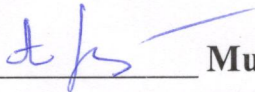


AGREED

Chairman of the
Educational and Methodological
Council of JSC «International Information
Technology University»

 **Mustafina A.**

«12» December 2024 Protocol of the EMC № 3

APPROVED

Chairman of the Board-Rector of JSC
«International Information
Technology University»



Issakhov A.

«28» February 2025 Protocol of the AC № 10

EDUCATIONAL PROGRAM

6B06201 Telecommunication systems and networks

Code and classification of the field of education: 6B06 Information and communication technologies

Code and classification of training area: 6B062 Telecommunications

Group of educational programs: B059 Communications and communications technologies

ISCED level: 6

NQR level: 6

ORC level: 6

Academic degree awarded: Bachelor's degree in Information and Communication Technologies of the educational program «6B06201 Telecommunication systems and networks»

Duration of study: 4 years

Number of credits: 240

AGREED

President
«ASTEL» JSC

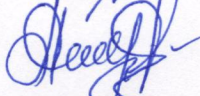
 **Breusov V.**
« » 2025

AGREED

General Director
«Optical technologies» LLP

 **Emirov S.**
« » 2025

The code and name of the educational program: **6B06201 Telecommunication systems and networks**

№	Educational program developers (Position, scientific degree, academic degree, Full name)	Signature
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2	Aitmagambetov Altay Zufarovich – Candidate of Technical Sciences, Professor of the Department of Radio Engineering, Electronics and Telecommunications	
3	Daineko Yevgenia Alexandrovna – PhD, Associate Professor of the Department of Radio Engineering, Electronics and Telecommunications	
4	Kulakayeva Aigul Yergalievna – PhD, Associate Professor of the Department of Radio Engineering, Electronics and Telecommunications	
5	Breusov Vladimir Yevgenievich – president «ASTEL» JSC	
6	Emirov Suleimen Gurbanbaevich – general director «Optical technology» LLP	
7	Sypatay Torekhan Maratuly – Senior Engineer of the Urban Access Networks Group at «Mobile Telecom-Service» LLP	
8	Orazakova Aibala Nurakhmetovna – User Support Engineer at «Astel» JSC	
9	Aitzhanov Damir Nurlybekovich is a 2nd-year master's student of group TSN-231M	
10	Kenes Tamilla Askhatovna is a 4th-year student of group SST-2104	

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List of abbreviations and acronyms

BD	Cycle of basic disciplines
BC	Basic competency
BM	Basic module
UC	University component
HE	Higher education
NMS	National Mandatory Standards of Higher and Post-Graduate Education
ATT	Additional types of training
EQF	European qualifications framework
EFE	European foundation for education
KSA	Knowledge, Skills and Abilities
FA	Final attestation
EC	Elective component
ISCED	International Standard Classification of Education
NQF	National qualifications framework
NQS	National qualifications system
GHM	General humanitarian module
RC	Required component
GEM	General education module
GED	Cycle of general education disciplines
EP	Educational program
GPM	General professional module
SQF	Sectoral qualifications framework
GEC	General education competency
MD	Cycle of major disciplines
PI	Professional internship
PS	Professional standard
PE	Postgraduate education
PC	Professional competency
PM	Professional module
LO	Learning outcome
QMS	Quality Management System

1. Description of the educational program

This educational program «6B06201 Telecommunication Systems and Networks» is developed on the basis of the main regulatory documents that determine the content of training in the direction «6B062 Telecommunications»:

- The Law of the Republic of Kazakhstan «On Education» dated July 27, 2007 No. 319-III;
- Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2 «On the Approval of the State Compulsory Standards for Higher and Postgraduate Education»;
- National qualifications framework (NQF). Approved by the protocol of March 16, 2016 by the Republican Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations;
- Sectoral Qualifications Framework (SQF). Approved by the minutes of the meeting of the Industry Commission in the field of information, informatization, communications, and telecommunications dated December 20, 2016 No. 1;
- The rules for organizing the educational process on credit technology of education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152;
- The classifier of areas for training personnel with higher and postgraduate education (order of the Ministry of Education and Science of the Republic of Kazakhstan No. 569 dated October 13, 2018).

The program is designed to implement the principles of the democratic nature of education management, expanding the boundaries of academic freedom and the powers of educational institutions, which will ensure the training of competitive specialists in the labor market for innovative and knowledge-intensive industries.

The «6B06201 Telecommunication Systems and Networks» educational program ensures the application of an individual approach to students, provides for the transformation of professional competencies from professional standards and qualification standards into learning outcomes. Student-centered learning is provided - the principle of education, which implies a shift in emphasis in the educational process from teaching to learning.

The educational program «6B06201 Telecommunication Systems and Networks» is developed taking into account the needs of the labor market based on the analysis of the labor functions of professional standards in the field of information and communication technologies for the 6th level of qualification (bachelor).

2. Aim and objectives of the educational program

The purpose of the EP is to prepare highly qualified specialists for innovative and knowledge-intensive sectors of the economy in the field of telecommunications, equipping them with the theoretical and practical knowledge, skills, and competencies necessary for successful professional activity in line with the demands of both domestic and global markets for intellectual labor.

AP objectives:

1. Operation of switching subsystems and network platforms of the Internet of Things.
2. Operation of subscriber access networks.
3. Operation of transport and data networks.
4. Maintenance of subscriber telecommunications equipment.
5. Maintenance of linear telecommunications equipment.
6. Service of station telecommunication equipment.
7. Support for software users of the Internet of Things.
8. Organization of monitoring and diagnostics of M2M network equipment and the Internet of things.

3. Passport of the academic program

№	Name	Description
1.	Education area code and classification	6B06 Information and communication technologies
2.	Training direction code and classification	6B062 Telecommunications
3.	Group of academic programs	B059 Communications and communication technologies
4.	Name of the educational program	6B06201 Telecommunication systems and networks
5.	Aim of the educational program	The purpose of the educational program «6B06201 Telecommunication Systems and Networks» is to prepare highly qualified specialists for innovative and knowledge-intensive industries in the field of telecommunications with theoretical and practical knowledge, skills and abilities necessary for their implementation in professional activities that meet the needs of domestic and global markets of intellectual labor.
6.	Type of the educational program	Current EP
7.	Level according to the National Classifications Framework	6
8.	Level according to the Sectoral Qualifications Framework	6
9.	Distinctive features of the program	6
10.	Partner University	-
11.	Academic degree awarded	Bachelor's degree in Information and Communication Technologies of the educational program «6B06201 Telecommunication systems and networks».
12.	Duration of study	4 years
13.	Volume of credits	240 ECTS credits
14.	Language of education	Kazakh, Russian, English
15.	Atlas of new professions	-
16.	Regional standard	
17.	Availability of an attachment to the training license	yes
18.	License number for the training area	KZ81LAM00001263
19.	Availability of program accreditation	Independent Agency for Quality Assurance in Education (IQAA).
20.	Generated learning outcomes	He is able to design, implement and operate modern telecommunication systems and networks, demonstrating professional knowledge in the field of engineering and information and communication technologies, mastery of engineering calculation and modeling methods, as well as skills in critical thinking, self-education and the application of scientific methods, taking into account the principles of academic integrity, professional ethics, safety requirements and intercultural communication.

4. Professional Standards (PS), profession cards, labor functions

№	Name of the PS	Profession card	Labor functions
1	Management of communication and telecommunication networks	Telecommunications Network Management Engineer	Management of software and hardware of information services of the organization's telecommunication system.
			Management of the development of the organization's telecommunication system.
2	Design, installation and commissioning of telecommunication equipment	Engineer-designer of telecommunication systems and mobile communication networks	Design of facilities and communication systems, telecommunication systems
			Design of mobile communication systems
		Telecommunications Technical Support Engineer	Collection, distribution, and monitoring of technical support requests
			Network status monitoring and troubleshooting coordination
			Organization of maintenance of telecommunication equipment software
		Telecommunication Equipment Setup and Testing Engineer	Performing a set of works on setting up and configuring telecommunication equipment
			Operation of telecommunication equipment
3	Administration, management and diagnostics of computer networks and network infrastructure	Computer Network Administrator	Development and construction of a computer network
			Monitoring the resource usage of network devices and software

5. List of the EP competencies

GEC1. Have basic knowledge in the field of natural science (social, humanitarian, economic) disciplines that contribute to the formation of a highly educated person with a broad Outlook and culture of thinking.

GEC2. To know the social and ethical values based on public opinion, traditions, customs, social norms and to be guided by them in the professional activity, to know bases of legal system and the legislation of Kazakhstan; to observe norms of business ethics, to own ethical and legal norms of behavior.

GEC3. Be able to work in a team, correctly defend your point of view, offer new solutions; be able to find compromises, correlate your opinion with the opinion of the team; strive for professional and personal growth.

GEC4. Have basic economic knowledge, have a scientific understanding of management, marketing, Finance, etc.; know and understand the goals and methods of state regulation of the economy, the role of the public sector in the economy.

GEC5. Be able to communicate professionally in Kazakh and Russian languages; to know a foreign language at the level necessary to perform professional tasks.

GEC6. Ability to know the methods of solving problems of analysis and calculation of characteristics of electrical, radio and communication networks and data networks.

GEC7. Being capable of generalization, analysis, information perception, goal setting, and selecting ways to achieve it; developing critical thinking in evaluating scientific hypotheses, formulating arguments, and solving problems in the field of operation, maintenance, and servicing of telecommunication systems; able to collect and interpret information to form judgments while

considering social, ethical, and scientific aspects.

GEC8. Own methods of technical and economic analysis, is able to justify the decisions taken and implemented in the field of operation, repair and maintenance of telecommunications systems, their units, systems and elements; is able to apply the results in practice.

GEC9. Be able to master the features of maintenance and repair of technical and technological equipment and transport communications.

GEC10. Be able to participate in the team of performers in the performance of laboratory, bench, field, acceptance and other types of testing of systems and means of operation, maintenance, repair and service of telecommunications systems.

GEC11. Possess the ability to produce a measuring experiment and evaluate the results of measurements.

GEC12. to be able to use the data of evaluation of technical condition of telecommunication systems using diagnostic equipment and indirect signs.

GEC13. Be able to use advanced technologies for routine maintenance and maintenance of telecommunications systems using new materials and diagnostic tools.

6. List of learning outcomes of the EP

LO1. Ability to hold verbal and written communication, including in a foreign language, to form and reasonably defend one's own point of view, ideological and civic position in interpersonal interaction and intercultural environment, to know the methods of scientific research and academic writing and apply them in their professional activities.

LO2. Demonstrate and apply basic mathematical, natural science, humanities, socio-economic and legal knowledge in an interdisciplinary context to solve professional problems in the field of telecommunications, as well as understand the values of the principles and culture of academic integrity.

LO3. Demonstrate the ability for self-organization, self-education, and professional development, critical reflection of accumulated experience, and development of critical thinking when analyzing scientific data. Be capable of collecting and interpreting information to form judgments considering social, ethical, and scientific considerations.

LO4. Possess the basics of economic knowledge, have a scientific understanding of management, marketing, finance, possess the skills of making decisions of an economic and organizational nature in conditions of uncertainty and risk, as well as possess the learning skills necessary for independent continuation of further education.

LO5. Demonstrate the ability to independently, methodically correctly use the methods of physical education and health promotion to ensure well-rounded social and professional activity.

LO6. Use in professional activities various types of information and communication technologies: Internet resources, cloud and mobile services for the search, storage, processing, protection and dissemination of information. Apply knowledge and understanding of facts, phenomena, theories, and complex relationships between them in the professional field.

LO7. Demonstrate the ability to acquire new knowledge, expand and deepen previously acquired knowledge, skills, and competencies in various areas of life, necessary for successful implementation in the field of professional activity, including at the junction of different areas of activity and fields of science.

LO8. Demonstrate the skills of building mathematical and physical models of telecommunication networks and systems. Use the methods of mathematical processing of the results of theoretical and experimental research, apply knowledge and understanding at a professional level, formulate arguments and solve problems.

LO9. Carry out engineering calculations according to standard methods and design telecommunication networks and systems in accordance with the terms of reference. Apply theoretical and practical knowledge to solve educational, practical, and professional problems in the telecommunications industry.

LO10. Demonstrate skills in planning, design, implementation, and operation of telecommunications networks and systems, their technical, information, and software support.

LO11. Demonstrate the ability to organize workplaces in accordance with safety standards, industrial sanitation, fire safety, and labor protection.

LO12. Analyze the results of the activity of the production unit, develop organizational, and technical documentation and draw up presentations of the results using modern technical means.

LO13. Be able to apply the acquired knowledge in the chosen additional educational program.

7. Matrix for correlating the learning outcomes of the EP with the formed competencies (V)

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12	LO13
GEC1	V	V											
GEC2		V											
GEC3	V		V		V		V						
GEC4				V									
GEC5													
GEC6						V		V	V				
GEC7			V				V					V	V
GEC8				V					V	V		V	V
GEC9										V			
GEC10											V		
GEC11								V			V		
GEC12						V						V	
GEC13									V	V			V

8. The relationship of LO with labor functions

№	LO	Labor functions
1.	LO10	Management of software and hardware of information services of the organization's telecommunication system.
2.	LO7, LO10	Management of the development of the organization's telecommunication system.
3.	LO7- LO9	Design of facilities and communication systems, telecommunication systems
4.	LO7- LO9	Design of mobile communication systems
5.	LO6, LO12	Collection, distribution, and monitoring of technical support requests
6.	LO10	Network status monitoring and troubleshooting coordination
7.	LO6, LO10	Organization of maintenance of telecommunication equipment software
8.	LO9, LO10, LO11	Performing a set of works on setting up and configuring telecommunication equipment
9.	LO10	Operation of telecommunication equipment
10.	LO9, LO10	Development and construction of a computer network
11.	LO6, LO10, LO12	Monitoring the resource usage of network devices and software

9. Table showing interconnection of competencies, learning outcomes, assessment methods and criteria

Competencies of the EP graduate	Competences expressed in expected learning outcomes	Evaluation criteria	Name of the estimation method
General education competencies			
Demonstrate knowledge and understanding of the main methods of analyzing socially significant problems and	Being able to have excellent spoken and written communication	Speaking and expressing one's own thoughts clearly	Creative task
		Answer questions correctly, fully, and convincingly	Creative task

processes, the main provisions and methods of the humanitarian, social, and economic sciences in various types of professional and social activities, as well as knowing the basic concepts of the theory of written and oral communication in the state language and the language of interethnic communication.	in the state and official languages	Maintain office work and document flow	Essay
	Demonstrate and apply humanitarian, socio-economic, and legal knowledge in an interdisciplinary context to solve professional problems.	Use the basics of philosophical knowledge to form a worldview argument	Creative task
		Have physical education skills	Fit test
		Knowing the basics of the legal system and legislation	Creative task
		To be proficient in the state language and one of the foreign languages at the level necessary for solving the problems of interpersonal and intercultural interaction and professional tasks.	To have oral communication skills
	Knowing the state and foreign languages in written communication	Essay	
	Know the methods of scientific research and academic writing	Creative task	
To be able to develop arguments, to apply knowledge, and to solve problems	The ability for self-organization, self-education, and professional development	To strive for professional and personal growth	Creative task
		Public speaking	Presentation
		To be able to find compromises	Creative task
	Ability to critically reflect on past experience	To be able to develop arguments	Creative task
		To apply knowledge in practice and to solve problems	Creative task
	To apply basic knowledge to solve professional problems	To be able to negotiate	Creative task
		To strive for professional and personal growth	Creative task
		To offer new solutions	Creative task
Must be able to express their judgment and be able to interpret information to communicate their own understanding, skills, and activities to colleagues	To be competent in production and non-production costs	The ability to understand the presented task	Report
		Grasping the content	Report
	To be competent in ensuring conditions for safe living	Objective perception of the problem	Creative task
		Analysis of the initial situation	Creative task
Must have the ability to establish the most trusting relationships with colleagues, to work in a team, and to communicate information, ideas, problems, and solutions	Ability to work in a team	Maintaining partnerships	Project
		Conducting electronic communications	Report
	Tolerantly perceive social and cultural differences	Ability to work in a team	Project
		Capability of taking an active civic stance	Creative task
Must be able to independently study the materials necessary for continuing education in the specialty	The ability for self-organization and self-education	Possessing the skills of self-organization and self-education	Report
		Using the provisions and methods of self-organization and self-education in professional activities	Report
	Ability to use regulatory documents in their activities	Ability to read technical literature	Report
		To know international standards and recommendations	Presentation
Core competencies			
Willingness to take into account modern trends in the	To demonstrate and apply mathematical,	To solve professional tasks	Settlement and graphic work

development of electronics, measuring and computing technology, information technology in their professional activities, to master the basic methods of processing and presenting laboratory data	natural science knowledge to solve basic problems in the field of telecommunication systems and networks	To set up laboratory experiments	Report
		To rethink past experience	Report
	To know the current trends in their professional area in the development of electronics, measuring and computing technology, information technology	To identify the essence of problems	Creative task
		To calibrate measuring instruments	Creative task
		To make measurements	Creative task
		To interpret measurement results	Report
	To master the basic techniques for processing and presenting laboratory data	To know programs for modeling MatLab	Report
		To analyze simulation results	Creative task
		To know modern DSP techniques	Report
The ability to collect, process, analyze and systematize scientific and technical information on research topics, to use the achievements of domestic and foreign science, engineering, and technology, to be competent in choosing methods of mathematical modeling to solve engineering problems, including using standard software packages	Ability to apply basic knowledge to solve professional problems in the field of telecommunication systems and networks	Designing nodes of telecommunication systems	Report
		Modeling telecommunication systems	Report
		To solve professional tasks	Settlement and graphic work
	To demonstrate the basic concepts and laws of electrical and radio engineering circuits	To know the basic laws of electrical circuits	Creative task
		To know the laws of radio circuits in various modes of operation	Creative task
		To read circuit diagrams	Report
	To analyze and systematize scientific and technical information on the research topic	Solving engineering problems	Settlement and graphic work
		To work with scientific and technical literature	Report
		To work with national standards	Creative task
		To work with international standards and guidelines	Report
Ability to participate in the development of organizational and technical documentation and established reporting according to approved forms, to perform tasks in the field of certification of technical means, systems, processes, equipment, and materials, and metrological support of production	To know the principles of building telecommunication systems and networks	To know the principles of networks	Report
		To know the current trends in the development of the telecommunications industry	Report
		To know the current trends in the development of measuring and computing technology	Report
	To know the element base of circuitry, determine the main parameters of electronic and measuring devices	To read and understand diagrams	Report
		To interpret measurement results	Project
		To be able to work with measuring instruments	Report
		To know national standards	Creative task
		To be able to use reference materials	Creative task
Must have the ability to self-organize, self-educate and establish the most trusting relationships with colleagues, to work in a team, communicate information, ideas, problems, and solutions	To possess skills for self-organization and self-education	Maintaining partnerships	Project
		To know problems and ways to solve them	Creative task
	Ability to establish trusting relationships with colleagues, and to work in a team	To work in a team	Project
		Tolerantly perceive social and cultural differences	Creative task
	To know the main directions, problems, and methods of self-organization and self-education	Maintaining partnerships	Project
		To improve qualifications	Report
		To solve problems	Creative task

Must be able to independently study scientific and technical literature necessary to continue training in the specialty	Ability to use regulatory and technical documents in their professional activities.	To strive for professional and personal growth	Report
		Ability to use reference materials	Report
		Development of equipment operation methodology	Report
	To possess the skills to draw up technical reports on the results of the work performed	Ability to draw up reports, acts, etc.	Report
		To develop technical documents	Report
		To read scientific and technical literature	Report
Professional competences			
Willingness to take into account in their professional activities modern trends in the development of electronics, measuring and computing technology, Internet of Things technologies, information technologies, and to master the basic methods of processing and presenting laboratory data	To demonstrate and apply mathematical, natural science knowledge to solve professional problems in the field of telecommunications	To solve professional tasks	Settlement and graphic work
		To set up laboratory experiments	Report
		To rethink past experience	Report
	To know the current trends in the development of the telecommunications industry, Internet of Things technologies, information technologies in their professional activities	Designing telecommunication networks	Creative task
		To calibrate measuring instruments	Creative task
		To make measurements	Creative task
		To interpret measurement results	Discussion
	Master the basic techniques for processing and presenting laboratory data	To know programs for modeling MatLab	Report
		To analyze simulation results	Creative task
		To know modern DSP techniques	Report
Ability to perform calculation and design of telecommunication systems and networks, IoT technologies, all types of mobile communications in accordance with the terms of reference and provide technical support and software maintenance for intelligent telecommunication systems	Ability to apply professional knowledge to solve problems in the professional field	Designing telecommunication systems	Report
		Modeling telecommunication systems	Report
		To solve professional tasks	Settlement and graphic work
	To carry out calculation of the parameters of electrical and radio circuits, switching systems, transmission, reception and processing of information, parameters of nodes of systems and networks	To know the basic laws of electrical circuits	Creative task
		To know the laws of radio circuits in various modes of operation	Creative task
		To read circuit diagrams	Report
	To analyze and systematize scientific and technical information in professional activities	Solving engineering problems	Settlement and graphic work
		To work with scientific and technical literature	Report
		To work with national standards	Presentation
		To work with international standards and guidelines	Presentation
Ability to develop a design and technical documentation, draw up completed design work and monitor the compliance of developed projects and technical documentation with standards, specifications, and other regulatory documents; to implement the results of developments in production,	Ability to have the skills to operate radio and telecommunications equipment, to conduct laboratory studies of electrical and radio engineering circuits by modeling using modern computer technologies	To know the principles of networks	Report
		To apply the knowledge gained in practice	Creative task
		To know the current trends in the development of digital radio engineering	Report
		Ability to use reference materials	Creative task
		To know modeling techniques	Report
		Operation of telecommunication equipment	Report

prepare documentation and participate in the work of the quality management system at the enterprise	To understand the basic principles of M2M networks and the Internet of Things, transport networks and data transmission networks, subscriber telecommunications equipment, line, and station telecommunications equipment	To read and understand all kinds of circuits	Report
		To interpret measurement results	Project
		To be able to work with telecommunication equipment	Report
		To develop regulatory and technical documentation	Creative task
		To know national standards	Creative task
		To develop national standards	Creative task
To possess the ability to self-organize, self-educate and establish the most trusting relationships with colleagues, to work in a team, communicate information, ideas, problems, and solutions	To possess professional skills for self-organization and self-education	Maintaining partnerships	Project
		To know problems and ways to solve them	Creative task
	To establish trusting relationships with colleagues, to work in a team	To work in a team	Project
		Tolerantly perceive social and cultural differences	Creative task
	To know the main directions, problems, and methods of self-organization and self-education	Maintaining partnerships	Creative task
		To improve qualifications	Report
Ability to independently study scientific and technical literature necessary to continue training in the specialty	Ability to use regulatory and technical documents in their professional activities.	To solve professional problems	Creative task
		To strive for professional and personal growth	Report
		Ability to use reference materials	Report
	To possess the skills to draw up technical reports on the results of the work performed	Development of equipment operation methodology	Report
		Ability to draw up reports, acts, etc.	Report
		To develop technical documents	Report
		To read scientific and technical literature	Report

10. Information about the modules of the educational program

Module code and name	Volume (labor intensity) of the module	Learning outcomes	Learning outcomes assessment criteria	Disciplines forming the module Code and name
GENERAL EDUCATION MODULES				
OMM 6001 - Module of social and cultural development	18	<i>As a result of studying this module, the student must:</i> - establish connections and compare individual phenomena and events of the past with the overall paradigm of the global historical development of human society; demonstrate the ability to objectively understand and explain historical events; cultivate informed citizenship based on the principles of patriotism and tolerance; - understand the formation of key approaches to addressing fundamental philosophical issues such as existence, matter, consciousness, nature, and society; comprehend the techniques and logic of scientific research and develop strategies for cognitive activity; - demonstrate a sense of political will and identify concrete ways for individuals to actively participate in politics; possess the ability to impart sociological knowledge to others, along with the skills and attitudes necessary for engaging community members; - apply scientific thinking to interpret psychological phenomena and demonstrate psychological information literacy.	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	HK6002 - History of Kazakhstan
				SPS6001 - Philosophy
				SPS6007- Sociology-Political science
				SPS6006- Cultural studies- Psychology
OOM6002 - Language and ICT skills development module	25	<i>As a result of studying this module, the student must:</i> - be able to distinguish and use grammatical phenomena such as the present, past, future, tenses and questions, and correctly use general and professional vocabulary on the topics being studied, understand authentic speech on the topics being studied; - have the ability to make judgments, write literacy, maintain information, collect basic information, make reports, independently study and use explanatory dictionaries; - to know about the use of software packages; about the architecture of computer systems, operating systems and networks; the principles of information and communication technologies and e-learning.	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	ICT6001 - Information and Communication Technologies
				LAN6001A - Foreign language
				LAN6002A - Foreign language
				LAN6001KR - Kazakh (Russian) language
	8	<i>As a result of studying this module, the student must:</i>		LAN6002KR - Kazakh (Russian) language
				PhC6005 - Physical Culture

OOM6003 - Module of physical culture		- demonstrates knowledge of the basics of physical culture and a healthy lifestyle, is able to apply physical exercises to promote health, develop endurance and improve overall performance; - develops skills of self-regulation and physical self-improvement, is able to independently organize physical activity, taking into account individual characteristics and principles of health.	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	PhC6006 - Physical Culture
OOM6004 - Module of personal and social development	5	<i>As a result of studying this module, the student must:</i> - demonstrates an understanding of the fundamentals of economics and law, is able to apply the acquired knowledge to make financial and economic decisions in conditions of uncertainty and risk; - knows legal and organizational measures to combat corruption, is able to identify conflicts of interest, apply research methods to analyze the activities of organizations; - is able to ensure the safe functioning of organizations and protect people from emergencies, using modern methods and means of preventing and eliminating their consequences; - is able to form sound scientific judgments, critically evaluate information and apply scientific knowledge in educational and research activities; - understands the fundamentals of business functioning, forms of ownership, and key management processes in production, marketing, finance, and personnel; - understands the environmental aspects of sustainable development, assesses the impact of economic activity on the environment and the role of international cooperation in solving global environmental problems; - is able to organize an inclusive educational process at the university, develop adapted programs and provide psychological and pedagogical support to students with disabilities.		ECO6007 - Foundation of economics and financial literacy LAW6007 - Fundamentals of law and anti-corruption culture JUR6413 - Fundamentals safety of life activity RM6001 - Research methodology MGT6706 - Startups and entrepreneurship JUR 6505 - Ecology and sustainable development HUM6400 - Inclusive education
BASIC MODULES				
BM 6600 - Physics and Mathematics module	24	<i>As a result of studying this module, the student must:</i> - solve systems of linear equations using matrix operations and apply, graphically illustrate arithmetic operations for vectors on the plane, in three-dimensional space, and in R_n; formulate and geometrically describe equations of lines and planes in three-dimensional space both in parametric and non-parametric forms; - use derivatives to find intervals on which a given function is increasing or decreasing, to identify function maxima and minima, points of inflection, and determine the concavity of curves; articulate fundamental	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	MAT6081 - Linear Algebra and Analytical Geometry MAT6002- Mathematical analysis PHY6002 - Physics (1)

		concepts and principles of mechanics, thermodynamics, electricity, and magnetism; - apply knowledge of physical principles and equations to solve physical problems in the fields of mechanics, thermodynamics, electricity, and magnetism, and to address physical problems in optics and light, quantum mechanics, and atomic physics; - understand methods of differentiating and integrating functions of complex variables; methods of expanding functions of a complex variable into Laurent series; - use calculus to solve practical problems.		PHY6004 - Physics (2)
				MAT6007- Theory of functions of a complex variable
BM 6601 – Basic module	19	<i>As a result of studying this module, the student must:</i> - understand the basic principles of electromagnetic wave propagation, including reflection, refraction, diffraction, and scattering in various media; - know the fundamental Maxwell's laws and their application in the analysis of electromagnetic waves; - comprehend the mechanisms of wave propagation in free space, waveguides, coaxial, and fiber optic lines; - study the characteristics of electromagnetic wave transmission in atmospheric and ionospheric conditions, considering the impact of weather conditions and interference; - be able to calculate the parameters of radio waves, Fresnel zones, attenuation levels, and antenna directivity patterns; understand the principles of construction and operation of radio access networks and systems. - understand the methods of modulation, encoding, resource allocation, and access control in radio networks.	1. Oral exam 2. Test 3. Midterm exam 4. Exam	EP6601 - Educational Internship
				EEC 6604 - Theory of Electromagnetic Waves Transmission
				MIN601 - Minor 1
				EEC 6617 - Radio access networks and systems
BM 6602 – "Fundamentals and Methods of Analysis of Radio Engineering Systems and Signals" Module	33	<i>As a result of studying this module, the student must:</i> - understand the operating principles and differences between various types of amplifying devices, filters, signal converters, and generators; distinguish their parameters and characteristics; calculate and compute parameters and characteristics of circuits; measure and analyze the parameters and characteristics of circuits; - be able to read electrical schematic diagrams of amplifying devices, generators, converters; determine their parameters; reproduce the fundamental concepts, laws, and methods of analysis of electrical circuits; assess calculation methods and compute the parameters and characteristics of circuits; measure and analyze the parameters and characteristics of	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	EEC6634 - Electronics and circuitry of radio engineering devices
				EEC6635 - Basic Circuit Theory
				EEC6605 - Basics of radio circuits and signals
				EEC6636 - Telecommunication theory and teletraffic engineering
				EEC6676 - Digital Communications
				EEC6656 - Radio engineering devices

		circuits; evaluate probabilities and intervals of measurement errors, and the accuracy of measurements and controls; - read diagrams of various radio transmitting devices of radio-electronic equipment, their individual units and stages, and conduct necessary technical calculations, including using computer technology.		EEC6637 - Metrology and radio measurements
BM 6603 – Telecommunication systems and information security module	28	<i>As a result of studying this module, the student must:</i> - have an understanding of the main directions of development in mobile communication systems; basic concepts of Ethernet, such as data transmission media, services, and operating principles; - know the principles of constructing fiber-optic transmission systems and the main methods of measuring the parameters of transmission systems and communication lines; methods of constructing radio access systems; - be aware of the main rules of network behavior to ensure security, and understand the basic concepts and methods of constructing NGN (Next Generation Network) and post-NGN networks; - be able to assess and describe the importance of addressing schemes and naming assignments at various levels of data transmission networks in IPv4 and IPv6 environments; develop, calculate, and apply subnet masks and addresses in IPv4 and IPv6 networks according to specified requirements; - understand the principles of operation and configuration of Network Address Translation (NAT) for IPv4 networks, as well as the ability to troubleshoot related issues; set up service and device management tasks, including the Cisco Discovery Protocol (CDP), Link Layer Discovery Protocol (LLDP), Network Time Protocol (NTP), system logging, device backup and restoration, password recovery, and IOS management.	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	NET6602-Introduction to networking technologies
				EEC6630-Fiber optic transmission systems
				EEC6674-NGN and post - NGN networks
				NET6601-The basics of routing and switching
				EEC6675-Basics of information security of networks and communication systems
BM 6604 – Computer modeling in telecommunication systems module	8	<i>As a result of studying this module, the student must:</i> - utilize methods for image transformation; employ the fundamental method of descriptive geometry, engineering graphics; use the theory and solutions for positional and metric problems and read technical drawings; create drawings using AutoCAD; determine geometric shapes and dimensions of parts through drawing; - know the main methods of intelligent signal processing, including filtering, spectral analysis, wavelet transformation, and data compression;	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	EEC6608-Computer and mathematical modeling
				EGR6600-Engineering and computer graphics
				EEC6677-Intelligent signal processing and data analysis

		- create and improve modern radio engineering objects using MatLab and integrate mathematical modeling methods with the practical implementation of modern radio engineering objects; - apply the MatLab software package in digital signal processing tasks and use application software packages for designing radio engineering devices.		EEC6610-Digital signal processing
PROFESSIONAL MODULE				
PM 6600 – Professional module	25	<i>As a result of studying this module, the student must:</i> - participate in discussions on the subjects studied, express opinions, present ideas, agree/disagree, provide arguments, and suggest solutions. - understand the technological processes of transmission, signal processing in telecommunication systems and radio engineering devices related to their thesis topic; - possess professional communication skills in a foreign language within the field of telecommunications, understand and interpret technical documentation, standards, and scientific publications; - apply the knowledge gained in practice during industrial and pre-diploma internships, perform analysis, setup, and testing of telecommunications equipment; - adapt to changing conditions of professional activity, work in a team, and adhere to the norms of professional ethics.	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	LAN 6003PA- Professionally oriented foreign language
				IP6602 - Professional Internship
				IP6603 - Professional Internship
				PP6604 - Pre-diploma Internship
				MIN603- Minor 2
				MIN602- Minor 3
PM 6601 - Telecommunication systems and radio engineering systems and networks module	14	<i>As a result of studying this module, the student must:</i> - understand the operating principles and differences between various types of semiconductor and optoelectronic devices, distinguish their parameters and characteristics; comprehend the physical essence of processes occurring in signal conversion paths; know the main methods of processing, transmitting, and receiving television and broadcasting signals; - understand the principles of operation of digital devices and microprocessors, analyze their architecture and functioning in telecommunication systems; - be able to read electrical schematic diagrams of analog devices, determine their parameters, construct current-voltage characteristics; apply the acquired knowledge to analyze and design frequency and territorial planning of broadcasting. Use ITU, CEPT, and the Republic of Kazakhstan regulatory documents in the design, implementation, and operation of RTS and networks for various purposes; - know the functions of microprocessor systems by integrating additional peripheral devices; - Be competent in developing electrical schematic diagrams of RTS.	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	EEC6611- Digital devices and microprocessors
				EEC6607- Programming in microprocessor systems
				EEC6619- Broadcasting systems

PM 6602- Modern telecommunication systems and networks module	24	<i>As a result of studying this module, the student must:</i> - understand the principles of construction and functioning of Machine-to-Machine (M2M) and Internet of Things (IoT) networks; - be knowledgeable about the architecture and protocols of IoT, including MQTT, CoAP, LoRaWAN, NB-IoT, and their application in telecommunication systems; - know the main methods of machine learning, including regression, classification, clustering, and neural networks; - apply big data analytics algorithms in telecommunications, and be capable of processing, visualizing, and interpreting data; - understand the principles of construction of mobile networks (2G, 3G, 4G, 5G) and their evolution; - comprehend the architecture of mobile systems, including key interfaces, identifiers, and authentication mechanisms; - be skilled in methods of optimization and automation of telecommunication processes using artificial intelligence and machine learning.	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	EEC 6629 - Network of M2M and Internet of things
				EEC6678-Data Analysis and Machine Learning
				EEC 6613 - Mobile communication systems
				EEC 6660 - Intelligent telecommunication systems

11. Information about the disciplines of the educational program

№	Discipline Code and Name	Brief description of the discipline (30-50 words)	Labor intensity of discipline in credits	Learning outcomes formed (codes)	Prerequisites	Postrequisites
Cycle of general education disciplines (GED)						
Required component (RC)						
1	HK6002- History of Kazakhstan	This program is designed to form the historical consciousness of undergraduate students, based on the knowledge gained in the study of modern history of Kazakhstan. The versatility and importance of the discipline "Modern history of Kazakhstan" is due to its huge role in strengthening the identity of Kazakhstan, the identity of the people and the implementation of tasks related to the need for an intellectual breakthrough in the new Millennium. Kazakhstan's society must have a spiritual and ideological core for the successful implementation of its goals, which is facilitated by the "Ruhani zagryu" program, which reveals the mechanisms for modernizing public consciousness and is based on the continuity of spiritual and cultural traditions. This program is designed to form the historical consciousness of undergraduate students, based on the knowledge gained in the study of modern history of Kazakhstan.	5	LO2, LO3	-	RW6001
2	SPS6001 - Philosophy	The object of study of the discipline is philosophy as a special form of spiritual studies in its cultural and historical development and modern sound. The main directions and problems of world and national philosophy are studied. Philosophy is a special form of cognition of the world, creating a system of cognition of the general principles and foundations of human life, about the essential characteristics of man's attitude to nature, society and spiritual life, in all its main direction.	5	LO2, LO3, LO7	-	RW6001
3	LAN6001A - Foreign language	An English language course offered to the 1st year students of IITU majoring in various specialties with a basic knowledge of general English. The course centers around general topics such as countries and nationalities; family and friends; daily routines; neighbourhood; shopping habits; travelling; sports and hobbies, etc. Each topic is studied through skills-oriented	5	LO1, LO3, LO6	-	LAN 6002A

		acquisition of the relevant glossary and target grammar structures in various kinds of listening, reading speaking and writing activities.				
4	LAN6002A - Foreign language	A course of General English is offered to the 1st year students of IITU. It focuses on such topics as Student's life, Daily routine, Education, jobs. Professional Skills, Work Experience, Kazakhstan on the global map, Holidays/ Traditions and Customs, etc. It is designed to deepen the students' understanding of their priorities and values, raise their language awareness, improve their speech skills and communication competences in General English. The language training is communicative, interactive, student-centered, outcome-oriented and heavily reliant on students' self-study work. The latter is organized as TSIS (paragraph writing) and SIS (self-check Grammar, WB exercises, and project).	5	LO1, LO3, LO7	LAN 6001A	LAN6003 PA
5	LAN6001KR - Kazakh (Russian) language	The Kazakh/Russian Language course is aimed at improving language, speech, and communication skills. Its task is to improve the language abilities of students, develop skills and skills in four types of speech activity (speaking, listening, reading, writing). The content of the standard curriculum of the general education discipline "Kazakh/Russian language" includes topics of seminar (practical) classes and independent work of students. The training is conducted at 3 levels: A, B, C.	5	LO1, LO3, LO7	-	LAN 6002KR
6	LAN 6002KR - Kazakh (Russian) language	The course is based on a communicative-oriented concept, which includes elements of problem-based and communicative-individualized learning. The following three main linguo-methodological principles were chosen as the foundation: 1. The communicative focus of teaching, taking into account the relevant areas of speech communication; 2. The consideration of systematicity in the study of lexical units, their semantic interconnection, and their stylistic conditionality in various contexts and situations; 3. The formation of a system of language, speech, and communicative competencies that enable students to use the language	5	LO1, LO3, LO7	LAN 6001KR	RW6001

		effectively in diverse communicative situations. This approach allows students to develop not only theoretical knowledge but also practical skills necessary for effective language use in real-life situations.				
7	ICT6001 - Information and Communication Technologies	Information and Communication Technologies is a course dedicated to studying modern methods and tools for processing, storing, transmitting, and protecting information. It covers the basics of working with digital technologies, internet resources, and software, as well as their application in professional and everyday activities.	5	LO6; LO12	-	NET6602
8	SPS6007- Sociology- Political science	During the course "Sociology" various phenomena of social life are studied. At the same time the study is carried out from various paradigms of social knowledge, using theories and scientific methods. The course Political science provides comprehensive coverage of all key elements, the study of sources and political relations, types of political systems, democratic and authoritarian systems, political mechanisms, political competition and power, political capital and values, survival of political ideas, nationalism, analysis of domestic and foreign policy, political growth, state policy in the world political system.	4	LO1, LO3, LO7	HK6002	SPS6006
9	SPS6006- Cultural studies- Psychology	As a result of studying a course in the field of cultural studies, students will acquire the fundamentals for studying the entire complex of social sciences and humanities, and master intercultural communication. At the same time, the discipline of cultural studies can serve as an addition to general courses in history and philosophy. The course material can serve as a methodological guide for a number of special disciplines: for example, ethics, history of culture, styles of art, national schools of management, strategy and negotiation tactics, management of culture. Methods and technologies of training used in the implementation of the program: role-playing games and educational discussions in various formats; case study, project method. The psychology course studies main issues of psychology in a wide educational and social context.	4	LO2, LO3, LO7	SPS6007	RW6001

		Knowledge and skills gained in the course give students the opportunity to practically apply them in different life spheres such as personal, family, professional, business, social (working with people of different age and social categories).				
10	PhC6005 - Physical Culture	The course provides a solution to the main tasks of physical education of students, provides for the delivery of control exercises and standards.	4	LO5	-	PhC6006
11	PhC6006 - Physical Culture	The course provides a solution to the main tasks of physical education of students, provides for the delivery of control exercises and standards.	4	LO5	PhC6005	RW6001
Cycle of general education disciplines (GED)						
University component (UC) and (or) Optional component (OC)						
12	ECO6007 - Foundation of economics and financial literacy	This course provides an integrated introduction to economics and legal foundations relevant to entrepreneurial decision-making and everyday personal finance. Students will understand basic economic principles, and navigate legal systems affecting individuals and businesses and learn how to manage personal finances. Topics include economic behavior, legal research, business budgeting, taxation, investment and case analysis. The course is open to non-economics majors interested in how economic, legal and financial systems shape our lives.	5	LO2; LO4	SPS6007	RW6001
	LAW6007 - Fundamentals of law and anti-corruption culture	The course outlines the legal, economic, and social foundations of fighting corruption. Throughout the course, students will gain practical knowledge in identifying the peculiarities of state policies, applying international experiences in combating corruption, mastering skills in conflict resolution, and detecting corruption activities using professional ethics and methods. After successful completion of the course, students will gain the following competencies: 1. Understand the measures of legal responsibility for participation in corruption violations. 2. Determine the conflict of interests in the activities of organizations leading to corruption. 3. Analyze the work of organizations using various research methods.		LO2, LO3, LO4	SPS6006	RW6001
	JUR6413 - Fundamentals safety of life activity	Studying ways of safe human interaction with the environment (industrial, domestic, urban, natural), sustainable operation of business facilities (organizations) in emergency situations, issues of		LO5, LO11	SPS6006	RW6001

		protection from negative factors, prevention and elimination of the consequences of natural and man-made emergencies and the use of modern means defeat.				
	RM6001 - Research methodology	The course is devoted to the study of activities aimed at developing students " ability to independent theoretical and practical judgments and conclusions, skills of objective evaluation of scientific information, freedom of scientific research and the desire to apply scientific knowledge in educational activities, including for the diploma project (work).		LO1, LO3, LO7	SPS6006	RW6001
	MGT6706 - Startups and entrepreneurship	This course provides an introduction to what a business is, how it works and how to run it. Students will define ownership and processes used in manufacturing and marketing, finance, personnel, and management in business operations.		LO2, LO4, LO7	SPS6006	RW6001
	JUR 6505 - Ecology and sustainable development	The course reveals the role of ecology in solving modern economic, social and political problems, as well as the emergence of global environmental problems as a result of human production activities and the responsibility of the world community for them. A very important aspect is also international cooperation to ensure sustainable development. Various areas of practical application of ecology are also considered - natural resources and environmental pollution.		LO2, LO3, LO7	SPS6006	RW6001
	HUM6400 - Inclusive education	The philosophy, history and methodology of an inclusive approach. Documents governing the development of an inclusive process in higher professional education. Educational needs of students with disabilities and disabilities. Methods and forms of organization of the educational process at a university for students with disabilities. Development of adapted educational programs, curricula and educational paths for students with disabilities and disabilities. Psychological and pedagogical support of students with disabilities and disabilities at the university.		PO3	SPS6006	RW6001
Cycle of core disciplines University component						
13	EEC6634 - Electronics and circuitry of radio engineering devices	The study of the basic elements and devices of electronic engineering, microelectronics, types of amplifying devices, the physical foundations of semiconductors, the	7	LO6, LO8, LO9	PHY6002	EEC6611

		classification of semiconductor and optoelectronic devices, parameters, characteristics, operating modes and operating principles of diodes, transistors, thyristors, photoemitters, photodetectors, optocouplers and integrated circuits.				
14	MAT6081 - Linear Algebra and Analytical Geometry	The course is devoted to the study of theoretical and practical foundations of the theory of matrices and determinants, methods of coordinate transformation; designed to develop mathematical intuition and form a scientific worldview and logical thinking	4	LO2, LO8	-	MAT6002
15	MAT6002 - Mathematical analysis	Familiarization of students with important branches of calculus and its applications in IT. Ability to apply mathematical methods and tools to solve various applied problems. Study of fundamental methods for studying infinitesimal variables using analysis based on the theory of differential and integral calculations.	6	LO2, LO8	MAT6081	MAT6007
16	PHY6002 - Physics (1)	The study of the laws, principles, postulates and equations of mechanics, molecular physics and thermodynamics, electricity and magnetism, the use of physics equations to solve specific physical problems, the use of physics methods for research, analysis, and laboratory work in order to verify the operation and implementation of the laws of physics in nature and technique.	6	LO2, LO8, LO11	-	PHY 6004
17	EEC6635 - Basic Circuit Theory	The study of physical laws and processes occurring in electric circuits of direct, harmonic and non-harmonic current, methods for analyzing transient and steady processes occurring in linear circuits with lumped parameters; modes of operation of quadripoles and filters, physical processes occurring in electrical circuits with distributed parameters and in non-linear DC circuits.	6	LO6, LO8, LO9	PHY6002	EEC6605
18	PHY6004 - Physics (2)	Consideration of the laws, principles, postulates and equations of ray and geometric optics, quantum and wave optics, relativity theory, atomic and nuclear physics, analysis of the foundations of modern physics and quantum mechanics, the use of physical equations for solving physical problems, the use of physical methods for laboratory work with the purpose of checking the work	4	LO2, LO8, LO11	PHY 6002	EEC6634

		and implementation of the laws of physics in nature and technology.				
19	MAT6007 - Theory of functions of a complex variable	The study of mathematical apparatus necessary for the application of mathematical methods in practice and in research; familiarization of students with the concepts, facts and methods that make up the theoretical foundations of complex analysis.	4	LO2, LO8	MAT 6002	EEC6605
20	EEC6604 - Theory of Electromagnetic Waves Transmission	Study of the main issues of the theory of electromagnetic fields and waves, the basic laws of electrodynamics, analysis of the issues of radiation, propagation, and diffraction of electromagnetic waves. Consideration of the theory of plane electromagnetic waves in various media, as well as coverage of the issues of the influence of the troposphere and ionosphere on the propagation of radio waves of various frequency ranges.	6	LO6, LO8, LO9	PHY 6004	EEC6636/ EEC6676
21	EEC6605 - Basics of radio circuits and signals	The study of methods and foundations for the construction of radio circuits and devices, types of representation of signals and interference in radio systems for transmitting information.	4	LO6, LO8, LO9	EEC6635	EEC6656
22	EEC6656 - Radio engineering devices	The discipline studies the basics of the construction and operation of radio systems for various purposes, the classification of radio systems, the basics of the functioning of radio systems, the methods of calculating the main characteristics of radio systems, the principles of functioning of the main nodes and blocks of mobile and base stations, about the applied coding systems and types of modulation of high-frequency oscillations	6	LO6, LO8, LO9	EEC6605	EEC6619
23	EEC6637 - Metrology and radio measurements	Study of the metrological foundations of radio measurements, classification of measurement errors, principles and features of the construction of radio measuring instruments for measuring voltage, frequency, phase shift, time intervals, power, signal spectra, characteristics of random processes, parameters of radio circuits, amplitude-frequency characteristics.	4	LO6, LO8, LO11	EEC6635	EEC6678
24	EEC6617 - Radio access networks and systems	Formation of students' theoretical and practical knowledge of the physical processes underlying the principles of modern networks and systems of radio access, providing transmission and reception of the necessary information, development and operation of radiating and	6	LO6, LO9, LO10	EEC6636	EEC6613

		receiving devices of radio access systems.				
25	NET6602 - Introduction to networking technologies	Learning the basics of networking and covering topics such as: local area network, connecting to a local network, connecting to the global Internet, network protocols and services, cables and contacts, wireless technologies, wireless network, security in wired and wireless networks, search, and elimination problems with wired and wireless networks.	6	LO6, LO9, LO10	ICT 6001	NET6601
26	NET6601 - The basics of routing and switching	Learn how to configure routers and switches for advanced functionality, configure aggregation, redundancy, and routing protocols, troubleshoot devices, and fine-tune routing protocols.	7	LO6, LO9, LO10	NET 6602	EEC6675
27	EEC6630 - Fiber optic transmission systems	It provides for the study of the principles of operation, basic parameters, design features of radiation sources and receivers, optical amplifiers, passive optoelectronic components of FOTS (fiber optic transmission systems), the study of structural, functional circuits and nodes FOTS-PDH and FOTS- SDH, WDM technology.	6	LO6, LO8, LO9, LO10	PHY 6004	EEC6674
28	EEC6674 - NGN and post - NGN networks	The discipline provides for the study of the main parameters and characteristics of telecommunication networks of the new generation, the basics of their structural construction, taking into account modern trends in the development of communication networks, in-depth study of functional schemes, methods of design and integration of telecommunication networks and systems, as well as the evolution of telecommunications technologies.	7	LO6, LO9, LO10	EEC6630	EEC6675
29	EEC6675 – Basics of information security of networks and communication systems	The discipline studies the organizational and legal foundations of information security in modern telecommunications systems, as well as promoting the formation of a scientific worldview and the development of systems thinking.	7	LO6, LO9, LO10	NET 6601	EEC6678
30	EP6601- Educational Internship	Studying the basics of using computer technology, the basics of programming, applications for radio engineering and telecommunication systems.	2	LO6	ICT 6001	PP 6601
Cycle of core disciplines Optional component						
31	MIN601 – Minor 1	Additional educational program (Minor) (minor) - a set of disciplines and (or) modules and other types of	5	LO13	-	RW6001

		educational work, determined by students for study in order to form additional competencies.				
Elective Discipline 1						
32	EEC6608 - Computer and mathematical modeling	The study of algorithms and technology for solving differential and difference equations for building a mathematical model and their computer simulation using the MatLab software package. Consideration of sound system support, expansion packs. Solving problems with matrices, vectors, lists, with program structures such as loops and branches in the MatLab package.	4	LO6, LO8, LO9	ICT 6001	EEC6610
33	EGR6600 - Engineering and computer graphics	The study of the theoretical foundations for constructing displays of geometric images on a plane, ways to solve engineering problems in a drawing. The development of spatial and logical thinking, the ability and skills to present technical ideas using a drawing in the AutoCAD environment.	4	LO6, LO9, LO10	ICT 6001	RW6001
Elective Discipline 2						
34	EEC6636 - Telecommunication theory and teletraffic engineering	Studying the issues of formation, conversion, and transmission of signals over communication channels, methods for improving noise immunity and transmission speed in communication systems, increasing the efficiency of communication systems, describing the transformations of signals and interference in communication systems, analyzing processes in communication systems that improve the efficiency of communication systems	6	LO6, LO8, LO9	EEC 6604	EEC6678
35	EEC6676- Digital Communications	Students study the relationship between information theory and the design of digital communication systems, as well as providing knowledge and skills to perform design calculations in these systems. Students will use standard mathematical methods to model and analyze digital communication systems, as well as to predict performance indicators such as the S/W ratio and the expected bit error rate.	6	LO6, LO8, LO9	EEC 6605	EEC6678
Cycle of majors University component						
36	LAN6003PA - Professionally oriented foreign language	This course involves further improvement of communication skills and abilities in all types of speech activity on the basis of educational and methodological kits for studying a professionally	3	LO1, LO3, LO6	LAN 6002DA	RW6001

		oriented foreign language. Professionally oriented is understood as training based on taking into account the needs of students in learning a foreign language, dictated by the characteristics of the future profession or specialty.				
37	EEC6660 - Intelligent telecommunication systems	The purpose of the discipline is the study of the basic concepts of the intellectual system (IP), the basic properties and classification of IP, representation and methods of processing knowledge in intelligent systems of knowledge representation, methods of creating a visual and speech interface of intelligent systems and intelligent search engines, ability to use acquired knowledge and skills in the design of intelligent information and communication management systems.	6	LO6, LO8, LO9	NET6602	EEC6678
38	EEC6607 - Programming in microprocessor systems	The study of typical microprocessor electronic circuits used in radio engineering and telecommunications, the formation of knowledge and skills in the development of software for microcontrollers as elements of embedded systems for various purposes, as well as the development of positive motivation for independent work and self-education for the design of microprocessor systems.	4	LO6, LO8, LO9, LO10	EEC6611	RW6001
39	EEC6619 - Broadcasting systems	Studying the principles of constructing the transmitting and receiving paths of digital television and radio broadcasting systems of the DVB-T2 standard and their elements, devices, television antenna-feeder path. Studying the principles of building VHF FM sound broadcasting, also systems MMDS, DRM, DAB.	6	LO6, LO8, LO9, LO10	EEC6636/ EEC6676	EEC6678
40	EEC6613 - Mobile communication systems	Students study the features of the construction of modern mobile communication systems that provide various communication services, as well as the basic standards of mobile communication systems, as well as general principles of signal processing in various standards of mobile communication systems and networks, principles of design and planning of mobile communication networks.	6	LO6, LO9, LO10	EEC6636/ EEC6676	EEC6678
41	EEC6629 - Network of M2M and	Studying the principles of building the Internet of Things and M2M networks, including the features of	6	LO6, LO9, LO10	EEC6636/ EEC6676	EEC6678

	Internet of things	using the radio frequency spectrum, building access networks using the 3GPP Partnership Project technologies (GSM, GPRS, UMTS, LTE, 5G), satellite technologies and LPWAN technologies (LoRa, SigFox, NB-IoT, EC-GSM, XNB, Bluetooth, ZigBee), its architecture and domains, interfaces, security, types of services and traffic management features.				
42	EEC6611 - Digital devices and microprocessors	Study of the key principles of digital electronics, features of digital signals, ways of organizing the interaction of elements, nodes, and devices of digital systems. Basic information about binary logic, digital signals, codes, synchronization, symbols on diagrams. Principles of construction and application of operational and permanent storage devices, the basics of programming microprocessor systems.	4	LO6, LO8, LO9, LO10	EEC 6605	EEC6607
43	EEC6678-Data Analysis and Machine Learning	This course aims to provide engineering students with the skills to process and examine different forms of data in Python, and an understanding of how machine learning methods can use this data to solve classification and regression problems. They will learn how to implement these methods in Python using Scikit-learn and PyTorch.	6	LO6, LO8, LO9	EEC 6605	RW6001
44	IP6602 - Professional Internship (2 course)	Studying the characteristics of radio engineering devices, telecommunication systems, linear cable structures.	4	LO9-LO11	EP6601	IP6603
45	IP6603 - Professional Internship (3 course)	Learning the basics of operation and design of networks and telecommunications systems.	4	LO9-LO12	IP6602	PP6604
46	PP6604 - Pre-diploma Internship	Collection of materials for writing a graduation project.	5	LO3, LO7, LO12	IP6603	RW6001
Cycle of majors						
Optional component						
47	MIN602 – Minor 2	Additional educational program (Minor) (minor) - a set of disciplines and (or) modules and other types of educational work, determined by students for study in order to form additional competencies.	5	LO13	-	RW6001
48	MIN603 – Minor 3	Additional educational program (Minor) (minor) - a set of disciplines and (or) modules and other types of educational work, determined by students for study in order to form additional competencies.	5	LO13	-	RW6001
Elective Discipline 3						
49	EEC6610	The study of basic methods and algorithms for digital signal	4	LO6, LO8, LO9	EEC 6605	EEC6678

	- Digital signal processing	processing, and their computer simulation using a software package (MatLab). The specifics of the representation of signals and digital signal processing systems in the MatLab language, the study of linear discrete systems, the synthesis of digital filters and the modeling of these objects and processes using MatLab software.				
50	EEC6677- Intelligent signal processing and data analysis	It covers a wide range of topics, including machine learning algorithms, signal recovery, as well as more complex techniques such as message passing and graph signal processing. In addition, the course includes coding theory, data storage solutions, adaptive filters, array processing, remote sensing, and time and frequency domain analysis.	4	LO6, LO8, LO9	EEC 6605	EEC6678
Final State Examination						
51	RW6001	Writing and defending a diploma thesis, diploma project or preparation and passing of a comprehensive exam.	12			

12. Curriculum of the educational program (Platonus)

Module code	Module name	Discipline cycle	Discipline component	Code of subject	Subject name	Academic credits	Academic study period	Control in the academic period			Number of hours							Distribution of credits per academic period								
											Total	Classroom work					Independ ent work of students		1 course		2 course		3 course		4 course	
								Exams	Differentiated	Term		Lectures	Laboratory trainings	Practice	Studio lessons	Practice	Independent work of	Independent work of	1	2	3	4	5	6	7	8
																			Number of weeks in the academic period							
																			1	1	1	1	1	1	1	1
5	5	5	5	5	5	5	5	5																		
Minor module for disciplines																										
General modules																										
1	OMM6002 – Language and ICT skills development module	GE R	C S	LAN6001 KR	Kazakh (Russian) language	5	1	1			5/15 0			45			15	90	5. 0							
2		GE R	C S	ICT6001	Information and Communicatio n Technologies	5	1	1			5/15 0	15	30. 0				15	90	5. 0							
3		GE R	C S	LAN6001 A	Foreign language	5	1	1			5/15 0			45			15	90	5. 0							
4		GE R	C S	LAN6002 A	Foreign language	5	2	2			5/15 0			45			15	90		5. 0						
5		GE R	C S	LAN6002 KR	Kazakh (Russian) language	5	2	2			5/15 0			45			15	90		5. 0						
6	OMM6001 - Module of social and cultural development	GE R	C S	HK6002	History of Kazakhstan	5	1	1			5/15 0	15		30			15	90	5. 0							
7		GE R	C S	SPS6007	Sociology- Political science	4	2	2			4/12 0	15		30			15	60		4. 0						
8		GE R	C S	SPS6001	Philosophy	5	3	3			5/15 0	15		30			15	90			5. 0					
9		GE R	C S	SPS6006	Cultural studies- Psychology	4	4	4			4/12 0	15		30			15	60				4. 0				

10	OOM6003- Module of physical culture	GE R	C S	PhC6005	Physical Culture	4	2	2			4/12 0			45			15	60		4. 0					
11		GE R	C S	PhC6006	Physical Culture	4	3	3			4/12 0			45			15	60			4. 0				
12	OMM6004 – Module of personal and social development	GE R	E S	JUR 6505	Ecology and sustainable development	5	8	8			5/15 0	15		30			15	90							
13		GE R		MGT6706	Startups and entrepreneurshi p			8			5/15 0	15		30			15	90							
14		GE R		RM6001	Research metodology			8			5/15 0	15		30			15	90							
15		GE R		JUR6413	Fundamentals safety of life activity			8			5/15 0	15		30			15	90							
16		GE R		LAW6007	Fundamentals of law and anti-corruption culture			8			5/15 0	15		30			15	90							
17		GE R		ECO6007	Foundation of economics and financial literacy			8			5/15 0	15		30			15	90							
18		GE R		HUM640 0	Inclusive education			8			5/15 0	15		30			15	90							
Modules of specialty/education programm																									
19	BM6600 - Physics and Mathematics module	BS	U C	MAT6081	Linear Algebra and Analytical Geometry	4	1	1			4/12 0	15		30			15	60	4. 0						
20		BS	U C	PHY6002	Physics 1	6	1	1			6/18 0	15	30. 0	15			15	105	6. 0						
21		BS	U C	MAT6002	Mathematical analysis	6	2	2			6/18 0	30		30			15	105	6. 0						
22		BS	U C	PHY6004	Physics (2)	4	2	2			4/12 0	15	30. 0				15	60	4. 0						
23		BS	U C	MAT6007	Theory of functions of a complex variable	4	3	3			4/12 0	15		30			15	60		4. 0					

2 4	BM6601 – Basic module	BS	UC	EP6601	Educational Internship	2	2				2/60				60				2.0					
2 5		BS	UC	EEC 6604	Theory of Electromagnetic Waves Transmission	6	3	3			6/180	15	30.0	15		15	105		6.0					
2 6		BS	UC	EEC 6617	Radio access networks and systems	6	6	6			6/180	15	30.0	15		15	105				6.0			
2 7	BM6602 – "Fundamentals and Methods of Analysis of Radiotechnical Systems and Signals" module	BS	UC	EEC6635	Basic Circuit Theory	6	3	3			6/180	15	30.0	15		15	105		6.0					
2 8		BS	UC	EEC6634	Electronics and circuitry of radio engineering devices	7	3	3			7/210	30	30.0	15		15	120		7.0					
2 9		BS	UC	EEC 6605	Basics of radio circuits and signals	4	4	4			4/120	15	30.0			15	60		4.0					
3 0		BS	ES	EEC6636	Telecommunication theory and teletraffic engineering	6	4	4			6/180	15	30.0	15		15	105		6.0					
3 1		BS		EEC6676	Digital Communications			4			6/180	15	30.0	15		15	105							
3 2		BS	UC	EEC6656	Radio engineering devices	6	5	5			6/180	15	30.0	15		15	105				6.0			
3 3		BS	UC	EEC6637	Metrology and radio measurements	4	5	5			4/120	15	30.0			15	60				4.0			
3 4	BM6603 – "Telecommunication systems and information security" module	BS	UC	NET6602	Introduction to networking technologies	6	4	4			6/180	15	30.0	15		15	105		6.0					
3 5		BS	UC	NET6601	The basics of routing and switching	6	5	5			6/180	15	30.0	15		15	105				6.0			

3 6		BS	U C	EEC 6630	Fiber optic transmission systems	5	5	5			5/15 0	15	30. 0				15	90					5. 0			
3 7		BS	U C	EEC 6674	NGN and post - NGN networks	5	6	6			5/15 0	15	30. 0				15	90					5. 0			
3 8		BS	U C	EEC 6675	Basics of information security of networks and communication systems	6	7	7			6/18 0	15	30. 0	15				15	105						6. 0	
3 9	BM6604 – "Computer modeling in telecommunications" module	BS	E S	EGR6600	Engineering and computer graphics	4	4	4			4/12 0	15	30. 0				15	60				4. 0				
4 0		BS		EEC6608	Computer and mathematical modeling			4			4/12 0	15	30. 0				15	60								
4 1		BS	E S	EEC6610	Digital signal processing	4	5	5			4/12 0	15	30. 0				15	60				4. 0				
4 2		BS		EEC6677	Intelligent signal processing and data analysis			5			4/12 0	15	30. 0				15	60								
4 3	PM6600 – Professional module	AS	U C	IP6602	Professional Internship	4	4				4/12 0					12 0					4. 0					
4 4		AS	U C	IP6603	Professional Internship	4	6				4/12 0					12 0						4. 0				
4 5		AS	U C	LAN6003 PA	Professionally oriented foreign language	3	7	7			3/90			30			15	45						3. 0		
4 6		AS	U C	PP6604	Pre-diploma Internship	5	8				5/15 0					15 0									5. 0	
4 7	PM6602- "Modern telecommunicati on systems and	AS	U C	EEC 6629	Network of M2M and Internet of things	6	6	6			6/18 0	15	30. 0	15			15	105					6. 0			

48	networks" module	AS	UC	EEC6660	Intelligent telecommunica- tion systems	5	7	7			5/15 0	15	30. 0				15	90								5. 0	
49		AS	UC	EEC 6613	Mobile communication systems	7	7	7			7/21 0	15	30. 0	30			15	120								7. 0	
50		AS	UC	EEC6678	Data Analysis and Machine Learning	6	8	8			6/18 0	15	30. 0	15			15	105									6. 0
51	PM6601 - "Telecommunica- tions and radio engineering systems and networks" module	AS	UC	EEC6611	Digital devices and microprocessor s	4	6	6			4/12 0	15	30. 0				15	60							4. 0		
52		AS	UC	EEC6607	Programming in microprocessor systems	4	7	7			4/12 0	15	30. 0				15	60								4. 0	
53		AS	UC	EEC6619	Broadcasting systems	6	7	7			6/18 0	15	30. 0	15			15	105								6. 0	
Additional modules beyond qualification																											
Modules of choice																											
54	Additional educational program	BS	ES	MIN601	Minor 1	5	5	5			5/15 0	15	30. 0				15	90						5. 0			
55		AS	ES	MIN602	Minor 2	5	6	6			5/15 0	15	30. 0				15	90							5. 0		
56		AS	ES	MIN603	Minor 3	5	7	7			5/15 0	15	30. 0				15	90								5. 0	
Weekly average workload at hours																			0	0	0	0	0	0	0	0	0
1	General education subjects(GER)					56		12	0	0	153 0	75	30	39 0	0	0	16 5	870	2 0	1 8	9	4	0	0	0	0	5
	Core subjects(GER/CS)					51		11	0	0	153 0	75	30	39 0	0	0	16 5	870	2 0	1 8	9	4	0	0	0	0	0
	University component(GER/UC)					0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Electives(GER/ES)					5		1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
2	Base requirements(BS)					112		21	0	0	294 0	30 0	45 0	22 5	0	60	27 0	163 5	1 0	1 2	2 3	2 0	3 0	1 0	1 1	6 0	0
	Core subjects(BS/CS)					0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	University component(BS/UC)	93		1 7	0	0	279 0	28 5	42 0	22 5	0	60	25 5	154 5	1 0	1 2	2 3	1 0	2 1	1 1	6	0
	Electives(BS/ES)	19		4	0	0	150	15	30	0	0	0	15	90	0	0	0	1 0	9	0	0	0
3	Profession requirements(VRS)	64		1 0	0	0	192 0	13 5	27 0	10 5	0	39 0	15 0	870	0	0	0	4	0	1 9	3 0	1 1
	Core subjects(VRS/CS)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	University component(VRS/UC)	54		8	0	0	162 0	10 5	21 0	10 5	0	39 0	12 0	690	0	0	0	4	0	1 4	2 5	1 1
	Electives(VRS/ES)	10		2	0	0	300	30	60	0	0	0	30	180	0	0	0	0	0	5	5	0
4	Disciplines for the formation of professional competencies(BDFPC)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Core subjects(BDFPC/CS)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	University component(BDFPC/UC)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Electives(BDFPC/ES)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Disciplines of personal development and the formation of leadership qualities(BDPD)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Core subjects(BDPD/CS)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	University component(BDPD/UC)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Electives(BDPD/ES)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total on curriculum		23 2			0	0	639 0	51 0	75 0	72 0	0	45 0	58 5	337 5	3 0	3 0	3 2	2 8	3 0	3 0	3 6	1 6
6	Additional courses											Number of credits		Academic period		Number of hours		Number of weeks				
7	Module of final certification (MoFC)										8				240.0							
Total including FC										240				7200.0								

13. Additional Educational Programs (Minor)