

**NJSC "Kazakh National Research Technical University named after K.I. Satbayev»**

**Institute of Metallurgy and Industrial Engineering  
Department of «Technological machines, transport and logistics»**

**EDUCATIONAL PROGRAM**

**«TECHNOLOGY AND AUTOMATION OF TRANSPORT AND TRANSPORT SYSTEMS»**

**(profile direction (1,5 years))**

**Master of technics and technology in the educational program «7M07120 -  
Technology and automation of transport and transport systems»**

2<sup>st</sup> edition

in accordance with the State Higher Education Standard of 2018

**Almaty 2020**

Разработано:	Рассмотрено: заседание УС Института	Утверждено: УМС КазННТУ	Страница 1 из 43
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**The program is compiled and signed by the parties:**

**From KazNTU them K.Satbayev:**

1. Head of the Department
2. Director of the Institute
3. The Chairman of the Department of UMG

  
  
**К.К. Елемесов**  
**К.К. Елемесов**  
**R. A. Kuzbagarov**

**From employers:**

1. Representative of the Specialty Council  
«Transport Engineering»,  
Director LLP «Жәкен Қалша»

  
**M.K. Azimbekov**

**From a partner university:**

Approved at the meeting of the Educational and Methodological Council of the Kazakh National Research Technical University named after K. I. Satbayev. Protocol N.4 for 14 «01» 2020

**Qualification:**

Level 7 of the National Qualifications Framework: a well-erudite specialist with fundamental scientific training, who knows the methodology of scientific and pedagogical creativity, modern information technologies, prepared for professional work and able to solve managerial tasks.

**Professional competence:** ground transport, transport equipment and technologies

**Short description of the program:**

1. The purpose of the educational program

The aim of this program is to improve the qualifications of bachelors in order to successfully solve industrial research and development tasks in the field of automation and control of transport technological processes and production facilities.

2 Types of employment

Labor activity in research, scientific and pedagogical, design and engineering and design and technological organizations, as well as divisions of industrial enterprises, covering the life cycle stages of automation systems for technological processes and production, the transport sector of the national economy.

3 Objects of professional activity

Objects of professional activity of a graduate, research and design institutes, firms and organizations (enterprises), involved in the technology of transportation, as well as designing, manufacturing, exploitation of ground-vehicle mobile machine, the mobile technology car and technological transport a range of agricultural, page, transport, military-transport and transport-technological purpose, design and regulatory and technical documentation, automation of transport and transport systems, methods and means of testing and control of quality transport products.

## EDUCATIONAL PROGRAM PASSPORT

### 1 Volume and content of the program

The duration of the master's degree program is determined by the amount of academic credits completed. Upon completion of the set amount of academic credits and achievement of the expected learning outcomes for obtaining a master's degree, the Master's degree program is considered fully developed. There are 90 academic credits in the specialized master's program with a study period of 1.5 years.

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

The Master's degree program in the profile direction implements educational programs of postgraduate education for the training of managerial personnel with in-depth professional training.

The content of the Master's degree program consists of:

- 1) theoretical training, including the study of cycles of basic and core disciplines;
- 2) practical training of undergraduates: various types of internships, scientific or professional internships;
- 3) experimental research work, including the implementation of a master's project, – for a specialized master's degree;
- 4) final certification.

The content of the OP

Thus, the completion of the educational program provides for theoretical training (studying the cycle of basic disciplines, the cycle of profile disciplines), passing research internships and internships, performing research work, as well as writing and defending a master's thesis. Within the framework of educational programs, specialized disciplines allow conducting targeted training of personnel in the specialty for professional activities in the field of land transport, transport equipment and technology, transportation organization, transport movement and operation, logistics and their automation.

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

- providing quality assurance of education in the specialty "Technology and automation of transport and transport systems" due to the introduction of mandatory requirements for the level of training of undergraduates and educational activities of universities;
- regularization of the rights of subjects of educational activity;
- improving the objectivity and informativeness of the assessment of undergraduates' training and the quality of educational programs;
- creating conditions for academic mobility of undergraduates;
- ensuring the functioning of the unified educational space of Kazakhstan;

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- ensuring the recognition of documents of the Republic of Kazakhstan on awarding the academic degree "Master" in the international educational space and in the international labor market.

## 2 Entry Requirements

The previous level of education of applicants is higher professional education (bachelor's degree). The applicant must have a diploma of the established standard and confirm the level of English language proficiency with a certificate or diplomas of the established standard.

The procedure for admission of citizens to the master's program is established in accordance with the Standard Rules for Admission to study in Educational organizations that implement educational programs of postgraduate education".

The formation of a contingent of undergraduates is carried out by placing a state educational order for the training of scientific and pedagogical personnel, as well as paying for training 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 this level of education for the first time.

At the "entrance", a master's student must have all the prerequisites necessary for mastering the relevant master's degree program. The list of necessary prerequisites is determined by the higher education institution independently.

In the absence of the necessary prerequisites, the master's student is allowed to master them on a paid basis.

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

**Awarded degree/qualifications:** A graduate of this educational program is awarded an academic degree "Master" (Master of Engineering and Technology) in the field of "Transport technology and automation of transport and transport systems".

A graduate who has completed Master's degree programs must have the following general professional competencies:

- ability to independently acquire, comprehend, structure and use new knowledge and skills in professional activities, develop their innovative abilities;
- ability to independently formulate research goals, establish the sequence of solving professional problems;
- ability to apply in practice knowledge of fundamental and applied sections of disciplines that determine the focus (profile) of the master's program;

- the ability to professionally select and creatively use modern scientific and technical equipment to solve scientific and practical problems;
- ability to critically analyze, present, defend, discuss and disseminate the results of their professional activities;
- proficiency in the preparation and execution of scientific and technical documentation, scientific reports, reviews, reports and articles;
- willingness to lead a team in the field of their professional activities, tolerating social, ethnic, confessional and cultural differences;
- readiness for communication in oral and written forms in a foreign language to solve problems of professional activity.

A graduate program who has completed a master's degree program must have professional competencies that correspond to the types of professional activities that the master's program is focused on:

- *production activities*:
  - ability to independently carry out production, field and laboratory work and interpretative work in solving practical problems;
  - ability to professionally operate modern field and laboratory equipment and devices in the field of the master's degree program;
  - ability to use modern methods of processing and interpreting complex information to solve production problems;
- *project activity*:
  - ability to independently draw up and submit research and production projects;
  - readiness to design complex research and production works while solving professional tasks;
- *organizational and managerial activities*:
  - readiness to use practical skills in organizing and managing research and production activities in solving professional problems;
  - readiness for practical use of regulatory documents in planning and organizing scientific and production works;

When developing a master's degree program, all general cultural and general professional competencies, as well as professional competencies related to the types of professional activities that the master's program is focused on, are included in the set of required results of the master's program.

## 4 Work curriculum of the educational program

### 4.1. Duration 1.5 years

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РЕСПУБЛИКИ КАЗАХСТАН  
 КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ

**APPROVED**  
**Rector KazNRTU named after K. I. Satpayev**  
**I. K. Beisembetov**  
**2020**

**MODULAR CURRICULUM**

Education program: 7M07120- **Technology and automation of transport and transport systems**

Form of study: full      Duration of training: 1,5 years      Academic degree: *Master of technics and technology*

The cycle	code	Name of disciplines	Semester	Acad. credits	lec.	lab.	prac	IWS	Type of contro	Chair
<b>Profile training module</b>										
<b>Basic disciplines (BD) (26 credits)</b>										
<b>University component (16 credits)</b>										
BD	LNG202	Foreign language (professional)	1	6	0	0	3	3	Exam	EL
BD	MNG274	Management	1	6	0	0	3	3	Exam	SECPM
BD	HUM204	Psychology of management	1	4	1	0	1	2	Exam	SECPM
<b>Choice component (10 credits)</b>										
BD	TRA225	Methodology of Transport Science	1	4	1	0	1	2	Exam	TMTaL
BD	TEC218	Automation of technological processes in the industry								
BD	TRA226	Information and computer technology in science and education	1	6	2	1	0	3	Exam	TMTaL
BD	TRA205	Information support systems for design, manufacture and maintenance of ground transport and technological machines								
<b>Major disciplines (MD) (36 credits)</b>										
<b>Choice component (CC)</b>										
<b>Automation and simulation module</b>										
MD	TRA227	Logistic tasks modeling	2	6	2	0	1	3	Exam	TMTaL
	TRA212	Supply Chain Modeling								
MD	TRA206	Automated systems for solving logistics problems	2	6	2	1	0	3	Exam	TMTaL
	TRA466	Intelligent diag-nostics and pre-dictive analysis of the condition of vehicles								
<b>Transport technology module</b>										
MD	TRA204	Research and testing of transport and transport-technological machines	2	6	2	1	0	3	Exam	TMTaL
	TEC533	Innovative methods for repairing machine parts								
MD	TRA207	Automation systems for road transport	2	6	2	0	1	3	Exam	TMTaL
	TRA214	Modern transportation technologies in supply chains								

MD	TRA219	CALS technologies	2	6	2	0	1	3	Exam	TMTaL
	TRA221	Supply Chain Design for Production Systems								
MD	TRA217	Technical means of the transport system	2	6	2	0	1	3	Exam	TMTaL
	TRA209	Electric cars								
<b>Practice-oriented module</b>										
MD	AAP246	Work placement	3	9					Report	TMTaL
<b>Experimental Research Module (18 credits)</b>										
MSER	AAP221	Master's student experimental research work, including internship and master's project implementation	2	4					Report	TMTaL
MSSR	AAP220	Master's student experimental research work, including internship and master's project implementation	3	14					Report	TMTaL
<b>Module of final attestation (12 credits)</b>										
FA	ECA206	Registration and defense of the master's thesis	3	12					Defense of dissertation	TMTaL
<b>Total</b>			<b>101</b>							

Vice-Rector for Research and Academic Affairs



D.K. Nauryzbayeva

Chair of the APC



K.B. Tulegenova

Director of the Institute of Metallurgy and Industrial Engineering



K.K. Elemessov

Head of the Department of technological machines, transport and logistics



K.K. Elemessov



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

Requirements for the master's degree level are determined on the basis of the Dublin Descriptors of the second level of higher education (Master's degree) and reflect the mastered competencies expressed in the achieved learning outcomes.

Learning outcomes are formulated both at the level of the entire master's degree program, and at the level of individual modules or academic discipline.

Descriptors reflect learning outcomes that characterize the student's abilities:

1) demonstrate developing knowledge and understanding in the field of transport engineering and technology, under study based on advanced knowledge in the field of technology and automation of transport and transport systems, while developing and / or applying ideas in the context of research;

2) apply your knowledge, understanding and abilities at a professional level to solve problems in a new environment, in a broader interdisciplinary context;

3) collect and interpret information to form judgments based on social, ethical and scientific considerations;

4) clearly and unambiguously communicate information, ideas, conclusions, problems and solutions, both to specialists and non-specialists;

5) training skills necessary for independent continuation of further training in the field of "Transport technology and automation of transport and transport systems".

## 6 Competences to complete the training

6.1 Requirements for key competencies of graduates *of a specialized master's degree program*, must:

1) *have an idea*:

- on current trends in the development of scientific knowledge;
- on current methodological and philosophical problems of natural (social, humanitarian, economic) sciences;

- on contradictions and socio-economic consequences of globalization processes;
- on the current state of the economic, political, legal, cultural and technological environment of the global business partnership;

- about the organization of strategic enterprise management, innovation management, leadership theories;

- about the main financial and economic problems of functioning of enterprises.

2) *know*:

- methodology of scientific knowledge;

- main drivers of changes in the structure of the economy;

- features and rules of investment cooperation;

– at least one foreign language at a professional level that allows you to conduct scientific research and practical activities.

*3) be able to:*

- apply scientific methods of cognition in professional activities;
- critically analyze existing concepts, theories, and approaches to the study of processes and phenomena;
- integrate the knowledge gained in different disciplines and use it to solve analytical and managerial tasks in new and unfamiliar conditions;
- conduct microeconomic analysis of the company's economic activity and use its results in enterprise management;
- apply new approaches to the organization of marketing and management in practice;
- make decisions in complex and non-standard situations in the field of organization and management of the economic activity of an enterprise (firm);
- apply in practice the norms of the legislation of the Republic of Kazakhstan in the field of regulation of economic relations;
- think creatively and take a creative approach to solving new problems and situations;
- carry out information-analytical and information-bibliographic work with the involvement of modern information technologies;
- summarize the results of experimental research and analytical work in the form of a master's thesis, article, report, analytical note, etc.

*4) have skills:*

- solutions to standard scientific and professional tasks;
- scientific analysis and solution of practical problems in the organization and management of economic activities of organizations and enterprises;
- research problems in the field of management and marketing and use the results obtained to improve enterprise management methods;
- professional communication and cross-cultural communication;
- public speaking skills, correct and logical presentation of their thoughts in oral and written form;
- expand and deepen the knowledge necessary for daily professional activities and continuing education in the doctoral program;
- use of information and computer technologies in the sphere of professional activity.

*5) be competent:*

- in the field of research methodology in the specialty;
- in the field of modern problems of the world economy and the participation of national economies in world economic processes;
- in the organization and management of the company's activities;

- in the implementation of industrial relations with various organizations, including public service bodies;
- in ways to ensure constant updating of knowledge, expansion of professional skills and abilities.

B – Basic knowledge, skills and abilities

B1 – Possession of basic knowledge in the field of natural science and pedagogical disciplines that contribute to the formation of a highly educated person with a broad outlook and a culture of thinking;

B2 – Possession of skills in handling modern equipment, ability to use information technologies in the field of professional activity;

B3 – Proficiency in acquiring new knowledge necessary for daily professional activities and continuing education in the doctoral program;

B4 – Proficiency in one of the foreign languages at a level higher than conversational.

P – Professional competencies:

P1 – Possession of a wide range of theoretical and practical knowledge in the professional field;

P2 - Readiness to participate as part of a team of performers in the development of transport and transport-technological processes, their elements and technological documentation;

P3 – Ability to master technologies and forms of organization of diagnostics, features of maintenance and repair of transport and transport-technological machines, technical and technological equipment and transport communications, as well as the causes and consequences of termination of their operability;

P4 - Ability for computer-aided design of technological processes of maintenance and repair (parts, components and aggregates) of motor vehicles, control and design programs;

P5 – Ability to computer-aided design of technological processes of cargo transportation;

P6 – Ability to set up and operate ground transport equipment;

P7 - Ability to design the vehicle links;

P8 - Mastering the knowledge of technical conditions and rules of rational operation of transport and transport-technological machines and equipment;

P9 – Ability to assess the risk and determine measures to ensure safe and efficient operation of transport and transport-technological machines, their components and aggregates, and technological equipment;

P10 - Ability to plan and organize the operation of transport complexes in cities and regions, to organize the rational interaction of modes of transport that make up a single transport system, when transporting passengers, luggage, cargo and cargo;

P11 - Ability to organize rational interaction of various modes of transport in a single transport system and effective commercial work at the transport facility, develop and implement rational methods of working with the client;

P12 - Ability to perform technical documentation reviews, monitor and control the condition and operation of ground transport, transport infrastructure facilities, identify reserves, identify the causes of malfunctions and deficiencies in operation, take measures to eliminate them and improve the efficiency of use;

P13 - Ability to find ways to improve the quality of transport and logistics services for cargo owners, develop the infrastructure of the commodity market and distribution channels, as well as determine the parameters for optimizing logistics transport chains and links, taking into account the criteria of optimality;

P14 - Ability to develop the most efficient traffic management schemes and apply the latest vehicle traffic management technologies;

P13 – Ability to identify priorities for solving transport problems, taking into account indicators of economic efficiency and environmental safety, and use modern information technologies as a tool for optimizing management processes in the transport sector;

P14 - Ability to design logistics systems for cargo and passenger delivery, choose a logistics intermediary, carrier and freight forwarder based on a multi-criteria approach;

P15 - Ability to develop projects and implement: modern logistics systems and technologies for transport organizations, intermodal and multimodal transport technologies, optimal routing;

About – Universal, social and ethical competencies

O1 – Knowledge of the traditions and culture of the peoples of Kazakhstan and compliance with the norms of business ethics, knowledge of ethical and legal standards of conduct

O2- Be tolerant to the traditions and culture of other peoples of the world;

O3 - Understanding the basics of the legal system and legislation of Kazakhstan;

O4 - Understanding of social development trends in society, ability to adequately navigate various social situations;

O5- Awareness of social significance of your future profession, having a high motivation to perform professional activities;

O6 – Introduction of the main methods of protecting production personnel and the public from the possible consequences of accidents, catastrophes, and natural disasters;

C- Special and managerial competencies:

C1 – Self-management and control of the processes of work and training activities within the framework of the organization's strategy, policy and goals, discussion of the problem, reasoning of conclusions and competent information management;

C2 - Mastering the basics of economic knowledge, scientific ideas about management, marketing, finance, etc.;

C3 – Understanding and understanding the goals and methods of state regulation of the economy, the role of the public sector in the economy;

C4 – Ability to search, analyze and evaluate information for preparing and making managerial decisions, readiness to take responsibility for them, as well as give instructions, manage the actions of other people, taking into account the abilities, capabilities and motivation of employees;

C5 – Ability to navigate modern information flows and adapt to dynamically changing phenomena and processes in the global economy;

C6- Be flexible and mobile in various conditions and situations related to professional activities;

C7- Knowledge of the purpose, classification, design and operation principles of transport machinery and equipment;

C8- Knows how to check the technical condition and remaining life of equipment, organize preventive inspection and routine repairs;

C9- is able to perform strength calculations and calculations for determining the drive power of machines, justify their choice for given conditions and production volumes.;

C10 – He is able to take part in the calculation and design of parts and assemblies of machine-building structures in accordance with technical specifications and using standard design automation tools.

6.2 Requirements for experimental research work of a master's student in a specialized master's program:

1) corresponds to the profile of the master's degree program in which the master's project is being implemented and defended;

2) is based on modern achievements of science, technology and production and contains specific practical recommendations, independent solutions to management tasks;

3) is performed with the use of advanced information technologies;

4) contains experimental research (methodological, practical) sections on the main protected provisions.

6.3 Requirements for the organization of practices:

The educational program of the specialized master's degree program includes industrial practice in the PD cycle.

Practical training in the PD cycle is carried out in order to consolidate the theoretical knowledge gained in the course of training, acquire practical skills, competencies and professional experience in the master's degree program being taught, as well as master's best practices.

### **7 Appendix to the ECTS Diploma**

The app was developed by post-standards European Commission, Council of Europe Of Europe and UNESCO/Sepes. This document serves only for academic recognition and is not an official confirmation of the document of education. It is not valid without a higher education diploma. Purpose of filling in the form The purpose of the European application is to provide sufficient data on the diploma holder, the qualification obtained by him , the level этой of this qualification, the content of the training program, the results, the functional purpose of the qualification, as well as information on the national системе education system. The application model that will be used for transferring grades uses the European Credit Transfer or Transfer System (ECTS).

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

**Foreign language (professional)**

CODE-LNG202  
CREDIT – 6 (0/0/3)

**COURSE GOALS AND OBJECTIVES**

Thanks to these courses, you will master specific terminology, be able to read specialized literature, and gain the knowledge necessary for effective oral and written communication in a foreign language in your professional activities.

**BRIEF DESCRIPTION OF THE COURSE**

In the course of training, students gain knowledge of a foreign language, including proficiency in specialized vocabulary, necessary for effective oral and written communication in a foreign language in their professional activities. Practical tasks and methods for developing the required language skills in the learning process includes: case studies and role-playing games, dialogues, discussions, presentations, listening tasks, working in pairs or in groups, performing various written tasks, grammar tasks and explanations.

**KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE**

As a result of mastering the discipline, the student will develop a professional lexical vocabulary, possess the skills of effective communication in a professional environment, the ability to correctly express thoughts in oral and written speech, understand specific terminology and read specialized literature.

**Management**

КОД – MNG274

КРЕДИТ – 6 (0/0/3)

**COURSE GOALS AND OBJECTIVES**

The purpose of teaching the discipline "Project Management" is to master the methodology of project management in various fields of activity, to foster a culture adequate to modern project management and information technologies, to create conditions for the introduction of new information technologies in the field of project implementation. The course is based on the international project management guidelines (project management body of knowledge).

**BRIEF DESCRIPTION OF THE COURSE**

The content of the discipline is aimed at studying modern concepts, methods, and tools of project management in order to apply them in the further practical activities of a specialist to solve problems of project planning and execution.

**KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE**

Be able to:

- prepare documents for the initialization phase of the project, such as a feasibility study, project charter, etc.
- develop and analyze documents related to project activity planning, apply various methods of decision support;
- quickly monitor the execution of work and track deadlines;
- to select personnel, resolve the contradictions between the members of the team;
- manage the risks that arise during the implementation of projects.

Knowledge gained during the course of the discipline:

- Modern standards in the region management of projects and their characteristics;
- PMI approach to project management;
- Planning of investment activities;
- Accounting for project risks;
- Methods for optimizing the use of available resources;
- Ways to resolve conflict situations;
- Analysis of actual indicators for timely adjustment of the progress of work.

**Skills:**

- project management in accordance with modern project management requirements-apply MS Project software in the project management process Project.



**Management psychology**

CODE HUM204

CREDIT 4 (1/0/1)

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**COURSE GOALS AND OBJECTIVES**

The goal is to master the methods of psychological analysis of management activities based on theoretical knowledge.

The aim of the course is to study the regularities of the organization of the management process and the relations between people that arise during this process, to develop a system and methods of active influence on the object of management, and to determine ways to anticipate and predict the studied processes.

**BRIEF DESCRIPTION OF THE COURSE**

Course content: Organization of personnel. Introduction to the subject of management psychology. History, philosophy and concepts of HR management. Personality as an object of management. Methods of personnel management. Mental properties of the individual. Impact on the individual. Methods and techniques of effective influence. Planning of work with personnel in the organization. Personality psychology and personnel policy. Technology of personnel management. Psychological aspects of personnel selection and adaptation. Methods, techniques, and personnel diagnostics. The adaptation period. Motivation of professional activity of personnel. Theory of activity. Leading activities at different ages. External and internal motives. Training and certification of personnel, psychological approach. Psychological aspects of the release and dismissal of staff. Organizational culture as a socio-psychological problem. Formation of the corporate culture of the organization. Head of the HR management system. Creating an image as an integral part of the communication culture. Mental properties of the individual, self-esteem and the concept of personality. Psychology of managerial (business) communication. Strategies for behavior in conflicts. Psychology of career management in an organization.

**KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE**

As a result of studying this course, the master's student must::

*Know:*

- the subject and main functions of HR management psychology and the areas of application of its tools in various areas of life;

*Be able to:*

- acquire systematic knowledge in the field of management psychology;

*Own:*

- personnel management skills, knowledge of the discipline as a science of interpersonal interactions in various spheres of life.

## Methodology of transport science

КОД –TRA225

Кредит – 4 (1/0/1)

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### COURSE GOALS AND OBJECTIVES

The goal is to develop knowledge in the field of the history of science and methodology of scientific research and design the results of its implementation.

Objectives -to impart the skills of choosing effective technical solutions methodologically competent understanding scientific problems in the road transport vision in the context of philosophy of science history; to promote the formation of scientific Outlook; to prepare for the perception of new scientific facts and hypotheses.

### BRIEF DESCRIPTION OF THE COURSE

Content of the discipline: Main stages of development of transport science and technology. World and Kazakh science at the present stage of development (XX-early XXI. centuries). Classification of transport and transport sciences. The role of the automobile in the development of science and technology. Mutual influence of achievements in the field of science and technology on the change and development of scientific methodology. The concept of a transport system. Classification of transport systems. Transport and its components. Transport system and its development prospects in the 21st century. Prospects for the development of transport corridors. Transport system of the city. The concept of the transport process. Transport efficiency indicators. Key indicators of the transport process. Technical and operational indicators of the transport process. Methods and forms of scientific knowledge. The concept of the method and methodology. Forms and methods of scientific knowledge; structuring of scientific knowledge and theories. Modern methods of collecting scientific information and conducting scientific research, experiment as the basis of scientific research. Methods of theoretical and experimental research. Planning an experiment. Analytical and static methods and models, methods of simulation modeling. Methods of analysis of research results and their impact on the reliability of the results obtained. Problems and trends in the development of scientific knowledge methodology at the present stage.

### KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

*As a result of mastering the discipline program, the master's student must:*

*Know:*

- main directions and trends in the development of transport equipment, transport technologies and production facilities;
- the state and directions of using the achievements of science and practice in professional activities;
- main stages of development of transport science, engineering and technology;

- methodological foundations of scientific knowledge and creativity: the concept of scientific knowledge;
- theoretical and empirical research methods;
- elements of the theory and methodology of scientific and technical creativity.

*Be able to:*

- use information support for the main positions of transport science, engineering and technology, taking into account social aspects;
- to use methods and means of scientific research to improve production processes in the enterprises of the industry.

*Skills:*

- methods and forms of scientific knowledge;
- methodology of experimental research.

**Automation of technological processes in the industry**

КОД – ТЕС218

Кредит – 4 (1/0/1)

**BRIEF DESCRIPTION OF THE COURSE**

The main issues in the study of automation process in the industry are: improving the efficiency of production processes; improving safety production-governmental process; improving the quality of regulation; increase in plant availability; improve working ergonomics process operators. Automation solution process is carried out by means of: the introduction of modern automation techniques; the introduction of modern means of automation

**Information and computer technologies in science and education**

CODE – TRA226

CREDIT – 6 (2/1/0)

**BRIEF DESCRIPTION OF THE COURSE**

The discipline studies the following: experiment Planning. Experiment, observation( experience), experimental data-the main terms and conditions. The concept of an approximate number and error. Estimation of errors in the computational process. Mathematical model of the research object in the form of an algebraic power polynomial. Regression polynomials are an approximate reflection of the ideal mathematical model of the research object. A random variable in the processing of experimental data by regression analysis. (experiments) in the experiment. The variance of reproducibility. The concept of reliability of experimental data. Stochastic relationship between random variables. Conditions (prerequisites) for applying the regression analysis method. Regression polynomial and system of conditional equations. Transformation of a system of conditional equations using the Gauss method. Residual variance of the regression polynomial. Building an estimate and confidence area for the mathematical model of the research object. "Orthogonal" regression. Preliminary processing of experimental data. Exclusion of grossly erroneous data from the variation series.

**Information support systems for design, manufacture and maintenance of ground transport and technological machines**

CODE – TRA205

CREDIT – 6 (2/1/0)

**COURSE GOALS AND OBJECTIVES**

The purpose of mastering the discipline: formation of theoretical and practical knowledge of information systems for ensuring technological processes in the field of design, manufacture and maintenance of ground transport and technological vehicles.

The task of the discipline is to form knowledge about the design and calculation of ground-based transport and technological vehicles .

**BRIEF DESCRIPTION OF THE COURSE**

Summary of the discipline: Existing information systems for the design, production and operation of machinery and equipment, information model of the life cycle of mechanical engineering products, CALS information technologies, ISO standards in the field of information technologies for supporting production processes, introduction of CALS information support products in the production process of machine design and manufacture, prospects for the development of information technologies in the production and operation systems of transport and technological machines and complexes.

**KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE**

As a result of mastering the discipline, masters should::

know:

- design and calculation of technological machines, as well as basic computer programs used for static, dynamic and traction calculations of machines, as well as programs for strength frames of machine elements and components;

- stages of development of a Unified system of design documentation in accordance with GOST: technical proposal, draft design, technical design, working design documentation;

be able to:

- formulate a new product concept and basic technical requirements;

- carry out critical analysis of layout schemes, perform adjustment work on machines, aggregates and components;

- perform drawings of parts and assembly units in accordance with the requirements for design documentation, including using three-dimensional computer modeling methods;

- identify the mechanisms and devices used in the construction of machines, if there is a drawing of them or a sample available for disassembly, and evaluate the main quality characteristics;

- analyze and evaluate the impact of the design on the operational properties of the units, select the parameters of the units in order to obtain optimal operational characteristics;
  - choose rational schemes of automatic systems and aggregates;
- own:
- engineering terminology in the field of design and production of transport and technological machines;
  - methods and skills of formulating a new product concept and technical requirements;
  - methods and skills of designing transport and technological machines, their aggregates and components, including using three-dimensional models;
  - methods and skills for calculating typical components and parts, including calculation of electric, hydraulic and pneumatic drives and devices (graphical, analytical and numerical).

**Logistic tasks modeling**

CODE-TRA227

Credit – 6 (2/0/1)

**COURSE GOALS AND OBJECTIVES**

The goal is to gain knowledge in the field, of modeling methods and solutions of logistics problems using mathematical models, to understand the role of individual elements of the structure of modeling problems, methods of their analysis and solution. The objectives of the discipline are to improve and develop the ability to self-study new research methods, to change the scientific and scientific-production profile of their professional activities, to acquire independently with the help of information technologies and use them in solving professional problems based on knowledge of world trends in the development of computing technology and information technologies.

**BRIEF DESCRIPTION OF THE COURSE**

Sections of the discipline "Modeling in logistics problems": Characteristics and classification of optimization models. A systematic approach to optimization problems. Main classes of methods for solving optimization problems. Basic algorithms for solving optimization problems. Software implementation and testing of methods for solving optimization problems. Analysis of solutions and their practical implementation. Analysis of solutions for sensitivity to variations in the source data. Making optimal decisions in conditions of uncertainty and multi-criteria in the process of its operation.

**KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE**

*As a result of mastering the discipline program, the master's student must::*

*Know:*

- models of representation and methods of knowledge processing, decision-making systems;
- optimization and design decision-making methods.

*Be able to:*

- develop mathematical models of processes and objects, use methods of their research, perform their comparative analysis;
- apply these methods to solve logistics problems.

*Skills:*

- methods of analysis and methods of formalization of intellectual tasks using artificial intelligence languages;
- management and selection of optimal solutions using mathematical models of decision-making in relation to logistics problems.



**Supply Chain Modeling**

CODE – TRA212

Credit – 6 (2/0/1)

**COURSE GOALS AND OBJECTIVES**

Objective: to study the theoretical and practical aspects of effective management of flow processes in supply chains, design of flexible and adaptive supply chains in various business areas.

The objectives of the discipline are to master the skills of applying logistics management and its tools for optimizing logistics processes in supply chains.

**BRIEF DESCRIPTION OF THE COURSE**

The discipline examines the evolution of logistics management of companies, the transition from logistics to supply chain management, the analysis of logistics concepts and strategies, understanding and highlighting logistics processes and key competencies in supply chains, the formation of logistics thinking and vision, the use of economic and mathematical methods, models and tools for optimizing the logistics chain by volume.

**KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE**

*As a result of mastering the discipline program, the master's student must::*

*Know:*

- theoretical foundations of SCM functioning;
- fundamentals of system and process (process-oriented) approaches;
- business processes of the organization, internal and external supply chain, value chain;
- basic concepts of logistics (flows, logistics processes, logistics and functional cycles) and logistics management; concepts and strategies of logistics;
- trends in the development of global logistics and the functioning of global logistics chains;
- methods for optimizing logistics processes and supply chain management.

*Be able to:*

- design logistics processes at the level of supply chains and build the configuration of supply chains;
- apply scientific approaches, methods and principles to supply chain research;
- analyze socio-economic literature in detail;
- apply system and process approaches;
- identify logistics processes at the supply chain level, as well as processes that do not create or reduce value;
- analyze and design logistics processes in the supply chain;
- perform logistics administration and supply chain design.

- apply relevant knowledge and make decisions in key areas of activity at the company level and at the level of supply chains.

*Skills:*

- mastering new material when performing individual tasks and independent work;
- professional argumentation and public statements in the process of research and analysis of logistics processes;
- methods of optimization; methods and techniques of negotiation.
  - management of economic and mathematical tools and supply chain modeling.

**Automated systems for solving logistics problems**

CODE – TRA206

CREDIT – 6 (2/1/0)

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**COURSE GOALS AND OBJECTIVES**

The purpose of mastering the discipline is to prepare undergraduates for the creation and application of modern intelligent automated systems, as well as to understand the importance of automated systems in solving modern logistics problems.;

Objectives of the discipline: introduction to modern CASE-software systems for automating the solution of logistics problems.

**BRIEF DESCRIPTION OF THE COURSE**

Content of the discipline. Corporate and transport logistics in examples and tasks. Specialized software for managing a logistics company. Principles of applying the lean manufacturing concept. Features of implementing the KANBAN system. The e-business platform mySAP Business Suite. Comprehensive integration platform SAP NetWeaver. Software logistics based on the SAP platform. Use of automated technologies of the SAP platform for supply chain Management (SCM). Use of automated technologies of the SAP platform for customer relationship Management (CRM).

**KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE**

As a result of studying the discipline, the master's student must::

know:

- approaches to solving logistics problems using modern automated systems;
- models and methods of formalized representation of logistics objects, technology for applying research and modeling automation tools required for solving logistics problems;
- basic concepts and principles of building automated systems of engineering analysis.

be able to: apply methods for representing logistics objects in modern automation systems.

possess: methods of solving logistics problems and skills of working in modern automation tools.

**Intelligent diag-nostics and pre-dictive analysis of the condition of vehicles**

КОД –TRA466

Кредит – 6 (2/1/0)

**BRIEF DESCRIPTION OF THE COURSE**

When studying the discipline, the questions of methods and methodology of diagnostics and forecasting of the technical condition of vehicles are considered. The structure and composition of predictive analytics systems. The order of collection and processing of predictive diagnostics monitoring data

**Research and testing of transport and transport-technological machines**

CODE – TRA204

CREDIT – 6 (2/1/0)

**COURSE GOALS AND OBJECTIVES**

The purpose of the discipline is to develop a system of scientific and professional knowledge and skills in the field of research and testing of ground transport and technological machines, allowing students to independently organize research and testing of lifting and transport, construction, road machinery and equipment, taking into account technical, technological, economic and environmental factors.

The main objectives of studying the discipline are:

- study of methods and techniques for research and testing of ground transport and technological machines and their components;
- study of the principles of selection of devices and equipment for research and testing of ground transport and technological machines and their components;
- study of the principles of development of technologies for research and testing of ground transport and technological machines and their components;
- creation of the foundations of broad theoretical training in the field of research and testing of ground transport and technological machines for undergraduates, which allows future masters to navigate the flow of scientific and technical information and provides them with the opportunity to use the achievements of scientific and technological progress in their practical activities;
- familiarizing undergraduates with the organization of advanced technological processes of research and testing of ground transport and technological machines using modern technological equipment and developing undergraduates ' techniques and skills in solving engineering problems based on alternative approaches using experiment, mathematical methods and computer technology;
- mastering and understanding of regulatory and technical documentation and laws applicable in the industry by undergraduates;
- mastering the methods of research and testing of ground-based transport and technological machines of ground-based transport and technological machines.

**BRIEF DESCRIPTION OF THE COURSE**

Content of the discipline: Basic requirements for the design and reliability of transport and technological machines and equipment of machines. Experimental determination of structural and operational properties of machines. Laboratory, factory, operational (industrial), running, road emissions. Cargo tests. Acceptance-, control, and research tests of machines are carried out. Testing of mass-produced and experimental vehicles with transport system life cycles. Test equipment and stands. The methodology of the testing machines. Investigation of starting properties, maneuverability, performance, and thermal conditions. Determination of dynamic and traction properties, durability and strength of machines and their components. Evaluation of the economic

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efficiency of implementing machines. Testing of machines in emergency mode. Certification tests of machines. Refinement of vehicles based on test results. Testing of power plants and machine drives. Testing of electrical machines. Testing of machines for reliability. Registration of machine test results.

### **KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE**

As a result of studying the discipline, the master must::

know:

- methods and methods of research and testing of ground transport and technological machines and their components;
- instruments and equipment for research and testing of ground transport and technological machines and their components;
- technology of research and testing of ground transport and technological machines and their components;

be able to:

- apply methods of research and testing of ground transport and technological machines of ground transport and technological machines;

have the following skills:

- independently prepare all transport and technological machines and their components for research and testing;
- plan research and testing of transport and technological machines and their components;
- use modern equipment, stands and scientific equipment for conducting research and testing of transport and technological machines and their components, as well as processing the results obtained;
- process and analyze materials and results of research and testing of transport and technological machines and their components.

**Supply Chain Design for Production Systems**

CODE – TRA221

CREDIT – 6 (2/1/0)

**BRIEF DESCRIPTION OF THE COURSE**

The content of the discipline: The basic principles of supply chain design. A systems approach and systems analysis in supply chain design. Modeling of objects and control subjects in production systems. Criteria for the quality and effectiveness of the supply chain. Methods and algorithms for supply chain design. Formation of the organizational structure of the supply chain. Evaluation of the effectiveness and efficiency of the supply chain of the production system.

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**Automation systems for road transport**

CODE –TRA207

Credit – 6 (2/0/1)

**COURSE GOALS AND OBJECTIVES**

The goal is to form students ' clear understanding of the purpose and capabilities of automated control systems, to study the design procedure for automated enterprise management systems, to analyze issues related to the classification and definition of tasks of automated control systems.

Objectives of the course -and methods of calculation of indicators of efficiency of traffic organization; study methods for the control of traffic lights, monitoring transport and navigation; the study of modern computer technologies that implement mathematical modeling, collection and processing of information, preparation and registration of documents, design documents, using specialized programs, presentation of material in information networks modeling skills of various systems of automobile transport.

**BRIEF DESCRIPTION OF THE COURSE**

The discipline deals with issues describing the basics of modern mobile communication facilities, automation systems, design and use of databases, computer networks and communications, automated systems and transportation management, and mathematical methods for solving motor transport problems. Communication and the role of automation systems in the organization of transport service; information support of transport process; the purpose and types of systems and transport and their characteristics; the scope of application of the various communication systems in transport; the information flows in the transport systems, their interaction with the global system of communication, storage and processing; ACS as a tool for optimization of management processes in the transport system: structure and levels of building automated control systems for transport, their functions.

**KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE**

*As a result of mastering the discipline program, the master's student must:*

*Know:*

- basic concepts, management tasks and methods of their solution in the system behavior, способы presentation sections;
- fundamentals of building and operating передатчидata transmission networks in transport;
- data network management system and information protection;
- network security management system.

*Be able to:*

- develop design diagrams of control systems and apply mathematical models to describe and study control systems;
- calculate the values of functions defined by analytical expressions, convert symbolic expressions;

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- apply technical and software tools to solve problems in various subject areas;
- analyze data processing processes;
- interpret the results obtained in order to develop proposals for improving the functioning of networks.

*Skills:*

-mathematical apparatus and theoretical schemes used in the description and study of various modes in control systems; work with the main means of computer equipment and information technologies.

- basic concepts and terms of the discipline; skills in building and administering computer networks of various scales.

**Modern transportation technologies in supply chains**

CODE – TRA214

CREDIT – 6 (2/0/1)

**COURSE GOALS AND OBJECTIVES**

Goals of the discipline "Modern transportation technologies in supply chains" - an in-depth study and discussion of specific issues related to technologies, tools and methods of transport support for supply chains and modern transport infrastructure,

**BRIEF DESCRIPTION OF THE COURSE**

Content of the discipline. The concept of the basic vehicle of each generation . Examples of modern technological solutions in the field of logistics. Information tools for monitoring the operation of transport. Connection of the discipline with other professional and special disciplines. Innovations, technological resource, generations of technology. The concept of "innovation". Extensive and intensive development in the field of logistics. Indicators for assessing the technological resource of a country or enterprise. Investment in innovation. Change of generations of equipment and technologies in the field of logistics. High-quality model of generations of transport equipment. Life cycle of generations of transport equipment and technology. Characteristics and basic directions of the scientific and technical revolution (NTR). Features of 3NTR. Application of 3NTR achievements in logistics - nanotechnology, creation of control systems with artificial intelligence, new means of communication and energy transmission. Forecasting the development of logistics infrastructure. Study of the technical level of logistics infrastructure elements. Assessment based on several quality indicators that determine the suitability of an infrastructure element to meet the demand for its services. Development of a project to improve transportation technology.

**KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE**

As a result of studying the discipline, the master's degree program should:

- know: characteristics, technological and economic features of modern transport systems for various purposes; modern principles of organizing transport services for supply chains of various profiles;
- be able to: determine the goals and objectives of research, develop conceptual models, work plans and programs for conducting scientific research in the field of transport support for supply chains; work as part of project teams in the development of modern transport support systems for logistics;
- own: scientific and business discussions on logistics transport support.

## **CALS-TECHNOLOGIES**

CODE –TRA219

Credit – 6 (2/0/1)

### **COURSE GOALS AND OBJECTIVES**

The goal is to form the ability of undergraduates to use CALS technologies for product design, work with international standards for electronic data exchange, and open up opportunities for undergraduates to self-study methods of continuous information support of supplies and the product life cycle. The objectives of the discipline are to build elements of open distributed automated systems for design and management in industry.

### **BRIEF DESCRIPTION OF THE COURSE**

Sections of the discipline "CALS-technologies": Modern methods of CALS technologies. Modern CAD/CAM / CAE systems for working on a common project. Tools of CALS technologies for providing a uniform description and interpretation of data. The organization of the elements of the logistics support products. Designing and maintaining descriptions of component parts of equipment and products in standardized data formats. Preparing design documents using AutoCAD. Prepare design and technological documents using the mechanicaldesktop system. Work on project fragments using a modern CALS system. Study of the characteristics of the main international standards for electronic data exchange. Development of a project component management procedure in accordance with the ISO standard. Creating elements of the product information CALS support program.

### **KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE**

*As a result of mastering the discipline program, the master's student must::*

*Know:*

- trends in the development of CALS technology methods;
- special scientific and technical literature on CALS technology methods;
- modern CAD/CAM / CAE systems for working on a common project;
- basic international standards for the electronic exchange of data and technical documentation;
- means of CALS technologies to ensure a uniform description and interpretation of data.

*Be able to:*

- store descriptions of component parts of equipment and products in unified data formats of network servers;
- develop components of the project based on the adaptation of design and technological documentation;
- use ISO standards to ensure CALS information integration;
- manage software tools based on CALS technologies for project quality control.

*Skills:*

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- methods and means of CALS technologies for repeated reproduction of project parts in new developments;
- organization of work on the application and operation of modern CALS technology systems;
- manage product integration processes in various systems and environments;
- work as a programmer for informational support of a product, product, or project.

**Innovative meehods for repairing machine parts**

CODE – TEC533

Credit – 6 (2/0/1)

**OBJECTIVES OF THE DEVELOPMENT OF DISCIPLINE**

The purpose and objectives of the discipline is to provide the specialist with modern knowledge on the technology of restoring specific parts of equipment for mining, metallurgical and oil and gas production.

In the process of mastering this discipline the following tasks are solved:

- familiarization of undergraduates with the principles of choosing a rational technological process of restoring and hardening parts of mining, metallurgical and oil and gas production, depending on the type of wear;
- familiarization with innovative methods of restoring parts that have undergone wear, destruction and fatigue failure as a result of the operation of process equipment.
- to study and put into practice innovative principles, methods and tools for the development of the technological process of recovery and hardening;
- obtaining theoretical knowledge and practical skills in the selection of equipment and devices for the technological process being developed;
- the formation of skills for the rational use of basic and additional materials for the restoration and strengthening;
- Acquisition of practical skills in filling regulatory and technical and technological documentation for the repair and restoration of equipment parts.

**KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE**

As a result of studying this discipline, the undergraduate must:

Know:

- technical and economic basis for the selection of innovative methods and technologies for restoring and improving the wear resistance of equipment parts;
- Principles of use of materials to achieve maximum wear resistance for various types of wear;
- The main requirements of the regulatory and technical documentation for the restoration and hardening of parts and assemblies;
- Basic requirements for the safe conduct of repair and restoration works.

Be able to:

- choose modern low-waste, energy-saving and environmentally friendly machine-building technologies for restoring and hardening parts of oil and gas equipment;
- to develop technological processes of hardening or restoration of parts;
- choose the necessary equipment, tools and accessories;
- choose the main and auxiliary materials of parts and coatings;
- to determine and ensure manufacturability of parts during their restoration and hardening;
- to make technological and repair documentation;

- To conduct a feasibility study of the selected technology.

Own:

- skills in developing technological maps of restoration processes and improving the wear resistance of parts;
- practical skills of drawing up project and technical documentation;
- practical skills to verify compliance of the developed process with the requirements of standards, specifications and other regulatory documents

## Technical means of the transport system

CODE –TRA217

Credit – 6 (2/0/1)

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### COURSE GOALS AND OBJECTIVES

The goal is to develop students ' complex knowledge, skills and abilities on general and specific issues of technical and technological policy in transport for the normal functioning of the transport industry and the country's economy.

Objectives of the discipline:- study of the methodology of analysis, synthesis, classification, structural and dynamic properties of technical systems; - acquisition of skills to optimize the company's activities, to efficiently allocate resources between subsystems of the enterprise, to determine the rational sequence of complex work and to update fixed assets; - mastering modeling and decision-making methods in complex systems.

### BRIEF DESCRIPTION OF THE COURSE

The discipline examines the elements of the infrastructure of the road transport complex; methods of managing production processes in road transport; classification, methodology of analysis, synthesis, structural and dynamic properties of transport systems.

### KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

*As a result of mastering the discipline program, the master's student must:*

*Know:*

- basic regulatory documents, production standards and technological standards for the consumption of materials, fuel and electricity.

*Be able to:*

- and be harnessed in the work of the normative documents;
- identify the causes of overspending of materials, fuel and electricity;
- search for sources of patent information, determine the patent purity of developed objects, prepare primary materials for patenting inventions, official registration of computer programs;
- convince them of the correctness of the proposed solution.

*To own:*

- practical skills in developing production standards and technological standards for the consumption of materials, fuel and electricity;
- experience in developing projects and programs in the field of patent activity;
- technological solutions that are adequate to the tasks set.

**Electric machines**

CODE - TRA209

CREDIT – 6 (2/0/1)

**COURSE GOALS AND OBJECTIVES**

The purpose of mastering the discipline "Electric machines" is to form a knowledge system for students to solve professional problems on mastering the skills of effective use of electric machines used in transport and technological machines and complexes.

To achieve this goal, when mastering the discipline, the following task is solved: studying the basics of the theory, device, working properties of electrical machines and their application areas.

**BRIEF DESCRIPTION OF THE COURSE**

Content of the discipline. Theory of the transformer. Electromagnetic processes in the transformer. Transformer power engineering. Special transformers. General information about electric machines. Asynchronous machines. Of the synchronous machine. AC collector machines. DC machines. Micromachines.

**KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE**

As a result of studying the discipline, the master's student must know:

- methodology for conducting research to determine the parameters of working processes of electric machines;
- features of bench testing of electric machines;
- adjustment parameters of the maintypes of electric machines;
- umet:
- conduct laboratory tests of electrical machines;
- draw up T - and L-shaped replacement schemes for electrical machines based on the tests carried out;
- configure the correct operating mode of transformers and electric motors during a pilot test;
- vladet:
- skills in determining the real physical processes of electrical machines by analytical and/or graphoanalytic methods;
- skills in testing electrical machines in operation;
- ability to adjust electric machines to a given operating mode.



**Registration and defense of the master's thesis**

CODE – ECA205

CREDIT –12

The purpose of completing a master's thesis is to:

demonstration of the level of scientific/research qualification of the master's student, the ability to independently conduct scientific research, test the ability to solve specific scientific and practical problems, knowledge of the most common methods and methods of solving them.

**BRIEF DESCRIPTION**

Master thesis – graduation qualification scientific work, by providing a generalization of the results independent of researches one of the urgent problems of a particular specialty of matching science that has internal unity and reflects the progress and results of elaborated topics.

Master's thesis – the result of research/experimental research work of the master's student, conducted during the entire period of study of the candidate.

Master's thesis defense is the final stage of master's degree preparation. A master's thesis must meet the following requirements:

- the work should conduct research or solve current problems in the field of technology and automation of transport and transport systems;
- the work should be based on identifying important scientific problems and solving them;
- decisions must be scientifically based and reliable, have internal unity;
- the dissertation work must be written individually.

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