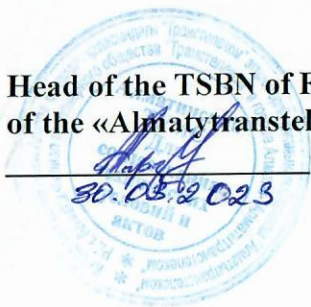


Head of the TSBN of FOCL
of the «Almaty transtelecom» branch
Myrzabayev A A.



CATALOG OF ELECTIVE SUBJECTS

EDUCATIONAL PROGRAM: 6B06208 Telecommunication systems and r.c.networks

Degree to be conferred: bachelor

Period of study: 4 years old

Year of admission: 2023 y.

Module	Cycle	Component	Name of discipline	Overall labor intensity		Term	Learning outcomes	Brief description of the discipline	Prerequisites	Postrequests
				in academic hours	in academic hours					
1	2	3	4	5	6	7	8	9	10	11
Module 5- Ecology and life safety	GED	EC 1	Ecology and life safety	150	5	3	LO 6	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).	Basic school knowledge of ecology	Labor protection
Module 1- General education subjects		EC 2	Scientific research methods				LO 11	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	Socio-political knowledge module	Educational practice, Industrial practice 1, Industrial practice 2, Final certification
Module 3- Economic and managerial competencies		EC 3	Basics of economics and entrepreneurship				LO 11	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	Socio-political knowledge module	Managerial Economics, Time Management

		EC 4	Basics of law and anti-corruption culture				LO 11	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	Socio-political knowledge module	Managerial Economics, Time Management
Module 4-IT competencies	BD	EC 5	Fundamentals of computer networks and telecommunications (Cisco + Huawei)	180	6	4	LO 3	Mastering the principles of building and functioning of local, regional, global computer networks and mobile telecommunications by students, as well as gaining practical skills in working with their information resources, working with Cisco and Huawei networks, SD-WAN and SDN. Active learning methods - "simulator" learning methods, i.e. aimed at the formation of special knowledge, skills: situational tasks, error detection method, project method, case method, open and closed tests	Information and communication technologies, Fundamentals of computer modeling	Robot control systems/Software testing, Multiservice telecommunication networks/Broadband access systems, Video surveillance and alarm systems/Security monitoring systems, Information security tools in telecommunication systems, Computer-aided design systems in Telecommunications, Production Practice 1, Production Practice 2, Introduction to MongoDB, Software-protected infocommunications, Machine Learning A-Z: Python & R in Data Science, Restoration of operability of software and hardware of the infocommunication system and/or its components after failures

		EC 6	Cloud Infrastructure Basics			LO 3	Mastering the technology of creating a cloud service, working with existing cloud services, students will learn how to use cloud computing and will be ready to use cloud computing technology in solving problems of optimizing IT processes. Within the framework of the discipline, interactive teaching methods, the calculation-analytical method, the case-task method, game methods are used	Information and communication technologies, Fundamentals of computer modeling	Robot control systems/Software testing, Multiservice telecommunication networks/Broadband access systems, Video surveillance and alarm systems/Security monitoring systems, Information security tools in telecommunication systems, Computer-aided design systems in Telecommunications, Production Practice 1, Production Practice 2, Introduction to MongoDB, Software-protected infocommunications, Machine Learning A-Z: Python & R in Data Science, Restoration of operability of software and hardware of the infocommunication system and/or its components after failures
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Module 7- General Engineering competencies	BD	EC 7	Robot control systems	180	6	5	LO 7	Mastering the basics of robotics, designing robots based on the Arduino complex and programming in the Arduino IDE development environment. Teaching methods are: problem solving, holding thematic colloquia, brainstorming seminars	Engineering Mathematics, Fundamentals of Computer Modeling, Fundamentals of Computer Networks and Telecommunications (Cisco +Huawei)/ Fundamentals of Cloud Infrastructure, Digital Electronics/Digital Devices and Microprocessors	Computer-aided Design Systems in Telemechanics, Introduction to MongoDB, Machine Learning from A to Z: Python & Run Data Science
		EC 8	Software testing				LO 7	Formation of knowledge and skills on software quality control - verification and testing of software products. Active learning methods: case methods; business role-playing games, group work	Engineering Mathematics, Fundamentals of Computer Modeling, Fundamentals of Computer Networks and Telecommunications (Cisco +Huawei)/ Fundamentals of Cloud Infrastructure, Digital Electronics/Digital Devices and Microprocessors	Computer-aided Design Systems in Telemechanics, Introduction to MongoDB, Machine Learning from A to Z: Python & Run Data Science

1		2	3	4	5	6	7	8	9	10
Module 8- Telecommuni- cation Technologies	BD	EC 9	Multiservice telecommunic- ation networks	180	6	6	LO 5	Mastering competencies in the field of building modern urban multiservice networks and IP / MPLS networks using wired communication. Within the framework of the discipline, interactive methods of teaching case-learning are used	Fundamentals of Telecommunications, Communication Theory, Fundamentals of Computer Networks and Telecommunications (Cisco +Huawei)/ Fundamentals of cloud infrastructure, Production practice 1	Multichannel digital transmission systems, Production practice 2, Restoration of operability of software and hardware of the infocommunication system and/or its components after failures
		EC 10	Broadband access systems				LO 5	Formation of students' knowledge in the features of building modern networks and systems of broadband access (BBA), providing a variety of communication services to both fixed and mobile subscribers, as well as the features of the technical characteristics of BBA of various standards. Methods of active learning are applied: calculation-analytical method, case-task method, game methods	Fundamentals of Telecommunications, Communication Theory, Fundamentals of Computer Networks and Telecommunications (Cisco +Huawei)/ Fundamentals of cloud infrastructure, Production practice 1	Multichannel digital transmission systems, Production practice 2, Restoration of operability of software and hardware of the infocommunication system and/or its components after failures

Module 8- Telecommunication Technologies	BD	EC 11	IP telephony and Internet protocols	180	6	6	LO 9	Students study the purpose and functions of video surveillance, structural diagrams and characteristics of equipment that is part of video surveillance systems. Application of methodologies and techniques for designing video surveillance systems, obtaining practical skills in the development of technical means of protection using television	Fundamentals of Telecommunications, Fundamentals of Computer Networks and Telecommunications (Cisco +Huawei)/ Basics of Cloud infrastructure	Satellite monitoring of rolling stock and railway infrastructure/Wireless communication technologies, Production practice 2, Final certification
		EC 12	Switching systems in communication networks				LO 9	Study of the principles of construction and functioning of switching systems for various purposes, built using channel switching and packet switching technologies	Fundamentals of Telecommunications, Fundamentals of Computer Networks and Telecommunications (Cisco +Huawei)/ Basics of Cloud infrastructure	Satellite monitoring of rolling stock and railway infrastructure/Wireless communication technologies, Production practice 2, Final certification
Module 7- General Engineering competencies	BD	EC 13	Digital electronics	180	6	3	LO 1, LO 2	Formation of students' ideas about digital electronics, the basics of digital circuitry, the principles of operation and design of digital devices. The course deals with the basic methods of description and synthesis of logic circuits, modern tools for the development of digital devices	Engineering Mathematics	Educational practice, Robot control systems/Software testing, Multichannel digital Transmission systems, Robot Control Systems/Software testing, Digital transceivers, Software-protected infocommunications, Restoration of operability of software and hardware of the infocommunication system and/or its components after failures

Module 7- General Engineering competenci es	BD	EC 14	Digital devices and microprocesso rs	180	6	3	LO 5	<p>It is focused on studying the theoretical and practical foundations of the functioning of digital devices and microprocessors in order to create circuit diagrams of communication devices and infocommunication technology. Within the framework of the discipline, interactive teaching methods, a calculation-analytical method, and a case-task method are used. The form of control is a creative exam</p>	Engineering Mathematics	<p>Educational practice, Robot control systems/Softw are testing, Multichannel digital Transmission systems, Robot Control Systems/Softw are testing, Digital transceivers, Software- protected infocommunic ations, Restoration of operability of software and hardware of the infocommunic ation system and/or its components after failures</p>
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Module 8- Telecommu- nication Technologies	BD	EC 15	Circuit design	180	6	3	LO 12	Formation of students' knowledge and skills in the field of construction and functioning, ongoing physical processes, methods of analysis of the simplest electronic devices, as well as synthesis of more complex devices based on them	Engineering Mathematics, Applied Physics	Power supply and special measurements in communication technology, Robot control systems/Software testing
		EC 16	Digital signal processing				LO 1	Clarification of the role and significance of digital signal processing in the reception and transmission of information, the features and advantages of digital representation of signals, the study of digital transformation algorithms, the implementation of digital processing in telecommunications, information-measuring and radiophysical systems and its application in various fields of science, technology and production	Engineering Mathematics, Applied Physics	Power supply and special measurements in communication technology, Robot control systems/Software testing
	PD	EC 17	Railway automation and telemechanics systems	180	6	5	LO 4	The study of the main elements and systems of railway automation, telemechanics and communication, designed: to control the technological process in railway transport; to ensure the safety of train traffic and the quality of passenger service. Within the framework of the discipline, field classes are provided to the branch of the department and guest lectures by top managers	Digital Electronics/Digital devices and microprocessors	Guiding telecommunication systems, Digital operational and technological communication/Theoretical foundations of communication systems with mobile objects
		EC 18	Operational basics of automation and telemechanics				LO 4	Familiarization of students with railway automation and telemechanics systems, their use in the transportation process to ensure the safety of train traffic; the effectiveness of the systems used for different types of roads with different traffic intensity. Within the framework of the discipline, field classes are provided to the branch of the department and guest lectures by top managers	Digital Electronics/Digital devices and microprocessors	Guiding telecommunication systems, Digital operational and technological communication/Theoretical foundations of communication systems with mobile objects

Module 8- Telecommunication Technologies	PD	EC 19	Digital operational and technological communication	180	6	8	LO 4	Formation of a systematic understanding, skills and abilities of students on the basics of operational and technological communication in railway transport (OTS), sufficient for subsequent operation, administration and maintenance of OTS systems in railway transport. During the training, the student must study the basic principles of building modern OTS systems; know the basic characteristics of digital OTS equipment; learn the basics of designing, operating, administering and maintaining digital OTS systems. Within the framework of the discipline, field classes are provided to the branch of the department and guest lectures by top managers	Railway automation and telemechanics systems/Operational basics of automation and telemechanics	Production practice 2, Final certification
		EC 20	Theoretical foundations of communication systems with mobile objects				LO 2	After studying the course, the student, based on a general understanding of the tasks solved by communication systems with mobile objects of various types, will be able to set and solve specific problems of synthesis and analysis of communication systems and networks, based on the methods of the theory of electrical communication, probability theory and mathematical statistics	Railway automation and telemechanics systems/Operational basics of automation and telemechanics	Production practice 2, Final certification
	PD	EC 21	Satellite monitoring of rolling stock and railway infrastructure	180	6	7	LO 4, LO 9	It is focused on the study of professional GPS/GLONASS monitoring systems of SHTURMAN company, which fully provide control of cargo transportation in Kazakhstan and movement of railway transport, containers, as well as control of fuel consumption of shunting locomotives (when working at railway stations, for moving wagons and drawing up railway trains). The discipline provides field classes in SHCH-33 (elements of dual education)	Fundamentals of Radio engineering and Telecommunications, Robot Control Systems/Software testing, Multiservice telecommunication networks/Broadband access systems, IP telephony and Internet protocols/Switching systems in communication networks	Production practice 2, Final certification

	PD	EC 22	Wireless communication technologies	180	6	7	LO 8	It is focused on teaching students the principles of organization and technologies of wireless communication (BS), methods of channel separation, their differences from standard PM channels; methods of signal separation using optical and radio communications, technical concepts of building BS systems; systems with spectrum expansion, as well as the principles of building wireless local area networks	Fundamentals of Radio engineering and Telecommunications, Robot Control Systems/Software testing, Multiservice telecommunication networks/Broadband access systems, IP telephony and Internet protocols/Switching systems in communication networks	Production practice 2, Final certification
Module 3- Economic and managerial competencies		EC 23	Managerial Economics (Minor 1)	90	3	5	LO 10	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	Fundamentals of Economics and Entrepreneurship, Fundamentals of Law and Anti-corruption Culture	Final certification
		EC 24	Time - management (Minor 2)				LO 10	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	Fundamentals of Economics and Entrepreneurship, Fundamentals of Law and Anti-corruption Culture	Final certification

Module 4-IT competencies	EC 25	Introduction to MongoDB (Minor 1)	90	3	6	LO 3	Formation of students' ability to process large amounts of data (MongoDB) to solve professional problems, effectively apply methods, technologies and tools for analyzing big data in professional activities. Methods of active learning are applied - group work	Fundamentals of Computer Networks and Telecommunications (Cisco +Huawei)/ Fundamentals of Cloud Infrastructure, Robot Management Systems/Software testing	Final certification
	EC 26	Machine Learning A-Z: Python & R in Data Science (Minor 2)				LO 3	Introducing students to the field of Data Science and Machine Learning, which covers data visualization, data analysis, libraries and open source tools. Methods of active learning are applied - group work	Fundamentals of Computer Networks and Telecommunications (Cisco +Huawei)/ Fundamentals of Cloud Infrastructure, Robot Management Systems/Software testing	Final certification

Module 4-IT competencies	EC 27	Software-protected infocommunications (Minor 1)	90	3	7	LO 12	To teach students the basic principles and methods of information security in modern infocommunication systems, approaches to the construction, maintenance and analysis of secure automated systems, as well as to promote the formation of a scientific worldview and the development of systems thinking. Interactive teaching methods - case methods	Information security tools in Telecommunication systems, Fundamentals of Computer Networks and Telecommunications (Cisco +Huawei)/ Fundamentals of Cloud Infrastructure, Digital Electronics/Digital Devices and Microprocessors	Final certification
	EC 28	Restoring the functionality of the software and hardware of the infocommunication system and/or its components after a failure (Minor 2)				LO 4, LO 12	The study of the principles of construction and architecture of modern operating systems and environments that provide the organization of computing processes in corporate information systems for economic, managerial, industrial, scientific and other purposes. Interactive teaching methods - game methods	Information security tools in Telecommunication systems, Fundamentals of Computer Networks and Telecommunications (Cisco +Huawei)/ Fundamentals of Cloud Infrastructure, Digital Electronics/Digital Devices and Microprocessors	Final certification
Total			2040	68					

Head of the Department "ICT" _____  D.T. Kasymova