AGREED
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«18» ____03___ 2025 y.

CATALOG OF DISCIPLINES OF THE COMPONENT BY CHOICE

EDUCATIONAL PROGRAMS **6B07187 - Engineering management of the carriage complex**

Level of education: bachelor course **Time of study: 3 years** **Year of admission: 2025 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		3	4	5	6	7	8	9	10	11	12
M5 - Module of economic and managerial competencies	GED	EC1	Ecological sustainable technologies	150	5	6	LR4	Discipline "Ecological sustainable technologies". technologies" studies modern methods and innovative solutions aimed at minimizing the negative impact of human activities on the environment. The course covers the principles of sustainable development, energy saving technologies, renewable energy sources, waste management strategies and environmentally friendly production processes.	Applied Physics, Engineering Mathematics 1,2	Occupational safety and health, Industrial practice 1,2, Final certification	MV &LS
	GED	EC2	Green economy and sustainable entrepreneurship				LR4 LR5	The discipline "Green Economy and sustainable entrepreneurship" is devoted to the study of environmentally oriented economic models and business strategies aimed at sustainable development. The course covers green economy concepts, ESG (Environmental, Social, Governance) approaches, circular economy, sustainable business models and their impact on global markets.	Engineering Mathematics 1,2, Sociology, Cultural Studies, Political Science, Psychology, History of Kazakhstan	Managerial Economics / Time Management, Production practice 1,2, Final certification	TLM

1	2	3	4	5	6	7	8	9	10	11	12
M5 - Module of economic and managerial competencies	GED	EC3	Fundamentals of Financial Literacy	150	5	6	LR5	The discipline is aimed at developing the ability to make informed financial decisions, plan income and expenses, assess risks and effectively manage their resources in a market economy. Studies basic knowledge in the field of finance and rational money management, discusses the concepts of the financial system, budget, banking products, lending, savings, investment, insurance, taxation and protection against financial fraud	Engineering Mathematics 1,2	Managerial economics / Time management, Production practice 1,2, Final certification	TLM
	GED	EC4	Digital inclusion				LR1	RO3 discipline "Digital Inclusion" is dedicated to studying the principles of ensuring equal access to digital technologies and information for all social groups, including people with disabilities. The course examines barriers to digital inequality, strategies to overcome them, technologies for adapting the digital environment, and government initiatives to develop an inclusive digital society.	Applied Physics, Engineering Mathematics 1,2, Sociology, Cultural Studies	IT technologies in transport, Production practice 1,2, Final certification	ICT
	GED	EC5	Fundamentals of scientific research				LR6	The discipline introduces the basics of scientific activity, covering its goals, methods and forms, contributing to the formation of theoretical knowledge and practical skills necessary for the successful conduct of scientific research in a chosen professional field, as well as developing the ability to independently search, analyze and apply scientific information, which becomes an important basis for further research and professional activities	Applied Physics, Engineering Mathematics, Theoretical Mechanics	Dynamics of wagons, Digitalization of processes of management and technical support of the wagon complex, Automation of technological processes	SHD &PE
	GED	EC6	Fundamentals of law and anti-corruption culture				LR1	The discipline sets out the fundamental concepts of law, the constitutional structure of state power of the Republic of Kazakhstan, the rights and freedoms of citizens enshrined in the Constitution, the mechanism and protection of legitimate human interests if they are violated. The discipline provides students with an increase in public and individual legal awareness and legal culture, as well as a system of knowledge and civic position on combating corruption as an anti-social phenomenon.	Sociology, Cultural Studies, Political Science, Psychology, History of Kazakhstan	Production practice 1,2, Final certification	SHD &PE

1	2	3	4	5	6	7	8	9	10	11	12
M7-Professional module	BD	EC	The future of rail transport and its importance for sustainable development	120	4	1	LR5	The discipline forms the idea of railway transport as a strategically important industry that promotes sustainable development, territorial integration and social mobility. The key components of the transport system, its importance for the economy and society, historical stages and modern vectors of development are studied. The key digital and technological transformations of the industry, the role of the engineer of the future, and the importance of engineering thinking and management in the context of ensuring safety and meeting future requirements are considered.	Basic school education	Disciplines of PD, Educational practice	RS
	BD	EC	Engineering profession in the railway industry of the future				LR5	The course is aimed at forming a holistic image of the profession of an engineering manager in the field of railway transport enterprises. The key trends of the industry are being studied: digitalization, transition to green energy, artificial intelligence. Through real success stories, professional tasks, role-playing cases and analysis of global challenges, students form a vision of their career and the value of technical thinking and an understanding of responsibility for compliance of engineering solutions with ethical and legal standards.	Basic school education	Disciplines of PD, Educational practice	RS
	BD	EC1	Heat engineering	120	4	3	LR2	Studies the basics of heat generation, conversion, transmission and use, 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 plants, 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 1,2,	Energy installations of transport equipment, Life support systems for passenger cars	RS
	BD	EC2	Mechanics of liquid and gas, hydraulic and pneumatic drive				LR2	He studies the general laws and equations of fluid dynamics, modes of fluid motion and the basics of hydrodynamic similarity, laminar and turbulent fluid motion, hydraulic resistances, fluid flow through holes and nozzles, hydraulic calculation of pipelines, volumetric hydraulic machines, hydraulic drives and hydraulic automatics, pneumatic drive, pneumatic motor, pumps, hydraulic motors, fans, hydrodynamic gears, hydraulic drives metal cutting tools. The teaching methods are: problem solving, conducting thematic surveys, open and closed tests.	Applied Physics, Engineering Mathematics 1,2,	Energy installations of transport equipment	RS

1	2	3	4	5	6	7	8	9	10	11	12
M7-Professional module	BD	EC1	Fundamentals of calculating the strength of machines and mechanisms	150	5	3	LR6	Studies the basics of the theory of mechanisms and machines, material resistance, calculation and design of general-purpose parts and assemblies widely used in machines to solve problems aimed at improving reliability It is necessary to ensure the reliability and durability of parts and assemblies in the design , construction and operation, using modern educational and information technologies. Active learning methods – performing individual calculation and graphic tasks.	Applied Physics, Engineering Mathematics 1,2, Theoretical Mechanics	Machine parts and design fundamentals, Fundamentals of rolling stock reliability	MV&LS
		EC2	Applied Mechanics				LR2, LR6	The discipline develops practical skills in applying the laws of theoretical mechanics and resistance of materials to calculate the strength, rigidity and stability of machine elements and engineering structures, as well as to analyze their movement and interaction under various types of loads, in order to further design of reliable and efficient technical systems.	Applied Physics, Engineering Mathematics 1,2, Theoretical Mechanics	Machine parts and design fundamentals, Fundamentals of rolling stock reliability	TS
	BD	EC1	Rolling stock and railway infrastructure	180	6	3	LR5 LR10	Formation of professional competencies in the field of design and operation of the railway rolling stock fleet in interaction with railway infrastructure objects.Regulatory and technical base regulating requirements for railway rolling stock and railway infrastructure elements; track and track equipment economy; electric power supply of railways; design features of locomotives and wagons; locomotive and wagon economy; rules of technical operation; automation, telemechanics and communication on railways; organization of transportation and train movement.	Applied Physics, Engineering Mathematics 1,2, Structural materials in transport engineering, Theoretical mechanics	Energy installations of transport equipment, Carriage design, Carriage dynamics, Fundamentals of rolling stock reliability, Modern car brakes and technological aspects of traffic safety, Fundamentals of technical operation of transport equipment / Transport safety and train traffic control systems, Specialized rolling stock of the carriage fleet	RS
		EC2	Transport equipment and means of mechanization				LR6 LR10	The discipline studies the principles of operation, design features of transport equipment and means of mechanization, the main 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 1,2, Theoretical Mechanics	Energy installations of transport equipment, Construction of wagons, Fundamentals of technical operation of transport equipment / Transport safety and train traffic control systems, Fundamentals of reliability of rolling stock, Specialized rolling stock of the wagon fleet.	MV&LS

1	2	3	4	5	6	7	8	8	10	11	12
M7-Professional module	BD	EC	Technical diagnostics of wagons	180	6	3	LR8	The discipline examines modern methods of technical diagnostics of components and parts of wagons: non-destructive testing, vibration diagnostics, thermography. Skills are being developed to assess the technical condition using equipment, interpret data to determine compliance. Malfunction risks are analyzed, solutions for effective repair planning are substantiated, taking into account safety requirements and regulatory documentation in the context of digital transformation and sustainable development.	Applied Physics, Engineering Mathematics 1,2, Structural materials in transport engineering, Construction of wagons	Modern technologies of repair of wagons , Operation and maintenance of wagons, Information and documentation support for compliance and the life cycle of wagons, Production practice 1, Industrial (pre-graduate) practice 2, Final certification	RS
		EC1	Methods of non-destructive testing of rolling stock				LR8, LR10	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 detection of rolling stock malfunctions are considered. Mastering and developing practical skills: working with modern diagnostic devices and flaw detectors; understanding and analyzing the results obtained. Training methods used: working with diagnostic equipment, group work, discussion.	Applied Physics, Engineering Mathematics 1,2, Structural materials in transport engineering, Construction of wagons	Modern technologies of repair of wagons , Operation and maintenance of wagons, Information and documentation support for compliance and the life cycle of wagons, Production practice 1, Industrial (pre-graduate) practice 2, Final certification	RS

1	2	3	4	5	6	7	8	9	10	11	12
M 7-Professional module	BD	EC1	Fundamentals of technical operation of transport equipment	120	4	8	LR5, LR10	Training of specialists who have the skills of professional activity in the field of technical operation of transport equipment in and the full use of machines and their maintenance in working condition in accordance with the nature of future work at a particular enterprise. The discipline covers the study of the following issues: operability and regularities of changes in the technical state of equipment; system of maintenance and repair of transport equipment; definition of standards; structure and resources of engineering and technical services; methods of decision-making in the management of maintenance and repair of transport equipment.	Rolling stock and railway infrastructure/ Transport equipment and means of mechanization, Modern car brakes and technological aspects of traffic safety	Management of wagon complex enterprises, Production (pre-graduate) practice 2, Final certification	MV&LS
		EC1	Transport safety and train traffic management systems				LR5, LR10	The discipline is devoted to the study of theoretical and practical aspects of ensuring safety in railway transport, as well as the principles of building and operating modern train traffic control systems. The course covers a wide range of issues related to the prevention of terrorist acts and other illegal activities, the protection of critical infrastructure, as well as ensuring train safety through the use of modern control systems.	Rolling stock and railway infrastructure/ Transport equipment and means of mechanization. Modern car brakes and technological aspects of traffic safety	Management of wagon complex enterprises, Production (pre-graduate) practice 2, Final certification	TLM

1	2	3	4	5	6	7	8	9	10	11	12
M 7-Professional module	PD	EC1	Electric machines and electric drive of modern control systems.	180	6	4	LR2 LR7	The processes of electromechanical energy conversion, principles of operation, characteristics and operational features of electric machines and electric drives are studied. Skills are being developed for: informed choice of electrical equipment with an emphasis on energy conservation, digitalization, compliance with standards and sustainable development; work with regulatory and technical documentation; modeling electromagnetic processes; developing technical justification for innovative engineering solutions and assessing their safety. Interactive methods and elements of dual learning are used.	Electrical engineering and the basics of electronics, Applied Physics	Labor protection and life safety, Passenger car life support systems	RS
		EC2	Electromagnetic technical mediationelements of dual training.				LR2 LR7	Studies the design, principle of operation, classification and characteristics of electrical machines and transformers for general industrial applications, equations of EMF, voltages, currents and torques, methods of starting and regulating the frequency of electric motors, physical working conditions, losses and efficiency. The discipline contributes to the analysis of technical solutions to improve performance and the application of engineering methods for calculating the parameters of electrical energy converters. Interactive teaching methods, case studies, problem solving, and test tasks are used.	Electrical engineering and the basics of electronics, Applied Physics	Labor protection and life safety, Passenger car life support systems	RS
M4-Module of information technologies and artificial intelligence	BD	EC1	Digitalization of management processes and technical support of the wagon fleet	120	4	8	LR3 LR8 LR10	The discipline introduces automated carriage management systems and digital solutions in the technical support of the carriage complex, including diagnostics, condition forecasting and visualization of processes. The skills of risk analysis, interpretation of operational data, and development of management decisions and process compliance control are mastered. Digital, analytical, and managerial competencies are being developed in the context of security, sustainable development, compliance with standards, and industry transformation.	Information and communication technologies, Fundamentals of scientific research, The basics of lean manufacturing / The organization of production and management of the enterprise, Modern technologies of repair of wagons, Modern welding technologies in repair of wagons	Management of wagon complex enterprises, Industrial (pre-graduate) practice 2, Final certification	RS
		EC1	Automation of technological processes				LR3 LR9	PO9 Competencies are formed in the field of design, implementation and maintenance of automated production control systems processes. The architecture and algorithms of automated systems, modeling and management of technical processes using specialized software are studied. Elements of AI for adaptive control are being mastered. The approach is focused on sustainable development through digitalization, energy efficiency, loss reduction and increased reliability of operational systems. Elements of scientific research methods are used: system analysis, modeling and justification of engineering solutions.	Information and communication technologies, Fundamentals of scientific research, Fundamentals of lean manufacturing / The organization of production and management of the enterprise, Modern technologies of repair of wagons, Modern welding technologies in repair of wagons	Management of wagon complex enterprises, Industrial (pre-graduate) practice 2, Final certification	RS

1	2	3	4	5	6	7	8	9	10	11	12
M4 - Module of information technologies and artificial intelligence	BD	EC1	Dynamics of wagons	120	4	8	LR3 LR6	The patterns of movement and fluctuations of wagons under various operating conditions, methods of stability analysis and traffic safety are studied. Competencies are being formed for calculating the dynamic characteristics of freight and passenger wagons using software tools (Mathcad, SolidWorks, Universal Mechanism), calculating applied problems of wagon dynamics based on AI algorithms. Elements of scientific research methods are used: system analysis, modeling and justification of engineering solutions.	Applied Physics, Engineering Mathematics 1,2, Engineering graphics and computer modeling, Construction of wagons, Information and communication technologies, Fundamentals of scientific research	Industrial (pre-graduate) practice 2, Final certification	RS
		EC2	IT technologies in transport				LR3, LR10	Studies the principles of forming information flows, managing information flows in transport systems of different levels of complexity, general principles of building intelligent transport systems (ITS), routing transport and monitoring its operation when using ITS, design of information systems, organization of information exchange between control objects, methods of automated identification of transport objects, methods of location determination, application of information technology in the design of vehicles.	Information and Communication Technologies, Fundamentals of Python Programming, Applied Physics, Engineering Mathematics 1,2, Electrical engineering and fundamentals of electronics, Engineering graphics and computer modeling	Management of wagon complex enterprises, Digital technologies and automation in the repair of wagons, Digital engineering management, Final certification	ICT
M5 - Module of economic and managerial competencies	BD	EC1	Managerial economics	90	3	6	LR5	Formation of the conceptual framework and development of economic analysis skills using modern models and patterns of economic science, consideration of economic problems and tasks facing the head of the company. Studying this discipline will allow students to gain and develop knowledge in the field of analytical research of economic, technological and technical parameters of the enterprise, as well as to master the skills of applying special methods of economic justification of management decisions and assessing their consequences.	Engineering Mathematics 1,2, Fundamentals of Financial Literacy, Green Economy and Sustainable Entrepreneurship	Fundamentals of lean manufacturing, Production organization and enterprise management, Digital engineering management	TLM
		EC2	Time management				LR5	discipline studies a system of methods, tools and approaches that are aimed at effective time management in order to achieve set goals. The course is designed to improve the skills of organizing and optimizing the use of working time, increase productivity, reduce stress, plan, delegate, use tools and technologies, and know your time and energy rhythms in order to use your time effectively.	Engineering Mathematics 1,2, Fundamentals of Financial Literacy, Green Economy and Sustainable Entrepreneurship	Fundamentals of lean manufacturing, Production organization and enterprise management, Digital engineering management	TLM

1	2	3	4	5	6	7	8	9	10	11	12
M5 - Module of economic and managerial competencies	BD	EC1	The basics of lean manufacturing	120	4	7	LR5	The discipline builds an understanding of the principles of lean manufacturing for increased efficiency and sustainable development. The methods of identifying and eliminating losses, visualizing processes, standardization, and digitalization are being studied. Managerial and analytical competencies are being developed, including risk assessment and decision-making based on production and economic indicators, ensuring product quality and compliance with established requirements and approaches to resource optimization.	Managerial economics, Time management,	Digitalization of processes of management and technical support of the carriage complex / Automation of technological processes	RS
		EC2	Production organization and enterprise management				LR5	The discipline reveals the basics of the organization of production processes and enterprise management, taking into account modern requirements of sustainable development. Methods of planning, rationing, risk analysis, quality management, decision-making and ensuring compliance of products and processes with standards are mastered. Digital optimization tools, automation elements, production and economic indicators and approaches to increasing efficiency, reducing losses and rational use of resources in industrial practice are considered.	Managerial economics, Time management	Digitalization of processes of management and technical support of the carriage complex / Automation of technological processes	RS
M4 - Module of information technologies and artificial intelligence	PD	EC1	Digital technologies and automation in the repair of wagons	150	5	9	LR3, LR9	Digital technologies and automatic control systems used in the repair of wagons are being studied. Competencies for designing and optimizing technological processes are being formed, taking into account production efficiency, quality, sustainability and compliance of repair work with regulatory documentation. Automation methods, technologies for creating 3D models of necessary spare parts and their production, replacement of parts and maintenance are being mastered. Technological and managerial risks are analyzed. The following elements are used: scientific analysis, quality control, dual and interactive learning.	Information and communication technologies, IT technologies in transport, Basics of Python programming, Modern technologies for the repair of wagons, Modern welding technologies in the repair of wagons Labor protection and safety of life	Industrial (pre-graduate) practice 2, Final certification	RS
		EC2	Digital Engineering Management				LR3 LR5	Digital approaches to the management of engineering processes of the carriage and locomotive complex are being studied, including the analysis of operational data, modeling and risk assessment. Digital design, quality management, and resource management skills are being developed. Scientific analysis methods and digital platforms are used. The focus is on management decisions, efficiency improvement, sustainable development and digital transformation of the industry.	Information and communication technologies, IT technologies in transport, Managerial economics / Time management	Industrial (pre-graduate) practice 2, Final certification	RS

1	2	3	4	5	6	7	8	9	10	11	12
M4 - Module of information technologies and artificial intelligence	PD	EC1	Life support systems for passenger cars	120	4	7	LR6 LR9	Formation of skills of diagnostics and technical calculation of life support systems of passenger cars of various types, in order to determine their optimal characteristics, for rational practical application in operation. Study of: modern designs of life support systems for passenger cars, their rational technical and technological solutions; regulatory and technical documentation for maintenance and repair of life support systems for passenger cars. Interactive teaching methods, elements of dual training are used.	Information and communication technologies, Electrical engineering and fundamentals of electronics, Fundamentals of Python programming, Thermal engineering, Power plants of transport equipment, Electric machines and electric drive/ Electromagnetic technical means	Operation and maintenance of wagons, Industrial (pre-graduate) practice 2	RS
		EC2	Information and documentation support for compliance and the life cycle of wagons				LR8 LR9 LR10	Study of the regulatory and technical base and procedures for assessing the conformity of wagons. Competencies for working with technical, repair and accompanying documentation of the life cycle are being formed. The basics of conformity assessment and identification methods are considered. Information systems and digital tools for document management, compliance control, and information support for operation and repair are being mastered.	Information and communication technologies, Technical diagnostics of wagons / Methods of non-destructive testing of rolling stock	Operation and maintenance of wagons , Management of wagon complex enterprises, Industrial (pre-graduate) practice 2	RS

1	2	3	4	5	6	7	8	9	10	11	12
M9-Sustainable development and standards in transport engineering/Module of the additional educational	PD	EC1	Design and calculation of components and parts of rolling stock	90	3	7	LR3 LR6	PO3 PO6 PO8 Methods of engineering analysis, strength calculations and selection of materials for rolling stock components are mastered using modern CAD/CAE/CAM systems (SolidWorks, MathCAD, COMPASS-3D). Digital competencies are being developed in the field of parametric modeling, visualization and optimization of structures with an emphasis on resource conservation, environmental friendliness and the use of IT tools at all stages of the product life cycle. Elements of scientific research methods are used: system analysis, modeling and justification of engineering solutions.	BD and PD disciplines	Production practice, Final certification	RS
		EC2	Minor program 1				LR1	The first of three disciplines, which allows you to form additional professional competencies in various subject areas.	BD and PD disciplines	Production practice, Final certification	RS
		EC1	Resource saving in transport	90	3	8	LR5 LR7, LR10	Study of the main types and characteristics of energy resources, regulatory support for energy saving, improving the energy efficiency of the transportation process; energy-saving technologies in repair production and operation of transport infrastructure facilities; organization and methods of energy saving management. It is used to solve problems, conduct thematic colloquiums, debates. Guest lectures are being held by leading experts of the transport and communication industry.	BD and PD disciplines	Production practice, Final certification	RS
		EC2	Minor program 2				LR3	is the second of three disciplines that allows you to form additional professional competencies in various subject areas.	BD and PD disciplines	Production practice, Final certification	RS
		EC1	Technical rationing and legal aspects of rolling stock	90	3	9	LR5 LR10	Regulatory and legal bases for ensuring safe, efficient and environmentally sustainable operation of rolling stock are studied. Methods of technical regulation, risk assessment and legal regulation in the transport industry are being developed. Competencies are formed in the field of compliance with the requirements of technical documentation, standards and legislation. Approaches to sustainable life cycle management of railway rolling stock are analyzed.	BD and PD disciplines	Production practice, Final certification	RS
		EC2	Minor program 3				LR5	The third of the three disciplines, which allows you to develop additional professional competencies in various subject areas.	BD and PD disciplines	Production practice, Final certification	RS
			Total	**2220**	**74**						