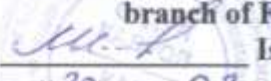


AGREED
 Deputy Head of production of the
 Almaty operational locomotive
 depot of the branch of LLP "KTZ-
 Freight transportation" - "Almaty
 branch of FT"

 Iskakov M.C.
 «30» 03 2023 y.



APPROVED
 «Логистика және қолық академиясы» АҚ
 Director of the Institute
 «Қәлі Transport Engineering»
 Chigambayev T.O.
 АО «Академия логистика және транспорт»
 Институт «Транспортная инженерия»

**CATALOG OF DISCIPLINES OF THE COMPONENT BY CHOICE
 EDUCATIONAL PROGRAMS 6B07137 Rolling stock Engineering**

Level of education: bachelor course

Time of study: 4 years

Year of admission: 2023 y.

Module	Cycle	Component	Name of the discipline	Total labor intensity		Semester	Learning outcome	Brief description of the discipline	Prerequisites	Post-requisites	Department
				in academic hours	in academic credits						
1	2	3	4	5	6	7	8	9	10	11	12
Module 5 - Ecology and life safety	GED	EC1	Ecology and life safety	150	5	3	ON4	The study of the basic environmental concepts, environmental problems and approaches to their solution, sources and types of environmental pollution by enterprises, the principles of standardizing the quality of atmospheric air and water, the main provisions of legislation in various fields, natural and man-made emergencies, their causes, methods of prevention and protection. Teaching methods - analysis of specific situations (case-study).	Applied Physics, Engineering Mathematics	Labor protection, Ensuring traffic safety on transport, Organization of operational work of the railway section, Resource saving in transport (Minor)	MV&LS

1	2	3	4	5	6	7	8	9	10	11	12
Module 2 – Natural science competencies		EC2	Scientific research methods	150	5	3	ON1, ON2	Obtaining theoretical and applied knowledge by students on the methods of scientific research of problems in the field of study, training of specialists with the skills of cognitive activity in the field of science, the formation of deep ideas about the content of scientific activity, its methods and forms of knowledge.	Applied Physics, Engineering Mathematics	Methods of nondestructive control of the rolling stock, IT technologies in transport, master's degree disciplines	SHD&PE
Module 6 - Economic and managerial competencies	GED	EC3	Basics of economics and entrepreneurship				ON5	He studies the activities of enterprises in various types of markets, the model of equilibrium and functioning of the market, state regulation of prices and tariffs. Considers the concept of entrepreneurship and the limits of its legal regulation, the conditions for the development of entrepreneurship, organizational and legal forms of doing business, business planning, entrepreneurial secrecy, social responsibility of. Active learning methods: case methods; business role-playing games, group work.	Engineering Mathematics Sociology, Cultural studies, Political Science, Psychology, History of Kazakhstan	Organization of operational work of the railway section, Managerial Economics (Minor)	TLM
Module 1 – General education disciplines		EC4	Basics of law and anti-corruption culture				ON1	Improving the public and individual legal awareness and legal culture of students, as well as the formation of a system of knowledge and civil position to combat corruption as an anti-social phenomenon. As a result of studying the course, the student must master the fundamental concepts of law, the constitutional structure of the state power of the Republic of Kazakhstan, the rights and freedoms of citizens enshrined in the Constitution, the mechanism and protection of the legitimate interests of a person in case of their violation.	Sociology, Cultural studies, Political Science, Psychology, History of Kazakhstan	Final certification	SHD&PE

1	2	3	4	5	6	7	8	9	10	11	12
Module 7 – General Enginee ring compet encies	BD	EC1	Fundamentals of calculating the strength of machines and mechanisms	180	6	4	ON2, ON6	Studies the basics of the theory of mechanisms and machines, the resistance of materials, calculation and design of general-purpose parts and assemblies widely used in machines to solve problems aimed at improving the reliability, strength and durability of parts and assemblies in design, construction and operation, using modern educational and information technologies. Methods of active learning – performing individual computational and graphical tasks.	Applied Physics, Engineering Mathematics, Structural materials in transport engineering, Theoretical mechanics,	Machine parts and design basics, Bases of reliability of the rolling stock	SE
		EC2	Applied Mechanics				ON2, ON6	Studies the theoretical foundations and methods of calculations for strength, rigidity, durability and stability of structural elements of transport structures, the main types of mechanisms, parts and assemblies of machines, general principles of design and construction, which is necessary when assessing the reliability of existing equipment in operating conditions. Methods of active learning – performing individual computational and graphical tasks.	Applied Physics, Engineering Mathematics, Structural materials in transport engineering, Theoretical mechanics,	Machine parts and design basics	SE

1	2	3	4	5	6	7	8	9	10	11	12
Module 2 – Natural science competencies	BD	EC1	Heat engineering	180	6	3	ON2	Studies the basics of obtaining, converting, transferring and using heat, thermodynamic cycles of heat engines and calculation of their parameters, types of heat exchange, heat exchangers and methods of their calculation, the principle of operation and design features of heat-power, heat-using machines, aggregates and devices. The discipline contributes to the analysis of energy-saving technology in transport and the determination of trends in the development of heat-engineering machines, equipment, installations and devices.	Applied Physics, Engineering Mathematics,	Energy installations of transport equipment, Traction theory and principles of energy saving, Technical operation of locomotives/ Technical operation of wagons	RS
		EC2	Fluid and gas mechanics, hydroand pneumatic drive				ON2	General laws and equations of hydrodynamics, fluid motion modes and fundamentals of hydrodynamic similarity, laminar and turbulent fluid motion, hydraulic barriers, fluid flow through nozzles and nozzles, hydraulic calculation of pipelines, volumetric hydraulic machines, hydraulic drives and Hydraulic automation, pneumatic drive, pneumatic motor, pumps, hydraulic motors, fans, hydrodynamic transmission, hydraulic drive drives are metal-cutting tools. Teaching methods: problem solving, conducting thematic surveys, open and closed tests.	Applied Physics, Engineering Mathematics,	Energy installations of transport equipment	RS

1	2	3	4	5	6	7	8	9	10	11	12
Module 10 - Reliability, diagnostics and repair of rolling stock	BD	EC1	Methods of nondestructive control of the rolling stock	270	9	5	ON9, ON10	Study, analysis and classification of the causes of operational and technological defects of components and parts of rolling stock. Advanced methods of non-destructive testing and fault detection of rolling stock are considered. Mastering and practicing practical skills: working with modern diagnostic devices and flaw detectors; understanding and analyzing the results. Training methods used: work with diagnostic equipment, group work, discussion.	Applied Physics, Engineering Mathematics, Structural materials in transport engineering, Scientific research methods	Bases of reliability of the rolling stock, Technology of repair of wagons and containers, Technology of maintenance and repair of ELECTRIC ROLLING STOCK/ Technology of maintenance and repair of diesel locomotives	RS
	BD	EC 2	Theory of automatic control				ON2, ON9	Formation of knowledge, skills and abilities of building automatic control systems based on modeling methodology using modern technologies and basic natural science laws. It consists of the following modules: fundamentals of automation of technological processes, the main tasks of the theory of automatic control, mathematical models of automatic control systems, research methods of linear non-linear automatic control systems, random impacts in linear automatic control systems, optimal control problems, current trends in the development of automatic control systems. Interactive teaching methods are used.	Applied Physics, Engineering Mathematics, Electrical engineering and the basics of electronics	Technology of maintenance and repair of diesel locomotives, Automation and mechanization of repair of wagons and containers	RS

1	2	3	4	5	6	7	8	9	10	11	12
Module 9 - Construction of rolling stock	BD	EC1	Dynamics of wagons	180	6	6	ON3, ON6, ON8	General ideas about classical and modern approaches to the study of the causes of carriage fluctuations are given. The methodology for determining the coefficients of dynamics and stability margin when moving a car in straight and curved sections of the railway track, the establishment and justification of criteria for the safe movement of rolling stock. Computational and analytical methods are used to solve problems related to determining the dynamic characteristics of freight and passenger cars. They are used by the "Universal Mechanism" software, Mathcad.	Applied Physics, Engineering Mathematics, Theoretical mechanics, Rolling stock design, Rolling stock and railway infrastructure	Bases of reliability of the rolling stock, Final certification	RS
		EC2	Dynamics of locomotives				ON3, ON6, ON8	Formation of skills for calculating the dynamic characteristics of locomotives, determining the optimal parameters of the running gear of locomotives. Dynamic system – "locomotive-path"; types of disturbances that cause locomotives to oscillate; methods for calculating the equations of crew oscillations; compilation of equations of vertical oscillations of simplified dynamic models; oscillations with random disturbances; lateral oscillations of locomotives; indicators of dynamic qualities of the mechanical part of locomotives; criteria for safe movement; computer simulation of locomotive dynamics, dynamic strength tests of locomotives. They are used by the "Universal Mechanism" software, Mathcad.	Applied Physics, Engineering Mathematics, Theoretical mechanics, Rolling stock design, Rolling stock and railway infrastructure	Bases of reliability of the rolling stock, Final certification	RS
EC3		IT technologies in transport	ON3, ON10				Studies the principles of information flow formation, information flow management in transport systems of various levels of complexity, general principles of building intelligent transport systems (ITS), routing of transport and monitoring of its operation when using ITS, information system design, organization of information exchange between management objects, methods of automated identification of transport objects, methods of location determination, application of information technology in the construction of vehicles. Methods of active learning: computer modeling, project method, work in small groups. It is used by: Mindmap, Python, MS PowerBI, Wialon system.	Information and communication technologies, Applied Physics, Engineering Mathematics, Electrical engineering and the basics of electronics. Fundamentals of computer modeling, Scientific research methods	Principles of computer-aided design of wagons, Automation and mechanization of repair of wagons and containers Final certification	ICT	

1	2	3	4	5	6	7	8	9	10	11	12
Module 11 - Operatio n of rolling stock	BD	EC1	Ensuring traffic safety on transport	180	6	6	ON5, ON10	Acquisition by students of knowledge, principles, conditions and methods of ensuring the safety of vehicles in accident-free operation, instilling skills of an integrated approach to solving transport security problems, including in non-standard situations. As part of the study of the discipline, interactive methods are used, the solution and analysis of situational problems, discussions, guest lectures by leading top managers of transport companies.	Applied Physics, Engineering Mathematics, Ecology and life safety	Labor protection, Final certification	OTOT
		EC2	Organization of operational work of the railway section				ON5, ON10	Study of the organization of the work of railway sections, dispatching personnel of railways, technical rationing of operational work and regulation of car traffic, locomotive and wagon fleets, rationing of work and rest of locomotive crews. Formation of skills for determining the operated fleet and calculating the operational indicators of the use of locomotives, operational planning of train and freight work of the road. As part of the discipline, demonstration of video clips is practiced, field classes are organized on the basis of the Almaty branch of the railway, Almaty-1, Almaty-2 stations.	Engineering Mathematics, Ecology and life safety, Basics of economics and entrepreneurship, Rolling stock and railway infrastructure	Technical operation of locomotives/ Technical operation of wagons, Final certification	OTOT

1	2	3	4	5	6	7	8	9	10	11	12
Module 9 - Construction of rolling stock	BD	EC1	Rolling stock and railway infrastructure	270	9	4	ON5, ON8, ON10	Formation of professional competencies in the field of construction and operation of a fleet of railway rolling stock in interaction with railway infrastructure facilities. Regulatory and technical base regulating requirements for railway rolling stock and elements of railway infrastructure; track and track facilities; railway power supply; design features of locomotives and wagons; locomotive, wagon facilities; rules technical operation; automation, telemechanics and communication on the railway; organization of transportation and train traffic.	Applied Physics, Engineering Mathematics, Structural materials in transport engineering, Theoretical mechanics	Dynamics of wagons / Dynamics of locomotives Organization of operational work of the railway section, Bases of reliability of the rolling stock, Auto-braking of locomotives and traffic safety / Of the automatic wagons and the safety of train movement.	RS
		EC2	Transport equipment and means of mechanization				ON8, ON10	The discipline studies the principles of operation, design features of transport equipment and means of mechanization, basic technical, operational, traction and energy characteristics, the role and significance of technical operation of various types of transport equipment. The discipline uses interactive teaching methods, conducting thematic surveys.	Applied Physics, Engineering Mathematics, Theoretical mechanics	Energy installations of transport equipment, Rolling stock design, Automation and mechanization of repair of wagons and containers	RS

1	2	3	4	5	6	7	8	9	10	11	12
Module 10 - Reliability, diagnostics and repair of rolling stock	PD	EC1	Microprocessor-based automatic locomotive control systems	180	6	6	ON7 ON8	The discipline studies the basics of using a microprocessor-based locomotive motion control system that provides control in both manual and automatic modes and has the functions of diagnosing the main equipment and registering the main motion parameters, the principles of operation of electrical, electronic and microprocessor control circuits and locomotive systems, analysis of the characteristics of control systems. Interactive teaching methods, case tasks, problem solving, laboratory tests are used.	Applied Physics, Engineering Mathematics, Electrical engineering and the basics of electronics, Energy installations of transport equipment	Technical operation of locomotives, Final certification	RS
		EC2	Equipment and technology of welding and surfacing works				ON8, ON9	Formation of skills: determining the most modern and rational methods of restoring parts by welding / surfacing; performing calculations of the characteristics of welding and surfacing processes; designing technological processes of welding and surfacing works. It consists of the following modules: technology and quality control of welding and surfacing, the concept of quality and reliability of welded structures; repair and restoration of wagon parts by welding and surfacing; equipment used in welding and surfacing. Interactive teaching methods, elements of dual training are used.	Applied Physics, Engineering Mathematics, Electrical engineering and the basics of electronics, Structural materials in transport engineering	Technology of repair of wagons and containers, Principles of computer-aided design of wagons, Automation and mechanization of repair of wagons and containers	RS

1	2	3	4	5	6	7	8	9	10	11	12
Module 11 - Operation of rolling stock	PD	EC1	Auto-braking of locomotives and traffic safety	180	6	6	ON8, ON10	Discipline based on the requirements of regulatory and technical documents in the field of locomotive operation and ensuring transport safety on the railway of the Republic of Kazakhstan. Studies the purpose and schematic diagrams of automatic brakes, the production of brake calculations, devices and devices for ensuring traffic safety, brake repair and maintenance systems in operation. Used: laboratory training and training complex of brake control; interactive teaching methods; elements of dual training.	Applied Physics, Engineering Mathematics, Electrical engineering and the basics of electronics, Theoretical mechanics, Machine parts and design basics, Energy installations of transport equipment, Rolling stock design, Rolling stock and railway infrastructure	Bases of reliability of the rolling stock,	RS
		EC2	Of the automatic wagons and the safety of train movement				ON8, ON10	Formation of skills: the use, diagnosis and analysis of the causes of malfunctions of the braking equipment of cars; determination of reliability and safety criteria for the operation of the braking equipment of cars; performing calculations to determine the availability of train brakes. The content of the discipline is based on the requirements of regulatory and technical documents in the field of operation of car brakes and ensuring transport safety on the railways of the Republic of Kazakhstan. Used: laboratory training and training complex of brake control; interactive teaching methods; elements of dual training.	Applied Physics, Engineering Mathematics, Electrical engineering and the basics of electronics, Theoretical mechanics, Machine parts and design basics, Energy installations of transport equipment, Rolling stock design, Rolling stock and railway infrastructure	Bases of reliability of the rolling stock	RS

1	2	3	4	5	6	7	8	9	10	11	12
Module 8 –Electrical engineering, electronics, electrical equipment	PD	EC1	Electromagnetic technical means	270	9	7	ON2, ON7	Studies the design, principle of operation, classification and characteristics of electric machines and transformers of general industrial use, equations of EMF, voltages, currents and moments, methods of starting and regulating the frequency of electric motors, physical working conditions, losses and efficiency factor. The discipline contributes to the analysis of technical solutions to improve performance and the application of engineering methods for calculating the parameters of electric energy converters. Interactive teaching methods, case tasks, problem solving, test tasks are used.	Applied Physics, Engineering Mathematics, Electrical engineering and the basics of electronics, Structural materials in transport engineering, Energy installations of transport equipment	Technology of maintenance and repair of ELECTRIC ROLLING STOCK	RS
Module 10 - Reliability, diagnostics and repair of rolling stock		EC2	Technology of repair of wagons and containers				ON8, ON9	Formation of skills for the development of rational technological processes for the repair of wagons and containers. The content of the discipline is based on the requirements of regulatory and technical documents in the field of repair of wagons in the Republic of Kazakhstan. It consists of the following modules: production and technological processes; preparation for repair; restoration methods; repair of wagon/container assemblies; requirements for the reliability of structures, quality control of repair work. Used: laboratory diagnostic equipment and tools; interactive teaching methods; elements of dual training.	Applied Physics, Engineering Mathematics, Structural materials in transport engineering, Rolling stock design, Methods of nondestructive control of the rolling stock, Equipment and technology of welding and surfacing works	Automation and mechanization of repair of wagons and containers Technical operation of wagons	RS

1	2	3	4	5	6	7	8	9	10	11	12
Module 11 - Operation of rolling stock	PD	EC1	Traction theory and principles of energy saving	180	6	7	ON9, ON10	The study of the theoretical foundations of the processes of traction force formation, methods for calculating the resistance to movement and braking of the train, the basic equation of train movement and methods of its solution, traction calculations. Mastering students' knowledge in the field of rationing the consumption of energy resources by locomotives for train traction, rational modes of train driving and features of the movement of heavy and long-component trains. Interactive teaching methods, case tasks, problem solving, test tasks are used.	Applied Physics, Engineering Mathematics, Electrical engineering and the basics of electronics, Rolling stock design, Heat engineering	Technical operation of locomotives, Final certification	RS
Module 4 -IT competencies		EC2	Principles of computer-aided design of wagons				ON3, ON8	Mastering theoretical knowledge and practical skills in the field of wagon design by students. Obtaining skills in using software systems and computer-aided design of components and parts of freight and passenger cars. Study of the requirements of regulatory and technical and design documentation in the field of designing modern railcars using methodological foundations, hardware and computer-aided design systems (CAD and CAD applications: AutoCAD, COMPASS 3D, etc.).	Applied Physics, Engineering Mathematics, Fundamentals of computer modeling, Machine parts and design basics, Rolling stock design, IT technologies in transport, Equipment and technology of welding and surfacing works	Automation and mechanization of repair of wagons and containers	RS

1	2	3	4	5	6	7	8	9	10	11	12
Module 10 - Reliability, diagnostics and repair of rolling stock	PD	EC1	Technology of maintenance and repair of ELECTRIC ROLLING STOCK	270	9	8	ON7, ON9, ON10	The discipline is based on the requirements of regulatory and technical documents in the field of maintenance and repair of ERS in the Republic of Kazakhstan. Studies the technology of maintenance and repair of life support systems of ERS, traction power plants, mechanical parts, electromagnetic devices of control and protection circuits, ways to optimize repair and maintenance of ERS. Forms the skills of developing rational methods of maintenance and repair of ERS. Used: diagnostic equipment, tools and templates, interactive teaching methods, elements of dual training.	Applied Physics, Engineering Mathematics, Labor protection, Energy installations of transport equipment, Rolling stock design, Bases of reliability of the rolling stock, Methods of nondestructive control of the rolling stock, Electromagnetic technical means	Production practice 2 Final certification	RS
		EC2	Technology of maintenance and repair of diesel locomotives				ON7, ON9, ON10	The discipline, based on the requirements of regulatory and technical documents for the repair and maintenance of locomotives, studies the causes of wear and damage to the main components of locomotives, the technology of repair of main and auxiliary systems, repair and maintenance of traction electric machines and control and protection circuit devices, crew parts; methods of improving the repair and maintenance system of locomotives. Develops skills in the development of rational technological processes for the maintenance and repair of locomotives.	Applied Physics, Engineering Mathematics, Labor protection, Energy installations of transport equipment, Rolling stock design, Bases of reliability of the rolling stock, Methods of nondestructive control of the rolling stock, Theory of automatic control	Production practice 2 Final certification	RS

1	2	3	4	5	6	7	8	9	10	11	12
Module 10 - Reliability, diagnostics and repair of rolling stock	PD	EC3	Automation and mechanization of repair of wagons and containers				ON3, ON9	Formation of skills in designing technological processes for manufacturing and repairing parts, assembly units and wagons and containers in general, taking into account optimal automation and mechanization of the work performed. It consists of the following modules: automation and mechanization of production in modern conditions; principles of automatic regulation and control of technological processes during the repair of wagons and containers; characteristics of automatic control units; quality indicators of the automatic control process.	Applied Physics, Engineering Mathematics, Labor protection, Electrical engineering and the basics of electronics, Rolling stock design, Bases of reliability of the rolling stock, Theory of automatic control, IT technologies in transport. Transport equipment and means of mechanization. Equipment and technology of welding and surfacing works, Technology of repair of wagons and containers, Principles of computer-aided design of wagons	Production practice 2 Final certification	RS

1	2	3	4	5	6	7	8	9	10	11	12
Module 11 - Operation of rolling stock	PD	EC1	Technical operation of locomotives	270	9	8	ON5, ON10	Studies the basics of organizing the operation and maintenance of locomotives, students will know and apply the methodology for calculating the indicators of the use of rolling stock. Familiarization of students with the theoretical foundations and principles of the organization of the locomotive fleet, the basics of the scientific organization of the work of locomotive crews. Reveals the basic principles of highly efficient use of locomotives. When studying the discipline, elements of dual education are used - the study of individual modules is provided on the basis of branches of the department at specialized enterprises.	Applied Physics, Engineering Mathematics. Labor protection. Energy installations of transport equipment, Rolling stock design. Bases of reliability of the rolling stock, Heat engineering. Organization of operational work of the railway section, Microprocessor-based automatic locomotive control systems, Traction theory and principles of energy saving	Production practice 2 Final certification	RS
		EC2	Technical operation of wagons				ON5, ON10	The content of the discipline is based on the requirements of regulatory and technical documents in the field of operation of wagons and ensuring transport safety on the railways of the Republic of Kazakhstan. It consists of the following modules: material and technical base and management of operational enterprises; requirements for reliability indicators of wagons; system, organization of works and technology of maintenance of wagons; calculations of indicators of the use of wagons in operation; modern methods of optimization of production. Interactive teaching methods are used, as well as elements of dual training.	Applied Physics, Engineering Mathematics, Labor protection. Energy installations of transport equipment, Rolling stock design. Bases of reliability of the rolling stock, Heat engineering. Organization of operational work of the railway section, Technology of repair of wagons and containers	Production practice 2 Final certification	RS

1	2	3	4	5	6	7	8	9	10	11	12
Module 6 - Economic and managerial competencies	PD	(Min or 1) EC	Managerial Economics (Minor)	90	3	5	ON5	Formation of the conceptual apparatus and development of economic analysis skills using modern models and laws of economic science, consideration of economic problems and tasks facing the head of the company. The study of this discipline will allow students to gain and develop knowledge in the field of analytical research of economic, technological and technical parameters of an enterprise, and will also allow them to master the skills of applying special methods of economic justification of management decisions and assessing their consequences. Active learning methods are used - situational tasks, case method.	Engineering Mathematics, Basics of economics and entrepreneurship	Final certification	TLM
	PD	(Min or 1) EC	Transport logistics (Minor)	90	3	6	ON5	The study of the main provisions of transport support of logistics systems, activities in the field of transportation, covering the entire range of operations and services for the delivery of goods from the manufacturer of products to the consumer, the principles of design and construction of logistics systems. Mastering the skills of optimization and organization of rational cargo flows, their processing in specialized logistics centers, ensuring an increase in their efficiency, reducing unproductive costs and expenses. The teaching methods are: solving problems, conducting thematic colloquiums, seminars "brainstorming". Within the framework of the discipline, guest lectures are conducted by leading specialists of transport and logistics companies.	Engineering Mathematics	Final certification	TLM
	PD	(Min or 1) EC	Resource saving in transport (Minor)	90	3	7	ON4, ON9	The study of the main types and characteristics of energy resources, regulatory and legal support for energy conservation, improving the energy efficiency of the transportation process; energy-saving technologies in repair production and operation of railway infrastructure facilities; organization and methods of energy conservation management. They are used to solve problems, conduct thematic colloquiums, debates. Guest lectures are being held by leading experts of the transport and communication industry.	Applied Physics, Engineering Mathematics, Ecology and life safety	Final certification	RS

1	2	3	4	5	6	7	8	9	10	11	12
Module 4 -IT competencies	PD	(Min or 2) EC	Time - management (Minor)	90	3	5	ON5	Formation of students' general ideas about the essence and types of time management, principles and methods of time resource management for more successful professional activities. Active learning methods are used - situational tasks, case method.	Engineering Mathematics,	Final certification	TLM
		(Min or 2) EC	Fundamentals of rolling stock design (Minor)	90	3	6	ON3, ON9	Systematize traditional methods and modern software systems for automated design of wagons and locomotives. Determine the optimal parameters of the rolling stock and its linear dimensions. Apply modern methods of developing design documentation when designing components and parts of CAD rolling stock and CAD applications: QCAD, FreeCAD, etc.).	Applied Physics, Engineering Mathematics, Theoretical mechanics, Machine parts and design basics, Rolling stock design	Final certification	RS
		(Min or 2) EC	PowerBI Business Analytics (Minor)	90	3	7	ON3, ON5	Formation of students' skills and knowledge to collect, analyze and structure data in order to build interactive dashboards, program at the modern level of development of the MDX multidimensional data analysis language, build models and algorithms of projects in relevant areas of BI technology, be able to analyze the essence of the project subject field and make decisions. Methods of active learning are used - brainstorming, working in small groups. The form of control is an individual project.	Engineering Mathematics,	Final certification	ICT

Head of the Department "Rolling stock"

Ashirbayev G.K.