

**NJSC «Kazakh National Research Technical University  
named after K.Satbayev»  
Institute of Metallurgy and Industrial Engineering  
Department of "Technological machines, transport and  
logistics"**

## **CURRICULUM PROGRAM**

**8D11301 - Transport services**

**Doctor of Philosophy (PhD)**

1<sup>st</sup> edition

in accordance with the State Educational Standard of Higher Education 2018

**Almaty 2021**

Разработано:	Рассмотрено: заседание УС Института	Утверждено: УМС КазНТУ	Страница 1 из 32
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The program is compiled and signed by the parties:

**From KazNITU named after K.I. Satbaev:**

1. Head of the Department \_\_\_\_\_ K.K. Yelemesov
2. Director of the Institute \_\_\_\_\_ K.K. Yelemesov
3. Chairman of the EMG of the Department \_\_\_\_\_ G.S. Mukhanova

**From employers:**

1. Director of Freight Company "TransAI" LLP \_\_\_\_\_ V.V. Korolev
2. Deputy Director of the «Institute of information and computational technologies» RSE on the REU \_\_\_\_\_ O.Zh.Mamyrbayev
3. Director of the Institution "Kazakhstan Logistics Cluster" \_\_\_\_\_ K.S. Chakeyeva

**From partner universities:**

1. Head of the "Business Technology" Department, Ph.D., Assoc. Professor of KazNU named after Al-Farabi \_\_\_\_\_ Akhmetova Z.B.
2. Dean of the Engineering and Information Technology Faculty, KGU \_\_\_\_\_ Kegenbekov Zh.K.

Approved at a meeting of the Academic Council of the Kazakh National Research Technical University named after K.I. Satpaev. Protocol No. 3, June 25, 2021

**Qualification:**

Level 8 of the National Qualifications Framework:  
 8D113- Transport services (doctoral studies):  
 8D11301 - Transport services

**Professional competence:** innovative and organizational and managerial activities, including the formation of a strategy for the development and improvement of large institutional structures at the national and international levels, the organization of the conditions for its implementation, responsibility for achieving results

**Brief program description:**

**1 Goals**

Training of highly qualified scientific, pedagogical and managerial personnel with methodological knowledge and professional competencies in making innovative decisions, to analyze and forecast the results of research activities in the field of transport flow and process management

**2** The labor activity of a graduate can be carried out in international, state, research, scientific and pedagogical, design engineering and design technological institutions, as well as in industrial companies, transport industry regional transport cluster organizations of the national economy, where they can carry out innovative, organizational, managerial, scientific and pedagogical activity in the field of transport services.

**3 Objects of professional activity:**

The objects of the graduate professional activity are state and non-state institutions, organizations of higher and secondary vocational education, research and design institutes, companies and organizations operating in the field of transport services design, transportation technology, as well as the design and improvement of transport systems, including transport infrastructure, transport and technological complexes for agricultural, construction, transport, military transport and transport and technological purposes.

**EDUCATIONAL PROGRAM PASSPORT**

**1. Volume and content of the program**

The term of doctoral studies is determined by the amount of mastered academic credits. Upon mastering the established amount of academic credits and achieving the expected learning outcomes for obtaining a PhD degree, the doctoral educational program is considered to be fully mastered. In scientific and pedagogical doctoral studies, at least 180 academic credits for the entire period of study, including all types of educational and scientific activities of a doctoral candidate.

Planning the content of education, the method of organizing and conducting the educational process is carried out by the university and the scientific organization by itself on the basis of credit technology of education.

The education program in the scientific and pedagogical direction implements educational programs of postgraduate education for the training of scientific and scientific-pedagogical personnel for universities and scientific

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organizations with in-depth scientific, pedagogical and research training.

The content of the PhD education program consists of:

- 1) theoretical training, including the study of cycles of basic and major disciplines;
- 2) practical training of doctoral students: various types of practices, scientific or professional internships;
- 3) research work including PhD thesis implementation;
- 4) final certification;
- 5) thesis defense in the dissertation council.

### Contents of the educational program

The content of the educational program provides for theoretical training (the study of a cycle of basic disciplines, a cycle of major disciplines), the passage of pedagogical and research practice, the performance of research work, as well as the writing and defense of a doctoral dissertation. Major disciplines allow within the framework of the educational program to conduct targeted training of personnel in the specialty for professional activities in the field of organizing transportation, traffic and operation of transport, transport systems.

#### **Objectives of the educational program:**

- providing the domestic labor market with highly qualified scientific personnel for the formation of a sustainable national economy with a high level of competitiveness on a global scale;
- the formation of scientists of a new generation capable of systemic and critical thinking in conditions of deep transformation at the worldview level;
- development of an environment that ensures the continuous development of scientific thought for the benefit of society as a whole;
- implementation of research work, organization and implementation of educational activities, taking into account the latest achievements of domestic and world science and practice;
- formation of sustainable partnerships with leading universities of near and far abroad for the purpose of open and mutually beneficial cooperation in the global educational and scientific space.

## 2 Entry Requirements

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The previous level of the applicants education is postgraduate education (programs leading to an academic master's degree and work experience of at least 1 (one) year or completed residency training in the relevant specialty and / or practical experience). The applicant must have a diploma of the established form and confirm the level of knowledge of the English language with a certificate or diplomas of the established form.

The procedure for citizens admission to the PhD degree is established in accordance with the “Model rules for admission on study in educational organizations that implement educational programs of postgraduate education”.

Enrollment of persons for profile training of PhD under the state educational order is carried out on a competitive basis, as well as paying for education at the expense of citizens' own funds and other sources. The state provides citizens of the Republic of Kazakhstan with the right to receive free postgraduate education on a competitive basis in accordance with the state educational order, if they receive education at this level for the first time.

At the "entrance" the PhD student should have all the prerequisites necessary for learning the corresponding educational program of the PhD degree. The list of necessary prerequisites is determined by the higher education institution by itself.

In the absence of the necessary prerequisites, the undergraduate is allowed to master them on a fee basis.

### **3 Requirements to complete the course and receive a diploma**

Those, who have obtained the doctoral education program and defended their doctoral thesis, with a positive decision of the dissertation councils of the university with a special status or the Committee on Control in Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan on the results of the examination, are awarded the degree of PhD profile and issued a state diploma with the Supplement (transcript).

Persons who have received a PhD degree in order to deepen scientific knowledge, solve scientific and applied problems on a specialized topic, perform a post-doctoral program or conduct scientific research under the guidance of a leading scientist chosen by the university.

Learning outcomes in the training direction 8D11301-"Transport services":

- 1) possess knowledge of methodology and basic theoretical principles, practical methods of conducting scientific research and the skills of

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- searching, analyzing and processing scientific data and information;
- 2) solve theoretical and applied research problems of transport science using methods of system analysis and forecasting the activities of transport systems, networks, processes and flows;
  - 3) be able to develop conceptual and simulation models of the activities of transport and logistics systems and networks, transport flows and logistics centers, conduct experimental research on the developed models, analyze the results of experiments and determine the optimal performance of the model;
  - 4) possess the methodology and methods of designing cargo supply networks, warehouse systems and transport and technological routes;
  - 5) carry out work on the design, improvement and reorganization of the activities of transport systems and networks, the development of projects and programs for the development of transport enterprises based on reengineering and modern research approaches;
  - 6) plan and carry out theoretical and experimental research on the management of transport enterprises, networks and flows using modern information technologies;
  - 7) perform patent search, study and analyze scientific and technical information, domestic and foreign experience on the topic under study;

A graduate who has mastered the doctoral program must have professional competencies corresponding to the types of professional activities that the doctoral program is focused on:

*in the field of research activities:*

- the ability to responsibly and purposefully solve problems or problems of a theoretical or applied nature by integrating the fundamental sections of science and specialized knowledge obtained during the development of the doctoral program;
- the ability to individually conduct experimental research in the transport field, analyze and critically evaluate the results of their own scientific research, as well as leading specialists and scientists in the field of research;
- the ability, based on the latest theoretical, methodological and technological achievements of domestic and foreign science, to create and investigate models of the studied objects of the transport industry;

*in the field of – research and production activities:*

- the ability to independently carry out production and research and production laboratory and interpretation work in solving practical problems;
- the ability to professionally operate modern laboratory equipment and

instruments in the field of transport processes and technologies;

*in the field of project activities:*

– willingness to design transport and logistics networks, transportation routes, logistics infrastructure facilities;

- the ability to design strategic research and development work in solving problems in the transport industry;

*in the field of organizational and managerial activities:*

- the ability to organize and manage research activities of varying degrees of complexity in solving strategic and systemic problems of the transport industry;

- readiness for mutually beneficial cooperation with strategic scientific partners on the basis of regulatory documents in the planning and organization of research work;

*in the field of scientific and pedagogical activity:*

- the ability to determine the goals of training activities and plan adequately for them the process of training in the transport services specialty;

- readiness and ability to use modern technologies and teaching aids in the direction of preparation of transport services in the bachelor's degree;

– the development of a professional research culture as a condition for pedagogical excellence and pedagogical creativity.

When developing a doctoral program, all general cultural and general professional competencies, as well as professional competencies related to those types of professional activities to which the doctoral program is oriented, are included in the set of required results for mastering the doctoral program.

## 4 The curriculum of the educational program

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN  
 NJSC "KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I.SATBAYEV"



**TRAINING PLAN**  
 educational program for the recruitment for 2021-2022 year  
 Educational program 8D11301 - "Transport services"  
 Group of Educational programs D147 - "Transport services"

Full-time: study      Study duration: 3 years      Academic degree: Doctor of Philosophy (PhD)

Year of study	Code	Name of disciplines	Cycle	Total Credits	Total hours	classroom volume (cl/lab/pr)	IWD (including IWD/T), in hours	Prerequisites	
1	1 semester								
	MET322	Research methods	BD UK	5	150	2/0/1	105		
	LNG305	Academic writing	BD UK	5	150	2/0/1	105		
	TRA301	Digital technologies of transport and logistics services	BD EK	5	150	2/1/0	105		
	TRA303	Simulation modelling of transport and logistics systems							
	TRA300	System analysis of transport systems	SD UK	5	150	2/0/1	105		
	TRA302	Reengineering in transport logistics	SD EK	5	150	2/0/1	105		
TRA304	Methodology for the design of transport and logistics systems and processes								
<b>Total:</b>				<b>25</b>					
2	3 semester								
	AAP345	Doctoral student research work, including internship and doctoral dissertation	SRWD	24					
	AAP355	Research practice	SD	10			-		
<b>Total:</b>				<b>34</b>					
3	5 semester								
	AAP346	Doctoral student research work, including internship and doctoral dissertation	SRWD	25					
							-		
<b>Total:</b>				<b>25</b>					
2 semester									
AAP345	Doctoral student research work, including internship and doctoral dissertation		SRWD	24					
AAP350	Pedagogical practice		BD	10					
<b>Total:</b>				<b>34</b>					
4 semester									
AAP346	Doctoral student research work, including internship and doctoral dissertation		SRWD	25					
<b>Total:</b>				<b>25</b>					
6 semester									
AAP346	Doctoral student research work, including internship and doctoral dissertation		SRWD	25					
ECA303	Writing and defending a doctoral dissertation		FC	12					
<b>Total:</b>				<b>37</b>					

The number of credits for the entire period of study	
Disciplines cycles	Credits
Cycle of general disciplines	0
Cycle of basic disciplines (BD UK, BD EK)	25
Cycle of special disciplines (SD UK, SD EK)	20
<b>Total theoretical training:</b>	<b>45</b>
SRWD	123
Writing and defending a doctoral dissertation	12
<b>TOTAL:</b>	<b>180</b>

The decision of the Academic Council of KazNTU named after K.I.Satbayev  
 Decision of the Academic Council of the IMandIE Institute

Vice-Rector for Academic Affairs  
 Director of the IMandIE  
 Head of Department of TMTandL  
 Representative of the Specialty Council from employers

B.A.Zhaultikov  
 K.B.Rysbekov  
 K.K.Yelemessov  
 M.K.Azimbekov

Protocol No. 3 from 25.06.2021y.  
 Protocol No. 12 from 02.06.2021y.



## 5 Descriptors of the level and volume of knowledge, skills, abilities and competencies

The third level descriptors within the framework of the Comprehensive Qualifications Framework of the European Higher Education Area (QF-EHEA) are reflect the learning outcomes that characterize the learner’s abilities:

1) demonstrate a systematic understanding of the field of study, mastering the skills and research methods used in the field of automation, robotics, artificial intelligence and automated control;

2) demonstrate the ability to think, design, implement and adapt the essential research process with a scientific approach;

3) to contribute by own original research to the expansion of the boundaries of the scientific field, which deserves publication at the national or international level;

4) critically analyze, evaluate and synthesize new and complex ideas;

5) communicate their knowledge and achievements to colleagues, the scientific community and the general public;

6) to contribute in progress in the academic and professional context to the technological, social or cultural development of society based on knowledge.

## 6 Competencies upon completion of training

### 6.1 Requirements for key competencies of doctoral graduates:

*have a knowledge:*

- about the role of science and education in shaping the public world outlook;
- about ethical standards in the professional activities of higher education;
- about modern conditions for the formation and development of institutional relations of social structures of the global society;
- about current trends in the development of scientific knowledge;
- about topical methodological and philosophical problems of natural sciences;

*know and understand:*

- methodology and methods of scientific knowledge;
- methodological principles for constructing programs of socio-economic and natural science disciplines;
- the main documents regulating the pedagogical activity of a teacher at a university in the conditions of the modern paradigm of education;
- psychological techniques and methods of influencing students in order to improve the efficiency and quality of education;

*be able to:*

- carry out scientific activities in the paradigm of modern trends in the global and national educational space in accordance with the modern national education strategy;

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- to organize the process of education and upbringing as a dynamic system in accordance with the modern strategy of education;
- critically analyze and evaluate modern scientific achievements, generate new ideas in solving research and practical problems, including in interdisciplinary areas;
- to design and carry out comprehensive research, including interdisciplinary ones, based on a holistic systemic scientific outlook using knowledge in the field of transport services and traffic flows;
- to implement scientific projects in the work of kazakh and international research teams to solve scientific and scientific and educational problems;
- solve standard tasks of professional activity using information and communication technologies;
- think strategically and creatively, as well as creatively approach solving non-standard problems and situations;
- to systematize and summarize the results of research and analytical work in the form of a dissertation, scientific article, report, analytical note, etc.;

*to be skilled for:*

- use a creative approach to professional pedagogical and scientific activities to apply interactive teaching methods;
- implementation of educational and pedagogical activities on credit technology of education;
- plan and solve problems of own professional and personal development;
- independently develop and implement projects in the field of traffic flows and processes, as well as readiness for self-education and self-improvement in the professional field;
- interaction with public institutions and people, as well as the possession of professional communication and behavior techniques;
- oratory, consistent and logical presentation of their ideas in oral and written form;

*be competitive:*

- в области методологии фундаментальных и прикладных научных исследований;
- в сфере управленческой, научной и научно-педагогической деятельности в образовательных учреждениях высшей школы;
- в развитии глобальной транспортной системы, проблемы построения глобальных транспортных коридоров и цепей поставок транснациональных корпораций и финансово-промышленных групп;
- in the development and organization of investment and innovation projects in the transport industry;
- in assessing the current state and prospects for the development of scientific thought in the field of transport logistics using information, computer and

network technologies for the study of professional tasks.

#### 6.2 Requirements for Scientific Research Work of the PhD Student studied in the PhD program:

- 1) Compliance with the main aspects of the doctoral education program, where defends the PhD dissertation;
- 2) relevant and contains scientific novelty and practical significance;
- 3) based on modern theoretical, methodological and technological achievements of science and practice;
- 4) based on modern methods of processing and interpreting data using computer technology;
- 5) performed using modern scientific research methods;
- 6) contains scientific-research (methodical, practical) sections on the main defending provisions.

#### 6.3 Requirements for the organization of practices:

The practice is carried out in order to develop practical skills of scientific, pedagogical and professional activities.

PhD education program includes:

- 1) pedagogical practice in the cycle of basic disciplines - at the university;
- 2) research in the cycle of major disciplines - at the university;

Pedagogical practice is carried out in order to form practical skills in teaching and learning methods. At the same time, doctoral students are involved in undergraduate or graduate studies at the discretion of the university. In the period of pedagogical practice, PhD students, if necessary, are invited to conduct classes in masters and bachelor programs.

The research practice of a doctoral student is carried out in order to study the latest theoretical, methodological and technological achievements of domestic and foreign science, modern methods of scientific research, processing and interpretation of experimental data.

## 7 Diploma Supplement by the standards of ECTS and MES RK

The Supplement is developed according to the standards of the European Commission, Council of Europe and UNESCO / CEPES. This document is for academic recognition only and does not constitute official proof of education. Without a diploma of higher education it is not valid. The purpose of completing the European Supplement is to provide sufficient information about the diploma owner, the qualifications obtained by him, the level of this qualification, the content of the training program, the results, the functional purpose of the qualification, as well as information about the national education system. In the application model, which will be used for the transfer of estimates, the European system of transfer or credit transfer (ECTS) is used.

The European Diploma Supplement provides an opportunity to continue education in foreign universities, as well as to confirm national higher education for foreign employers. When traveling abroad for professional recognition it will be required additional legalization of the diploma of education. The European Diploma Supplement is completed in English upon individual request and is issued free of charge.

CODE - MET322

Credit - 2/0/1/2

### GOALS AND OBJECTIVES OF THE COURSE

The purpose of the course is to master knowledge and develop the ability of doctoral students in the methodology of the formation of scientific theories, approaches to solving fundamental, applied problems, innovations and innovative processes.

#### COURSE OBJECTIVES:

Based on the analysis, systematization and generalization of the results of scientific research in the field of traffic flows and processes, develop doctoral students' ability to apply their knowledge in the process:

- fundamental research;
- applied research;
- development of geostrategic infrastructure transport projects at the international and national levels;

The objectives of the course are:

- study of methodologies and research methods in the transport system;
- studying the possibilities of modern information technologies and systems for the implementation of research in the transport industry;
- the formation of logical thinking in doctoral students, which is necessary for using the methodological foundations of conducting research, as well as conducting a comprehensive research project;
- development of analytical abilities, and the formation of a systematic vision of the processes taking place in the transport industry.

### - KNOWLEDGE, SKILLS AFTER COMPLETING THE COURSE

At the end of the course, doctoral students must

*Know:*

- patterns and trends in the development of social and natural sciences.
- the methodology of scientific research.
- the methodology of fundamental scientific research;

*Be able to:*

- apply theoretical and practical knowledge in the process of conducting independent scientific research,

- process fundamental and current scientific information in the chosen direction,
- independently draw generalizations and scientific conclusions.

*Master:*

In the process of mastering the discipline, doctoral students will acquire the following competencies aimed at developing:

- the ability to use quantitative and qualitative methods for research and management of transport processes;
- the ability to independently master new research methods, to change the scientific and research and production profile of their professional activities;
- skills in general scientific and specialized methods of scientific research and its essence;
- the ability to prepare analytical materials for analysis, synthesis, systematization and classification of the research results.

## ACADEMIC WRITING

CODE - LNG305

Credit - 5 (0/0/3)

### GOALS AND OBJECTIVES OF THE COURSE

Development of skills and competencies in the field of scientific research and the formation of skills in writing research papers.

### COURSE OBJECTIVES:

- The objectives of the discipline are to familiarize doctoral students with the basic requirements for writing in a scientific language;
- formation of skills for expressing reasoned ideas and opinions in writing, using professional vocabulary and terminology;
  - development of text editing skills;
  - training in the methods of correct and logical construction of the scientific research structure;
  - preparation for writing articles, scientific papers and annotations;
  - the study of techniques for a free and reasoned presentation of ideas on a scientific professional problem.

### BRIEF DESCRIPTION OF THE DISCIPLINE

The course is designed to update and develop knowledge in the field of scientific research and writing qualification papers. The study of the course is aimed at developing and improving competencies in the field of written scientific communication, which provides a high level of doctoral training necessary for effective communication in an academic environment.

### KNOWLEDGE, SKILLS AND SKILLS TO BE GROWN AT THE END OF THE COURSE

As a result of mastering the discipline, the doctoral candidate must:

Know:

- grammatical phenomena necessary for written presentation, translation and editing;
- complex syntactic constructions of scientific and business speech; recognizes the effective features of academic writing;
- basic terms, concepts and categories of the specialty language;
- various ways of putting forward hypotheses and constructing evidence.

Be able to:

- apply the acquired knowledge in the preparation and writing of a research paper in a written format;
- freely read the original literature of the relevant branch of knowledge in a foreign

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language;

- work with bibliography;
- formalize information extracted from foreign sources in the form of a translation, abstract, annotation;
- to compare the content of different sources of information on the problem of scientific research, to critically evaluate the opinion of the authors;
- correctly organize their own ideas, clearly and convincingly substantiate, and competently express them in writing.

Posses:

- the language of the specialty (professional conceptual and terminological apparatus) in the amount of at least 4000-4500 units. And 3000-3300 units are neutral and scientific vocabulary in a wide and narrow profile, 1200 units of vocabulary associated with the chosen specialty for the development of oral speech;
- the main methods of reading original literature in the specialty of various styles and genres;
- the style of written communication associated with the scientific work of a doctoral student;
- culture of thinking, ability to generalize and analyze information;
- skills of scientific text analysis.



DIGITAL TECHNOLOGIES OF TRANSPORT AND LOGISTICS SERVICES  
 CODE - TRA301  
 Credit - 5 (2/0/1)

**GOALS AND OBJECTIVES OF THE COURSE**

Mastering the options for using modern information systems and technologies to study the use of transport and logistics systems, logistics processes and supply chain management.

**THE OBJECTIVES OF THE COURSE ARE:**

- obtaining theoretical knowledge in the field of modern electronic technologies in transport systems;
- assessment of the digital model development prospects;
- studying the technology of electronic document management in transport.

**BRIEF DESCRIPTION OF THE COURSE**

Information systems and innovative technologies in the management of transport systems and flows. Digital transformation of business processes of international transport systems. New technological approaches to the organization of international transport systems. Systems of satellite communication and navigation, search and monitoring of commodity-transport flows. RFID systems. BigData, Blockchain, Internet Of Things technologies. Key issues of digital reengineering of transport processes. Technological approaches to the formation of the Unified Information Environment of International Transport Systems.

**KNOWLEDGE, SKILLS, SKILLS UNTIL COMPLETING THE COURSE**

As a result of studying the discipline, the doctoral student must:

*know:*

- the place of transport services types in the modern paradigm of the digital economy and the consideration of processes in transport;
- mechanisms for building a unified information environment in transport;

*be able to:*

- describe the principles of electronic interaction implementation in international transport systems;
- to design options for the formation of data aggregation of digital management services in transport;
- distinguish between digital transformation processes and automation processes (informatization, digitalization);

*master the skills:*

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- illustrations, explanations and evaluation of the fundamental features of real projects of electronic services in transport;
- implementation of new approaches to the implementation of electronic interaction in international transport systems.

**SIMULATION MODELLING OF TRANSPORT AND LOGISTICS SYSTEMS**  
 CODE – TRA 303  
 Credit - 5 (2/1/0)

**GOALS AND OBJECTIVES OF THE COURSE**

Acquisition of knowledge by doctoral students of the theory of simulation modeling: generation of options, design of experiments, comparison of options, evaluation of options, choice of options.

**THE OBJECTIVES OF STUDYING THE COURSE ARE:**

- obtaining theoretical knowledge in the field of simulation modeling methodology;
- obtaining practical skills in building conceptual and simulation models;
- obtaining practical skills for conducting experiments with simulation models.

**BRIEF DESCRIPTION OF THE COURSE**

Construction of conceptual and simulation models of the transport and logistics system, transport and logistics infrastructure facilities. Simulation modeling methods: discrete-event modeling; system dynamics; agent modeling. Simulation studies in the field of transport and industrial logistics:

- problem analysis;
- data collection;
- development of conceptual and simulation models;
- planning, execution and evaluation of the experiment;
- interpretation and presentation of results.

**KNOWLEDGE, SKILLS, SKILLS UNTIL COMPLETING THE COURSE**

- Analysis of the main methods of structuring measurement signals
- Solve forecasting problems in diagnostic systems
- Creating a predicate model
- Modernization of diagnostic systems based on big data and the use of modern intelligent technologies.

As a result of studying the discipline, the doctoral student must:

*know:*

- methodology for constructing conceptual and simulation models;
- methods and technologies of simulation modeling;

be able to:

- build a conceptual model of the investigated object;
- apply simulation methods;
- implement simulation models using Anylogic simulation systems;
- to analyze the simulated logistics processes;
- to conduct simulation experiments, statistical analysis and interpretation of the

simulation experiment results.

*Master the skills:*

- structuring and description of logistics processes in the system under study;
- application of simulation methods and tools for solving applied problems of logistics and supply chain management;
- making managerial decisions based on the results of a simulation study.

## SYSTEM ANALYSIS OF TRANSPORT SYSTEMS

CODE – TRA300

Credit - 5 (2/0/1)

### GOALS AND OBJECTIVES OF THE COURSE

formation of theoretical knowledge on the system analysis of transport systems and practical skills for solving system problems of transport processes.

### THE OBJECTIVES OF STUDYING THE COURSE ARE:

- study of methods for forecasting the demand for transport services with various characteristics of the consumer field and the degree of certainty of the relationship with consumers;
- study of the influence of entropy on the results of the study;
- study of methods of economic analysis of infrastructure projects of the transport industry at the national and international levels
- mastering the theoretical foundations of system analysis, theory of systems, transport systems, methods of making managerial decisions in the engineering of transport systems at the macro and meso levels.

### BRIEF DESCRIPTION OF THE COURSE

The structure and patterns of functioning of systems, including transport systems, methods and models of systems theory, information approach to systems analysis, analysis of the external and internal environment of the transport system, methods and tools for forecasting trips, methods for analyzing alternative traffic organization projects.

### KNOWLEDGE, SKILLS, SKILLS UNTIL COMPLETING THE COURSE

As a result of studying the discipline, the doctoral student must:

*know:*

- the regularity of the functioning of systems and their development;
- methods and models of systems theory;
- methods and tools for analyzing transport systems and predicting trips;

*be able to:*

- to conduct a systematic analysis of transport processes in a rapidly changing environment of the functioning of the global value chain;
- determine the stability and reliability of transport systems;
- predict the flow of trips under different demand conditions;
- justify the effectiveness of infrastructure projects of transport systems

*posses:*

- theoretical knowledge, practical skills for system analysis of transport systems at micro, macro, meso levels in the course of scientific research;
- methods for evaluating alternative projects of transport systems;
- means of setting tasks with a large initial uncertainty of the problem situation;

## REENGINEERING IN TRANSPORT LOGISTICS

CODE - TRA302

Credit - 5 (2/0/1)

### GOALS AND OBJECTIVES OF THE COURSE

The purpose of the discipline is formation of theoretical knowledge on reengineering in logistics and its application to the tasks of transport logistics. The study of processes in the main and auxiliary subsystems of logistics in terms of reengineering, modern methods of modeling these processes using CASE technologies. Mastering the process approach. Development of an information model of the object's logistics process. A particular solution to this complex work is the construction of information models of logistics functions, procedures and operations.

### OBJECTIVES OF THE DISCIPLINE

- mastering the theoretical foundations of reengineering, the principles of modeling the main and auxiliary subsystems of logistics from the point of view of reengineering using CASE technologies, techniques and methods of the process approach when modeling the activity of transport systems at macro and meso levels.

### BRIEF DESCRIPTION OF THE COURSE

Transport logistics: principles of the process approach of research and modeling, modern CASE technologies, building information models of logistics functions, procedures and operations of transport logistics, assessing the efficiency and reliability of the functioning of transport activities through the prism of a business process, as well as the set of business processes itself. Business process standards.

### KNOWLEDGE, SKILLS, SKILLS UNTIL COMPLETING THE COURSE

As a result of studying the discipline, the doctoral student must:

*know:*

- theory, techniques and methods of the process approach;
- modern CASE technologies;
- fundamentals of the analysis of the transport system in terms of decomposing the activity of an object into business processes, calculating their indicators, assessing the costs and results of the activities of a transport organization and the transportation process at macro and meso levels.

*be able to:*

-scientifically substantiate the process decomposition of the transport organization activities;

Разработано:	Рассмотрено: заседание УС Института	Утверждено: УМС КазННТУ	Страница 23 из 32
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- classify the tasks of transport logistics and scientifically substantiate the choice of the composition and content of business processes;
- calculate their indicators, estimate the costs and results of the transport organization as a set of business processes;

*posses:*

- theoretical knowledge, practical skills and tools for reengineering the activity of transport systems at the micro, macro, meso level in conducting applied research and managing business processes based on process flow;
  - tools for carrying out a process approach for studying the activity of an object (specifically, in the Process Modeler r7 environment);
- create diagrams of business process models: IDEF0, IDEF3, DFD of logistics processes;
- automatically generate research results using CASE technologies;
  - the skills of managing an interdisciplinary team to solve the problems of transport logistics based on a process approach.



METHODOLOGY FOR THE DESIGN OF TRANSPORT AND LOGISTICS SYSTEMS AND PROCESSES

CODE - TRA304

Credit - 5 (2/0/1)

GOALS AND OBJECTIVES OF THE COURSE

The purpose of the course is the formation of knowledge and skills for the study, design and modeling of transport processes and systems

Objectives of the discipline is:

- to mastering the methodological foundations of designing transport processes;
- development of methods for designing logistics networks for the transportation of goods, storage systems, objects of transport and logistics infrastructure, transportation routes.

BRIEF DESCRIPTION OF THE COURSE

Methodological bases of designing transport processes and systems. Information support of design. Modeling of transport processes. Methodology and methods for designing cargo supply chains, storage systems, transport capacities, transport and technological routes; planning, execution and controlling of resource flows (goods, materials, information, etc.) in complex transport and logistics systems and supply chains; problems of added value management in the production of transport services for the end consumer; problems of logistical coordination in transport systems. Designing urban/regional road freight routes.

KNOWLEDGE, SKILLS, SKILLS UNTIL COMPLETING THE COURSE

As a result of studying the discipline, the doctoral student must:

*know:*

- methods and methodology for designing logistics systems and their development;
- methods and tools for designing transport systems and traffic flows;

*be able to:*

- design transport and logistics networks, transportation routes, logistics infrastructure facilities;
- determine the parameters of transport systems;
- justify the effectiveness of infrastructure projects of transport systems;
- theoretical knowledge and practical skills for the design of transport systems in the course of scientific research;
- methods for evaluating alternative projects of transport and logistics systems;
- reasonably justify the choice of method for the design of transport systems and processes.

DEFENSE OF DOCTORAL DISSERTATION

CODE - ECA303

CREDIT –12

The purpose of the doctoral dissertation is to assess the level of scientific-theoretical and research-analytical skills of the doctoral student, the established professional and managerial competencies, readiness to perform professional tasks independently and his training in accordance with professional standards and doctoral programs.

BRIEF DESCRIPTION

The doctoral dissertation is an independent research work of a doctoral student, in which the set of theoretical rules can be classified as a new scientific achievement, or the solution of a scientific problem or the introduction of scientifically based technical, economic or technological solutions that make a significant contribution to economic development.

Doctoral dissertation is the result of research / experimental research work of a doctoral student conducted during the entire period of study.

The defense of a doctoral dissertation is the final stage of doctoral student's training. The doctoral dissertation must meet the following requirements:

- the topic of the dissertation should be related to the priorities of science development and / or government programs or programs of basic or applied research.
- the content of the dissertation, the goals and objectives, the obtained scientific results must strictly correspond to the topic of the dissertation.
- the dissertation is performed in accordance with the principles of Independence, internal unity, scientific novelty, reliability and practical value.

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