducting current assessment.

Midterm assessment is based on the types of work specified in the course syllabus: written assignments/source analysis; oral responses/presentations; projects, research work, specific practical tasks; portfolios (achievement folders), and others. All types of work are evaluated using predetermined criteria and are mandatory. They are planned in advance by the teacher as part of the assessment plan.

Final assessment is conducted according to the academic calendar and is administered in written form, in accordance with established standards and developed assessment criteria.

4. Passport of educational program

4.1. General information

№	Field name	Comments
1	Code and classification of the field of education	7M07 – Engineering, manufacturing and construction industries
2	Code and classification of training directions	7M071 – Engineering and Engineering affairs
3	Educational program group	M210 – Transmission system and infrastructure
4	Educational program name	7M07149 – «Transport infrastructure: certification and technical expertise»
5	Short description of educational program	The educational program 7M07149 – «Transport infrastructure: certification and technical expertise» is aimed at training highly qualified specialists in the field of technical regulation and quality assessment of transport infrastructure facilities. The program has been developed in accordance with the following Professional Standards: – Conformity Assessment of Railway Infrastructure – Quality Management – Quality Control of Products, Processes, and Services – Training of Specialists in the Field of Technical Regulation – Pedagogue (Academic Teaching Staff) of Higher and/or Postgraduate Education Institutions This educational program is also designed to support the academic implementation of the Sustainable Development Goals (SDGs): - SDG 4 – Quality Education, - SDG 9 – Industry, Innovation and Infrastructure, - SDG 12 – Responsible Consumption and Production.
6	Purpose of EP	Training of competent experts in the scientific and pedagogical direction to support the activities of conformity assessment and technical expertise of railway infrastructure facilities in the field of technical regulation in order to ensure the safety and quality of life of citizens.
7	Type of EP	Innovative EP
8	The level based on NQF	7
9	The level based on IQF	7
10	Distinctive features of EP	No
11	List of competencies of educational program	Key Competencies KC1 – Ability to conduct technical expertise of railway infrastructure facilities, including condition diagnostics and assessment of compliance with regulatory requirements. KC2 – Readiness to apply methods and technologies for quality analysis and control of railway facilities and their components. KC3 – Readiness to apply legal and regulatory

№	Field name	Comments
		frameworks and standards governing railway infrastructure activities. KC4 – Ability to develop proposals and recommendations for improving the quality and safety of railway facilities. KC5 – Readiness to apply methods and technologies for routine maintenance and technical servicing of railway tracks. KC6 – Ability to perform diagnostics and repair work to maintain railway tracks in proper working condition. KC7 – Ability to organize monitoring and control of the condition of railway tracks to promptly detect and eliminate defects. KC8 – Ability to apply modern technologies and tools for effective maintenance and repair of railway tracks aimed at reducing the negative impact of railway infrastructure on the environment. KC9 – Ability to conduct scientific research in the field of technical expertise and quality assessment of railway facilities. KC10 – Readiness to apply statistical analysis methods and data processing techniques obtained during research activities. KC11 – Readiness to conduct technical expertise of railway infrastructure facilities in terms of their environmental impact and contribution to sustainable development. KC12 – Readiness to apply methods and technologies for analyzing the environmental safety of railway facilities and their components. KC13 – Ability to develop proposals and recommendations to improve the environmental efficiency and sustainability of railway facilities. KC14 – Ability to plan and organize the educational process, develop academic programs and methodological materials. KC15 – Ability to effectively transfer knowledge to students using modern pedagogical methods and technologies.
12	Learning outcomes of educational program	LO1 – To apply a system of fundamental knowledge to identify, formulate and solve technical and technological problems in the field of technical expertise, conformity assessment and quality of transport infrastructure facilities. LO2 – To carry out the examination of technical documentation, supervision and control of the condition, operation, current maintenance and repair of transport infrastructure and technological equipment. LO3 – To establish the causes of malfunctions and deficiencies in operation in order to take measures to

№	Field name	Comments
		eliminate them and improve the efficiency of using transport infrastructure facilities. LO4 – To put into practice key concepts and theories in the field of production and repair site management, technical expertise, quality assessment and sustainable development of railway infrastructure LO5 – To apply the regulatory framework and standards governing activities in the field of railway infrastructure operation and repair and sustainable development LO6 – To develop management solutions in the field of technical expertise, operation and repair of railway infrastructure using innovative technologies LO7 – To analyze and control the quality of railway facilities, taking into account environmental and sustainable aspects LO8 – To carry out scientific research aimed at the sustainable development of railway infrastructure based on innovative technologies LO9 – To apply modern innovative technologies and tools to improve the efficiency and sustainability of railway facilities LO10 – To develop and implement environmentally efficient solutions in the field of railway infrastructure LO11 – To carry out computational and experimental studies for technical expertise and assessment of compliance of transport infrastructure facilities with safety requirements LO12 – To use modern methods and technologies of scientific communication, including in foreign languages LO13 – To develop scientific and methodological documents taking into account new technologies in the field of higher education and the profile of the educational program
13	Education form	Full-time
14	Period of training	2 years
15	Amount of credits	120
16	Languages of instruction	English, Russian, Kazakh
17	Academic degree awarded	Master of Technical Sciences
18	Developers and authors	Abdullaev S.S., Kamzanov N.S., Tokmurizna-Kobernyak N.A. employer: Imentaeva S.G. student: Kayratova A.Ye.

4.2. Relationship between the achievability of the formed learning outcomes based on educational program and academic disciplines

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
Cycle of basic disciplines University component																
1	Foreign language (professional)	Mastering professional English at an advanced level (for non-linguistic areas). The study of grammatical characteristics of scientific style in its oral and written forms. Professional oral communication in monological and dialogical form according to the educational program. Ability to demonstrate the results of research in the form of reports, abstracts, publications and public discussions; interpret and present the results of scientific research in a foreign language.	3						v							
2	History and philosophy of science	Purpose: to explore the history and philosophy of science as a system of concepts of global and Kazakh science. Content: the subject of philosophy of	3								v	v				

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
		science, dynamics of science, the main stages of the historical development of science, features of classical science, non-classical and post-non-classical science, philosophy of mathematics, physics, engineering and technology, specifics of engineering sciences, ethics of science, social and moral responsibility of a scientist and engineer.														
3	Higher school pedagogy	The course is aimed at mastering the methodological and theoretical foundations of higher education pedagogy. The discipline will help to master the skills of modern pedagogical technologies, technologies of pedagogical design, organization and control in higher education, skills of communicative competence. At the end of the course, undergraduates learn how to organize and conduct various forms of organizing training, apply active teaching methods, and select the	3										v	v	v	

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
		content of training sessions. Organize the educational process on the basis of credit technology of education.														
4	Psychology of management	The course is aimed at mastering the tools for effective employee management, based on knowledge of the psychological mechanisms of the manager's activity. Discipline will help you master the skills of making decisions, creating a favorable psychological climate, motivating employees, setting goals, building a team and communicating with employees. At the end of the course, undergraduates will learn how to resolve managerial conflicts, create their own image, analyze situations in the field of managerial activity, as well as negotiate, be stress-resistant and effective leaders.	3	v										v		
5	Assessment of the sustainability of	Objective: to acquire skills in developing strategies and	5		v			v		v						v

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
	transport development	solutions aimed at minimizing the negative impact of transport on the environment and society. Content: Global challenges in the field of sustainable development. Strategies and technologies to reduce the environmental impact of transport. Assessing the costs and benefits of sustainable transport solutions. Methods and tools for assessing sustainable transport development. Indicators of sustainable transport development.														
Cycle of basic disciplines Component of choice																
6	Factor analysis in transport	Objective: Formation of professional knowledge and skills in the analysis of factors influencing transport processes and systems. Contents: Introduction to factor analysis and its application in transport. Methods and models of factor analysis. Application of factor analysis for evaluating transport systems.	5		v								v			v

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
		Analysis of interactions between different modes of transport. Optimization of transport processes based on factor analysis results. Application of factor analysis for assessing the technical condition of transport infrastructure objects.														
7	Quality management systems for the operation and repair of railway transport	Objective: to acquire skills in developing management solutions for the operation and repair of railway transport based on international quality standards. Contents: ISO 9001 standards; quality management during operation and maintenance of rolling stock; process approach to organization management; organization, types and methods of technical quality control; development and implementation of quality systems in locomotive and wagon depots.	5		v	v										
8	Sustainable development strategies	Purpose: To train graduate students in sustainable development strategies to	5								v				v	v

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
		achieve a balance between economic growth, social responsibility, and environmental protection. Content: Graduate students will study the concepts and principles of sustainable development, the development and implementation of sustainable development strategies, the evaluation of their effectiveness, and international standards and best practices. Cases and examples of successful sustainable development strategies are included.														
9	Methods of Expert Assessments in Transport	Objective: Formation of knowledge and skills necessary for the application of expert assessment methods in the field of transport. Contents: Introduction to expert assessment methods. Theoretical foundations and methodology of expert assessments. Methods for collecting and processing expert data. Application of expert assessments in various	5				v	v	v							

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
		areas of transport. Analysis and interpretation of expert assessment results. Use of expert assessments for solving practical problems in transport.														
10	Intellectual property and research	The purpose of this course is to provide undergraduates with the knowledge and skills necessary to understand, protect and manage intellectual property (IP) in the context of scientific research and innovation. The course is aimed at training specialists who can effectively work with IP, protect the results of scientific research and apply them in practice.	5	v					v							
Cycle of profile disciplines University component																
11	Innovative Transport Infrastructure	Objective: Formation of knowledge and skills necessary for the development, implementation, and management of innovative solutions in transport infrastructure. Contents: Introduction to innovative	5		v								v			v

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
		transport infrastructure. Modern technologies and materials in the construction and operation of transport facilities. Intelligent transport systems and their role in innovative infrastructure. Economic efficiency and sustainable development of transport infrastructure. Environmental aspects and energy-efficient solutions in transport infrastructure.														
12	Technical expertise in transport	Purpose: to acquire the skills of conducting technical expertise of transport infrastructure facilities Contents: Introduction to technical expertise in transport. Regulatory and legal regulation of technical expertise in the transport industry. Methods and methods of technical expertise. Assessment and analysis of the technical condition of transport facilities. The role of technical expertise in the management of transport systems. Practical application	5					v	v	v						

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
		of the results of technical expertise.														
13	Methods of testing railway transport	Purpose: to develop practical skills in planning, staging and conducting experimental scientific research, searching for and testing new ideas for improving railway rolling stock. Contents: regulatory and technical base for testing rolling stock; equipment used for testing rolling stock; dynamic, static and vibration tests of rolling stock components; automation of experimental research and processing of experimental data.	5				v	v	v							
14	Theory of setting up an engineering experiment	Purpose: To get acquainted with existing methods, approaches to solving engineering problems, with planning methods, the procedure for conducting, processing and analyzing the results of an engineering experiment. Contents: fundamentals of experimental theory, methods of planning experiments, processing experimental results. The	4				v	v	v							

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
		theory of experiment planning formulates techniques and methods for the optimal organization of experimentation in the study of objects of a wide variety of physical nature.														
Cycle of profile disciplines Component of choice																
15	Technical regulation and standardization in transport	Objective: Formation of knowledge and skills necessary for the development, implementation, and management of technical regulations and standards in the field of transport. Contents: Regulatory and legal framework for technical regulation in the transport industry. International and national standards in transport. Control and assessment of compliance of transport objects and processes with established standards. Practical application of standards and regulations in transport system management.	5					v	v	v						

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
16	Technical diagnostics of transport infrastructure objects	Objective: Acquisition of skills for assessing the technical condition of transport infrastructure objects. Contents: Diagnostic tools for assessing the technical condition of transport infrastructure objects. Structure of dynamometric and track measurement railcars. Data processing and interpretation of measurement results. Innovative diagnostic methods.	5	v			v		v							
17	Methods for calculating the strength and stability of railway tracks	Objective: mastering the skills of conducting computational studies to assess the compliance of transport infrastructure facilities with the requirements of regulatory and technical documentation Content: Modern methods for calculating the stress-strains of the railway. Assessment of the qualities of rails, rows, ballasts and track base in accordance with the geographical, climatic and operational conditions.	5	v				v		v				v		

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
		Analysis of the impact of dynamic and static loads on the railway. Modeling and calculating the strength and strength of the railway.														
18	Certification testing of transport infrastructure objects	Objective: Acquisition of skills for conducting experimental studies to assess the compliance of transport infrastructure objects with safety requirements. Contents: Regulatory and legal framework for certification testing. Methods and techniques for conducting certification testing. Development of a certification testing program. Assessment of transport infrastructure objects' compliance with established requirements and standards. Application of certification testing results to improve the quality and safety of transport objects.	5	v								v		v		
19	Resource saving and energy saving in railway transport	Purpose: develops the ability to make decisions in the field of professional activity based on the principles of resource	5	v				v			v					

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
		and energy conservation. Contents: Types and characteristics of various energy resources; regulatory and legal support for energy conservation; ways to increase the energy efficiency of the transportation process; resource-saving technologies in repair production and operation of railway infrastructure facilities; organization and methods of energy conservation management.														
20	Environmental safety of railway transport	Objective: to acquire skills in solving problems related to ensuring environmental protection. Contents: basic requirements for environmental quality, regulatory and legal acts in the field of environmental protection, technical and economic methods for reducing the harmful effects of rail transport on the atmosphere, hydrosphere, soil, as well as methods for reducing energy pollution.	5					v			v				v	v

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
21	Assessment of environmental indicators of design solutions	Objective: to acquire skills in solving problems related to ensuring environmental protection. Contents: environmental legislation in the field of transport; negative impacts of railway transport facilities on the environment, monitoring and methods for assessing the negative impact on the atmosphere, hydrosphere, soil, flora and fauna; environmental design and project expertise.	5					v			v				v	v
22	Interaction of rolling stock and railway track	The purpose of the discipline: the formation of professional competencies in the field of methods for calculating and evaluating indicators of dynamic qualities of rolling stock and track Contents: Mechanical system "crew-path", interaction forces, mechanical processes and dynamic models of interaction between crew and track, calculation and evaluation of dynamic parameters of rolling stock and track.	5						v	v			v			

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
23	Risk management in transport	Objective: Acquisition of knowledge and skills necessary for analyzing, assessing, and managing risks in the transport industry. Contents: Introduction to risk management in transport. Theoretical foundations and methodology of risk management. Methods for identifying and assessing risks. Monitoring and managing risks in transport systems. Strategies and methods of risk management. Application of risk management in various areas of transport. Analysis and assessment of factors influencing risk levels	5								v					
24	Project Management	Goal: Gaining knowledge about the components and methods of project management based on modern models and standards. Objectives: study of behavioral models of project-oriented management of business development; mastering international	5		v						v					

№	Discipline name	Short description of discipline	Amount of credits	Результаты обучения												
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13
		standards PMI PMBOK, IPMA ICB and national standards of the Republic of Kazakhstan in the field of project management; analysis of the features of organizational management of business development through the integration of strategic, project and operational management.														
25	Strategic management	Strategic management methodology development: management management, extrapolation-based management, change management, flexible emergency solutions management, synergetic management. The main components of the strategic management paradigm (the concept) differ from the paradigm of operating management, the basic principles of strategic management.	5								v					



WORKING CURRICULUM

Academic year	2025-2026 (Autumn, Spring)
Group of educational programs	M210 - "Transmission system and infrastructure"
Educational program	7M07149 - "Transport infrastructure: certification and technical expertise"
The awarded academic degree	Master of Technical Sciences
Form and duration of study	full time (scientific and pedagogical track) - 2 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	lek/lab/pr Contact hours	in hours SIS (including TSIS)	Form of control	Allocation of face-to-face training based on courses and semesters				Prerequisites
									1 course		2 course		
									1 sem	2 sem	3 sem	4 sem	
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)													
CYCLE OF BASIC DISCIPLINES (BD)													
M-1. Module of basic training (university component)													
LNG213	Foreign language (professional)		BD, UC	3	90	0/0/30	60	E	3				
HUM214	Psychology of management		BD, UC	3	90	15/0/15	60	E	3				
HUM212	History and philosophy of science		BD, UC	3	90	15/0/15	60	E		3			
HUM213	Higher school pedagogy		BD, UC	3	90	15/0/15	60	E		3			
M-2. Transport sustainability and quality management in railway transport													
TRA703	Factor analysis in transport	1	BD, CCH	5	150	30/0/15	105	E	5				
TRA291	Quality management systems for the operation and repair of railway transport	1	BD, CCH	5	150	30/0/15	105	E	5				
MNG781	Intellectual property and research	1	BD, CCH	5	150	30/0/15	105	E	5				
TRA704	Methods of Expert Assessments in Transport	2	BD, CCH	5	150	30/0/15	105	E	5				
MNG782	Sustainable development strategies	2	BD, CCH	5	150	30/0/15	105	E	5				
TRA712	Assessment of the sustainability of transport development		BD, UC	5	150	30/0/15	105	E			5		
M-5. Practice-oriented module													
AAP235	Pedagogical Practice		BD, UC	3				R		3			
AAP277	Pedagogical practice		BD, UC	5				R				5	
CYCLE OF PROFILE DISCIPLINES (PD)													
M-3. Innovations and Technical Regulation in Railway Transport													
TRA705	Innovative Transport Infrastructure		PD, UC	5	150	30/0/15	105	E	5				
TRA707	Technical regulation and standardization in transport	1	PD, CCH	5	150	30/0/15	105	E		5			
TRA708	Technical diagnostics of transport infrastructure objects	1	PD, CCH	5	150	30/0/15	105	E		5			
TRA706	Technical expertise in transport		PD, UC	5	150	30/0/15	105	E			5		
TRA710	Certification testing of transport infrastructure objects	1	PD, CCH	5	150	30/0/15	105	E			5		
TRA709	Methods for calculating the strength and stability of railway tracks	1	PD, CCH	5	150	30/0/15	105	E			5		
TRA286	Environmental safety of railway transport	2	PD, CCH	5	150	30/0/15	105	E			5		
TRA287	Resource saving and energy saving in railway transport	2	PD, CCH	5	150	30/0/15	105	E			5		

M-4. Theoretical and Experimental Studies in Railway Transport													
TRA713	Scientific Problems of Transport Infrastructure Development		PD, UC	5	150	30/0/15	105	E	5				
TRA285	Methods of testing railway transport		PD, UC	5	150	30/0/15	105	E		5			
TRA294	Interaction of rolling stock and railway track	1	PD, CCH	5	150	30/0/15	105	E		5			
TRA295	Assessment of environmental indicators of design solutions	1	PD, CCH	5	150	30/0/15	105	E		5			
TRA711	Risk management in transport	2	PD, CCH	5	150	30/0/15	105	E		5			
MNG265	Strategic management	2	PD, CCH	5	150	30/0/15	105	E		5			
MNG705	Project Management	2	PD, CCH	5	150	30/0/15	105	E		5			
TRA701	Theory of setting up an engineering experiment		PD, UC	4	120	30/0/15	75	E			4		
M-5. Practice-oriented module													
AAP256	Research practice		PD, UC	4				R				4	
M-7. Module of final attestation													
ECA212	Registration and protection of the master thesis		FA	8								8	
M-6. Experimental research module													
AAP268	Research work of a master's student, including internship and completion of a master's thesis		RWMS	4				R	4				
AAP272	Research work of a master's student, including internship and completion of a master's thesis		RWMS	1				R		1			
AAP254	Research work of a master's student, including internship and completion of a master's thesis		RWMS	5				R			5		
AAP255	Research work of a master's student, including internship and completion of a master's thesis		RWMS	14				R				14	
Total based on UNIVERSITY:									30	30	29	31	
									60		60		

Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			
		Required component (RC)	University component (UC)	Component of choice (CCH)	Total
GED	Cycle of general education disciplines	0	0	0	0
BD	Cycle of basic disciplines	0	25	10	35
PD	Cycle of profile disciplines	0	28	25	53
Total for theoretical training:		0	53	35	88
RWMS	Research Work of Master's Student				24
ERWMS	Experimental Research Work of Master's Student				0
FA	Final attestation				8
TOTAL:					120

Decision of the Educational and Methodological Council of KazNRTU named after K.Satpayev. Minutes № 5 dated 20.12.2024

Decision of the Academic Council of the Institute. Minutes № 3 dated 29.11.2024

Signed:					
Governing Board member - Vice-Rector for Academic Affairs	Uskenbayeva R. K.				
Approved:					
Vice Provost on academic development	Kalpeyeva Z. B.				
Head of Department - Department of Educational Program Management and Academic-Methodological Work	Zhumagaliyeva A. S.				
Supervisor - School of Transport Engineering and Logistics	Abdullayev S. C.				
Department Chair - Transport Engineering	Kamzanov N. .				
Representative of the Academic Committee from Employers	Beketov T.				
____Acknowledged____					

