ХАЛЫҚАРАЛЫҚ УНИВЕРСИТЕТІ МЕЖДУНАРОДНЫЙ УНИВЕРСИТЕТ
INTERNATIONAL UNIVERSITY

AGREED
by the Chairman of the Educational and Methodological Council of «IITU» JSC
_____ A. K. Mustafina
«30» мауроз 2023 y.

APPROVED
by the Rector
of the «International Information Technology University» JSC
_____ A.K. Khikmetov
«30» мауроз 2023 y.

ACADEMIC PROGRAM

6B06201 - Telecommunication systems and networks
(academic program code and name)

Education area code and classification: 6B06 – Information and communication technologies

Training direction code and classification: 6B062 – Telecommunications

Group of academic programs: B059 – Communications and communications technologies

Level according to ISCED: 6

Level according to NQF: 6

Level according to IQF: 6

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

Training period: 4 years

Number of credits: 240

AGREED
Deputy Director
Institute of Space Technique and Technology»
SLLP
_____ N.M. Saterov
«27» мауроз 2023 y.

AGREED
President
«ASTEL» JSC
_____ V.Y. Breusov
«27» мауроз 2023 y.

AGREED
Director
« Argus Contact» LLP
_____ Akhmetov Zh.K.
«27» мауроз 2023 y.

AGREED
President of the Association of Innovative Companies of the SEZ
«Park of Innovative Technologies»
_____ A.T. Konysbayev
«27» мауроз 2023 y.

Almaty, 2023

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List of abbreviations and acronyms

CD	Cycle of core disciplines
CC	Core 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
OC	Optional 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
AP	Academic program
GPM	General professional module
SQF	Sectoral qualifications framework
GEC	General education competence
M	Cycle of majors
PI	Professional internship
PS	Professional standard
PE	Postgraduate education
PC	Professional competence
PM	Professional module
LO	Learning outcome
QMS	Quality Management System

1. Description of the academic 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 (with amendments and additions as of 01.01.2022);
- State compulsory standard of higher and postgraduate education (Order of the Ministry of Education and Science of the Republic of Kazakhstan No. 604 dated October 31, 2018 (with amendments and additions dated 23.07.2021);
- 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 state program «Digital Kazakhstan». Approved by the Resolution of the Government of the Republic of Kazakhstan dated December 12, 2017 No. 827;
- 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 (with amendments and additions as of 05.06.2020));
- Regulation on the development and approval of educational programs P-35 (Revision 3), approved by Protocol №3 from 18.11.2020 by the Rector of JSC «International Information Technology University».

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 academic program

AP aim of the education program is to prepare highly qualified specialists for innovative and knowledge-intensive sectors of the economy 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 for intellectual work.

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

3.1 General Information

№	Field name	Note
1	Education area code and classification	6B – 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 Academic Program	6B06201 - Telecommunication systems and networks
5	Aim of the Academic 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	Qualifications of the graduate of the Academic Program:	**Sphere of professional activity of the AP graduate:** The field of professional activity of the EP «6B06201 - Telecommunications Systems and Networks» is the field of science and technology, which is intended for the transmission of signals through various channels and communication lines, as well as issues of design, construction and operation of telecommunications systems or telecommunications networks for the exchange of information.
		Objects of professional activity of the AP graduates: The objects of professional activity of graduates of the EP «6B06201 - Telecommunications Systems and Networks» are telecommunications networks and systems that provide transmission and reception of signals through various channels and communication lines, methods and means of their design, construction, modeling, preparation for production and maintenance.
		Subject of professional activity: The subjects of the bachelor's professional activity in the EP «6B06201 - Telecommunications Systems and Networks» are enterprises related to the maintenance of telecommunications systems and networks; operation, repair and maintenance of fiber-optic and coaxial cable communication lines, communication systems, mobile and satellite communication systems; information security.
		Professional activities of the AP graduate: - design and operation of mobile communication systems; - design and operation of telecommunications systems; - design and operation of switching systems and communication networks; - design and construction of telecommunications networks; - design and operation of computer networks; - design, construction and operation of radio access systems;

		- operation of modern microprocessors and microcontrollers.
		Functions of the professional activity of the AP graduate: - design; - operation and service; - installation and commissioning; - maintenance and testing; - providing software and /or hardware protection.
8	Level according to the International Standard Classification of Education	6
9	Level according to the National Classifications Framework	6
10	Level according to the Sectoral Qualifications Framework	6
11	Number of credits	240 ECTS credits
12	Academic degree awarded	Bachelor's degree in Information and Communication Technologies of the educational program «6B06201-Telecommunication systems and networks».
13	List of generalized competencies of the educational program	Competences: **GC1.** 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. **GC2.** 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. **GC3.** 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. **GC4.** 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. **GC5.** Be able to communicate professionally in Kazakh and Russian languages; to know a foreign language at the level necessary to perform professional tasks. **GC6.** Ability to know the methods of solving problems of analysis and calculation of characteristics of electrical, radio and communication networks and data networks. **GC7.** To be able to generalize, analysis, information perception, goal setting and choice of ways of its achievement; is able to formulate arguments and solve problems in the field of operation, repair and maintenance of telecommunications systems; able to gather and interpret relevant data to inform judgments taking into account social, ethical and scientific considerations. **GC8.** 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. **GC9.** Be able to master the features of maintenance and repair of technical and technological equipment and transport communications. **GC10.** 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.

		GC11. Possess the ability to produce a measuring experiment and evaluate the results of measurements. **GC12.** to be able to use the data of evaluation of technical condition of telecommunication systems using diagnostic equipment and indirect signs. **GC13.** Be able to use advanced technologies for routine maintenance and maintenance of telecommunications systems using new materials and diagnostic tools.
14	List of generalized learning outcomes of the educational program	**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 improvement, critical comprehension of accumulated experience, and collect and interpret information to form judgments, by taking into account 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.** To be able to apply the acquired knowledge in the chosen additional educational program. **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.** Demonstrate the ability to independently, methodically correctly use the methods of physical education and health promotion to ensure well-rounded social and professional activity.
15	Form of training	Full-Time
16	Language of instruction	Kazakh, Russian, English
17	AP strategic partners	«Institute of Space Technology and Technology» SLLP, «ASTEL» JSC, Association of Innovative Companies of the SEZ «Park of Innovative Technologies», «Argus Contact» LLP and others.
18	Professional Standard for EP	1. Design, installation and commissioning of telecommunication equipment 2. Technical support of electronics 3. Management of communication and telecommunications networks 4. Assistant engineers for telecommunications and broadcasting 5. Technical support of broadcasting networks 6. Administration, management and diagnostics of computer networks and network infrastructure 7. Design and operation of telecommunication equipment
19	Developer (s) and authors of the academic program:	«International Information Technology University», Department of Radio Engineering, Electronics and Telecommunications: - Bakhtiyarova Yelena Azhibekovna, C.T.Sc, associate Professor; - Aitmagambetov Altay Zufarovich, C.T.Sc, Professor; - Kulakayeva Aigul Yergalievna, Master of RET, senior lecturer. - Serikbolova Albina Askarovna, PhD, assistant Professor.

Correlation table of competencies, learning outcomes, methods and assessment criteria

Dublin descriptors	AP Graduate Competencies	Competencies expressed in expected learning outcomes	Assessment criteria	Name of the assessment method
General education competencies				
1. Knowledge and understanding	Demonstrate knowledge and understanding of the main methods of analyzing socially significant problems and processes, the main provisions and methods of the humanitarian, social, and economic sciences in various types of professional and	Being able to have excellent spoken and written communication in the state and official languages	Speaking and expressing one's own thoughts clearly	Creative task
			Answer questions correctly, fully, and convincingly	Creative task
			Maintain office work and document flow	Essay
		Demonstrate and apply humanitarian, socio-economic, and legal knowledge in an interdisciplinary context to solve professional	Use the basics of philosophical knowledge to form a worldview argument	Creative task
			Have physical education skills	Fit test

	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.	interdisciplinary context to solve professional problems.	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	Creative task
			Knowing the state and foreign languages in written communication	Essay
			Know the methods of scientific research and academic writing	Creative task
2. Applying knowledge and understanding in practice	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
3. The ability to make judgments, to evaluate ideas and to formulate conclusions	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
4. Communication skills	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
5. Self-learning	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	Report

			activities	
		Ability to use regulatory documents in their activities	Ability to read technical literature	Report
			To know international standards and recommendations	Presentation
Core competencies				
1. Knowledge and understanding	Willingness to take into account modern trends in the development of electronics, measuring and computing technology, information technology in their professional activities, to master the basic methods of processing and presenting laboratory data	To demonstrate and apply mathematical, natural science knowledge to solve basic problems in the field of telecommunication systems and networks	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 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
2. Applying knowledge and understanding in practice	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

3. The ability to make judgments, to evaluate ideas and to formulate conclusions	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
4. Communication skills	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
5. Self-learning	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				
1. Knowledge and understanding	Willingness to take into account in their professional activities modern trends in the development of	To demonstrate and apply mathematical, natural science knowledge to solve professional problems in the field of	To solve professional tasks	Settlement and graphic work
			To set up laboratory experiments	Report
			To rethink past experience	Report

	electronics, measuring and computing technology, Internet of Things technologies, information technologies, and to master the basic methods of processing and presenting laboratory data	telecommunications		
		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
2. Applying knowledge and understanding in practice	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
3. The ability to make judgments, to evaluate ideas and to formulate conclusions	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	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	Report

	developments in production, prepare documentation and participate in the work of the quality management system at the enterprise		telecommunication equipment	
		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
4. Communication skills	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
			To solve professional problems	Creative task
5. Self-learning	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 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

3.2 Matrix for correlating the learning outcomes of the academic program with the formed competencies

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12
GC1	V				V							
GC2	V											
GC3		V										
GC4		V										
GC5			V	V								

GC6					V							
GC7					V	V						
GC8						V	V	V				
GC9									V			
GC10										V	V	
GC11										V		
GC12											V	
GC13												V

3.3. Information about the modules of the academic 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 6600 - Historical and social module	18	As a result of studying this module, the student must: - be able to connect and compare individual phenomena and events of the past with the general paradigm of the world-historical development of human society; the ability to objectively understand and explain historical events; meaningful citizenship based on the principles of patriotism, tolerance; - know about the formation of the main approaches to the consideration of problems: being, matter, consciousness, nature and society; the technique and logic of scientific research, how to create strategies for cognitive activity. - demonstrate a sense of political will and be able to identify specific ways in which an individual can participate fully in politics; the ability to transfer sociological knowledge to others; and the skills and attitudes needed to engage community members. - use 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	HK 6002 - History of Kazakhstan SPS 6001 - Philosophy SPS 6003- Political science SPS 6002 - Sociology SPS 6005 - Psychology SPS 6004 - Culturology
OMM 6601 – General education module	18	As a result of studying this module, the student must: - 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; - be able to apply an industrial environmental approach to critically evaluate the workplace or production process, find ways to improve energy use and reduce waste streams; - demonstrate an understanding of the relationship between the broader environment and the relevant components of workplace health and safety in relation to the concept of ecosystem health; - be able to conduct a case study when evaluating a process or industry from the point of view of industrial ecology in order to make recommendations for reducing the environmental impact.	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	ICT 6001 - Information and communication technologies (in English) ECO 6002 - Economics and organization of production PhC 6005 - PhC 6006 – Physical Culture
OMM 6602 – Language module	20	As a result of studying this module, the student must: - be able to distinguish and use grammatical phenomena such as the present, past, future, tenses and questions, and correctly use general and	1. Oral exam 2. Test 3. Midterm exam	LAN 6001A - Foreign Language LAN 6002A - Foreign Language LAN 6001KR - Kazakh

		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.	4. Computational and graphic work 5. Exam	language (Russian Language) LAN 6002KR - Kazakh language (Russian Language)
BASIC MODULES				
BM 6600 - Physics and Mathematics module	24	As a result of studying this module, the student must: - be able to solve systems of linear equations using matrix operations and apply and graphically illustrate arithmetic operations for vectors on the plane, in three-dimensional space, and in Rn; formulate and geometrically describe equations of lines and planes in three-dimensional space in both parametric and nonparametric form; - use derivatives to find the intervals at which a given function increases or decreases, the maxima and minima of functions, the inflection points of functions and determine the concavity of curves and formulate the basic concepts and principles of mechanics, thermodynamics and electricity and magnetism; - apply knowledge of physical principles and equations to solve physical problems in mechanics, thermodynamics, electricity and magnetism, and to solve physical problems in optics and light, quantum mechanics and atomic physics; - know methods of differentiation and integration of complex variable functions; methods of decomposition of functions of a complex variable into a Laurent series; - application of deductions for solving practical problems.	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	MAT 6081- Linear Algebra and Analytical Geometry MAT 6002- Mathematical analysis PHY 6002 - Physics (1) PHY 6004 - Physics (2) MAT 6007- Theory of functions of a complex variable
BM 6601 – Basic module	6	As a result of studying this module, the student must: - be able to differentiate and use grammatical phenomena such as passive verbs, nouns, articles, reported speech and modal verbs; create a general and professional vocabulary on the topics being studied and understand genuine speech on the topics being studied; work with the simplest measuring devices; - know pointers, recursion, structures;	1. Oral exam 2. Test 3. Midterm exam 4. Exam	LAN 6002DA - English for STEM PP 6600- Educational Internship
BM 6602 –Radio Engineering, Electronics and Metrology module	39	As a result of studying this module, the student must: - know the principle of operation and differences between different types of amplifier devices, filters, signal converters, generators, distinguish their parameters and characteristics; calculation methods and calculate the parameters and characteristics of circuits; measure and analyze the	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work	EEC 6634 - Electronics and circuitry of radio engineering devices EEC 6637- Metrology and radio measurements

		parameters and characteristics of circuits; - be able to read electrical circuit diagrams of amplifying devices, generators, converter, determine their parameters; reproduce the basic concepts, laws and methods of analysis of electrical circuits; evaluate calculation methods and calculate the parameters and characteristics of the circuit; measure and analyze the parameters and characteristics of the circuit; evaluate the probabilities and intervals of measurement error, measurement error and control; - read the diagrams of various radio transmitting devices of radio-electronic equipment, their individual nodes and cascades, and perform the necessary technical calculations, including using computer technology.	5. Exam	EEC 6636 - Telecommunication theory and teletraffic engineering EEC 6656 - Radio engineering devices EEC 6604 - Theory of Electromagnetic Waves Transmission EEC 6635- Basic Circuit Theory EEC 6605- Basics of radio circuits and signals
BM 6603 – Computer modeling in telecommunications module	8	As a result of studying this module, the student must: - be able to use image transformation methods; use the basic method of descriptive geometry, engineering graphics; use the theory and ways of solving positional and metric problems and read technical drawings; create images using the AutoCAD system; determine the geometric shapes and dimensions of parts using a drawing. - create and improve modern radio engineering objects using Matlab and link mathematical modeling methods with the practical implementation of modern radio engineering objects; - apply the MatLab mathematical package to digital signal processing tasks and application software packages for the design of radio engineering devices.	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	EGR 6600- Engineering and computer graphics EEC 6608- Computer and mathematical modeling EEC 6610- Digital signal processing
BM 6604 – Telecommunication systems and information security module	30	As a result of studying this module, the student must: - know the principles of construction of fiber-optic transmission systems and the main methods of measuring the parameters of transmission systems and communication lines; methods of construction of radio access systems; - have an understanding of the main directions of development of mobile communication systems; basic concepts of Ethernet, such as the data transmission environment, services and principles of operation; - know about the basic rules of network behavior for security and the basic concepts and methods of building NGN and post NGN networks; - be able to evaluate and describe the importance of addressing and naming schemes at various levels of data networks in IPv4 and IPv6 environments; develop, calculate and apply subnet masks and addresses	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	NET 6602 - Introduction to networking techologies NET 6601 - The basics of routing and switching EEC 6674 - NGN and post - NGN networks EEC 6630 - Fiber optic transmission systems

		in IPv4 and IPv6 networks according to the specified requirements; - understand the operation and configuration of network address translation (NAT) for IPv4 networks, as well as the ability to troubleshoot related problems, configure maintenance and device management tasks, including the Cisco Discovery Protocol (CDP), LLDP (Link Layer Discovery Protocol), NTP (Network Time Protocol), syslog, device backup and recovery, password recovery, and IOS management; - apply technologies, products and procedures used to protect confidentiality, ensure integrity, ensure high availability.		EEC 6675 - Basics of information security of networks and communication systems
PROFESSIONAL MODULE				
PM 6600 – Professional module	16	As a result of studying this module, the student must: - participate in discussions on the topics studied, express opinions, present ideas, agree/disagree, provide arguments, propose solutions; - know the technological processes of transmission, signal processing of telecommunications systems and radio engineering devices of telecommunications systems on the topic of the thesis.	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	LAN 6003PA- Professionally oriented foreign language PP 6601 - Professional Internship PP 6602 - Professional Internship PP 6603 - Pre-diploma Internship
PM 6601 - Telecommunications and radio engineering systems and networks module	14	As a result of studying this module, the student must: - know the principle of operation and the different types of semiconductor and optoelectronic devices, to distinguish their parameters, characteristics; physical essence of the processes occurring in paths of signal conversion; the main methods of transmission and reception of TV and radio signals; - be able to read electrical circuit diagrams of analog devices, determine their parameters, build current-voltage characteristics; apply the knowledge gained for the analysis and design of frequency and territorial planning of broadcasting. Use the regulatory documents of the ITU, RCC and AS RK in the design, implementation and operation of RTS and networks for various purposes; - know the functions of microprocessor systems by introducing additional peripheral devices into them; - be competent in the development of electrical circuit diagrams of RTS; - know inheritance, polymorphism, encapsulation, Server and Client libraries, database connection and JDBC; - be able to develop software for electronic devices based on microcontroller boards.	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	EEC 6617 - Radio access networks and systems EEC 6611 - Digital devices and microprocessors EEC 6607 - Programming in microprocessor systems

PM 6602- Modern telecommunication systems and networks module	24	As a result of studying this module, the student must: - be able to analyze the task in order to determine the composition, structure of data, restrictions on them and the choice of solutions, and develop algorithms for solving problems related to the manipulation of various types of data; apply wireless technologies in M2M and Internet of Things networks; - to know the basic principles and methodology of application software development, as well as to obtain software implementations of the obtained solutions in an algorithmic language; the purpose, types and main types of satellite systems and services, their principles of operation, design, operational characteristics, electrical parameters, and to apply analytical and numerical methods for analyzing satellite systems for a variety of tasks and frequency ranges, including using modern software - master the approaches and techniques for solving artificial intelligence problems.	1. Oral exam 2. Test 3. Midterm exam 4. Computational and graphic work 5. Exam	EEC 6619- Broadcasting systems EEC 6629 - M2M Networks and IoT EEC 6613- Mobile communication systems EEC 6660 - Intelligent telecommunication systems

3.4. Information about the disciplines of the academic 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	HK 6002 - History of Kazakhstan	The course examines the modern history of Kazakhstan as part of the history of mankind, the history of Eurasia and Central Asia. The modern history of Kazakhstan is a period in which a holistic study of historical events, phenomena, facts, processes, identification of historical patterns that took place on the territory of the great steppe in the twentieth century and to the present day.	5	PO1-PO2	-	RW6001
2	SPS 6001- Philosophy	The principles of understanding philosophy as a methodology of human activity, readiness for self-knowledge, Amateur activity, development of cultural wealth as a factor of harmonization of personal and interpersonal relations are studied.	5	PO1	-	RW6001
3	LAN 6001A - 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 acquisition of the relevant glossary and target grammar structures in various kinds of listening, reading speaking and writing activities. The teaching and learning is heavily reliant on the use of IT technologies and students self-study (self-checked grammar exercises, small group projects) which makes it useful for the students' successful career in the chosen field.	5	PO1	-	LAN 6002A
4	LAN 6002A - 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	5	PO1	LAN 6001A	LAN 6002DA

		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	LAN 6001KR - Kazakh (Russian) language	The course "Kazakh/Russian language" is aimed at improving language, speech, communicative competencies. Its task is to improve the language abilities of students, to develop skills and abilities in four types of speech activity (speaking, listening, reading, writing). The content of the typical curriculum of the general education discipline "Kazakh/Russian language" includes topics of seminar (practical) classes and independent work of students. Training is conducted at 3 levels: A, B, C.	5	PO1	-	LAN 6002KR
6	LAN 6002KR - Kazakh (Russian) language	the course "Kazakh/Russian language" is aimed at improving language, speech, communicative competencies. Its task is to improve the language abilities of students, develop skills in four types of speech activity (speaking, listening, reading, writing). The curriculum is based on communication-oriented concept, which includes elements of problem-based and communicative-individualized learning. Three basic linguo-methodological provisions were chosen as the basic principles: 1) the communicative orientation of training, taking into account the actual spheres of verbal communication; 2) taking into account the consistency in the study of lexical units, their semantic interconnectedness and stylistic conditionality of functioning in various contexts and situations; 3) the formation of a system of language, speech and communication tasks with a focus on the educational and professional needs of students."	5	PO1	LAN 6001KR	RW6001
7	ICT 6001 -	Modern methods and means of	5	PO6;	-	EEC 6608

	Information and communication technology (in English)	communication in everyday and professional activities are studied; application of information technologies to search, collect, store, process and disseminate the information is taught.		PO8		
8	SPS 6003 - Political science	The course 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.	2	PO2-PO3	-	RW6001
9	SPS 6002- Sociology	The special importance of this course for students is to develop a sociological imagination, to understand the basic concepts of sociology as a science. They will also gain complete knowledge of sociological subject areas, research methods and directions. The course will discuss in detail the basic sociological theories and the most effective ways to obtain in-depth knowledge of various aspects of our modern society. In this course, students will study the scientific social knowledge that will help them gain experience in the formation of models of social relations; In addition, they will learn to respect the values of both Kazakhstan and the rest of the world, the skills of social communication, interpersonal relations, respect for the different cultures of Kazakhstan and the world community.	2	PO2-PO3	-	RW6001
10	SPS 6005- Psychology	The course studies main issues of psychology in a wide educational and social context. 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).	2	PO2-PO3	-	SPS 6004
11	SPS 6004 - Culturology	Knowledge in the field of cultural studies can serve as a basis for studying the entire complex of social sciences and humanities. At the same time, the discipline of cultural studies can serve as an addition to general courses in	2	PO2-PO3	SPS 6002	RW6001

		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.				
12	PhC 6005-PhC 6006 - Physical Culture	The area of social activity, aimed at maintaining and strengthening human health, in the process of conscious motor activity. This is a part of culture, which is a set of values and knowledge created and used by society for the purpose of physical and intellectual development of a person's abilities, improvement of his physical activity and the formation of a healthy lifestyle, social adaptation through physical education, physical training and physical development.	8	PO13	PhC 6001	PhC 6004
Cycle of general education disciplines (GED) University component (UC) and (or) Optional component (OC)						
13	ECO 6002-Economics and organization of production	The study of organizational and managerial decisions in non-standard conditions, as well as in conditions of different opinions. Ability to calculate economic indicators, understanding the meaning of the principles and culture of academic integrity.	5	PO2; PO4; PO11	-	RW6001
Cycle of core disciplines University component						
14	EEC 6634 - 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 classification of semiconductor and optoelectronic devices, parameters, characteristics, operating modes and operating principles of diodes, transistors, thyristors, photoemitters, photodetectors, optocouplers and integrated circuits.	7	PO2; PO7-PO8	PHY 6004	EEC 6611
15	LAN 6002DA -	Formation and development of students' skills in listening, speaking, reading, and writing in English on topics related to entrepreneurship, as well as the development of social skills such	4	PO1	LAN 6002A	LAN 6003PA

		as making presentations. The approach to learning is communicative, interactive, student-centered, result-oriented and relies heavily on students' independent work.				
16	MAT 6081 - Linear Algebra and Analytical Geometry	The study of vectors, vector space, linear transformations and systems of linear equations, as well as other elements of linear algebra and analytical geometry using examples from real life and various sciences.	4	PO2	-	MAT 6002
17	MAT 6002 - 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	PO2	MAT 6008	MAT 6007
18	PHY 6002 - 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	PO2; PO8	-	PHY 6004
19	EEC 6635 - 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	PO3; PO7-PO8	PHY 6004	EEC 6605
20	EEC 6636 - 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	6	PO3; PO8-PO9	EEC 6605	EEC 6610

		communication systems.				
21	PHY 6004 - Physics (2)	The study of the laws, principles, postulates and equations of ray optics, quantum optics, the theory of relativity, atomic and nuclear physics, familiarization with the basics of modern physics and quantum mechanics, the use of physics equations for solving specific physical problems, the use of physics methods for research, analysis and laboratory works in order to verify the work and the implementation of the laws of physics in nature and technology.	4	PO2; PO8	PHY 6002	EEC 6635
22	MAT 6007 - 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	PO2	MAT 6002	EEC 6635
23	EEC 6604 - 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	PO3; PO7-PO8	PHY 6004	EEC 6636
24	EEC 6605 - 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	PO3; PO7	EEC 6635	EEC 6636
25	EEC 6656 - 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	PO3; PO7; PO9	EEC 6605	EEC 6619
26	PP 6600 - Educational Internship	Learning the basics of computer technology, programming basics, applications for radio and	2	CC1	-	PP 6601

		telecommunication systems.				
27	EEC 6637 - 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	PO7; PO9	EEC 6634	RW6001
28	EEC 6610 - Digital signal processing	The study of basic methods and algorithms for digital signal 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.	4	PO7-PO9	EEC 6636	EEC 6611
29	NET 6602 - Introduction to networking techologies	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	PO7-PO8	ICT 6001	NET 6603
30	NET 6601 - The basics of routing and switching	The discipline allows configuring routers and switches for advanced functionality, configuring aggregation, redundancy, and routing protocols, troubleshooting device problems, and fine-tuning routing protocols.	6	PO6; PO9	NET 6602	EEC 6659
31	EEC 6674 - NGN and post - NGN networks	The discipline «NGN and post - NGN networks» 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.	6	PO8; PO10; PO12	NET 6602	EEC 6659
32	EEC 6675 - Basics of	The discipline «Basics of information security of networks	6	PO9-PO10	NET 6602	EEC 6660

	information security of networks and communication systems	and communication systems» 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.				
33	EEC 6630 - 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	PO8-PO9; PO12	PHY 6004	EEC 6658
Cycle of core disciplines Optional component						
Elective Discipline 1						
34	EEC 6608 - 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	PO9-PO10	ICT 6001	EEC 6610
35	EGR 6600 - 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	PO3; PO7-PO8	-	RW6001
Elective Discipline 2-Minor 1						
36	MIN601-Minor 1	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	PO5	-	-
Cycle of majors University component						
37	EEC 6607 - 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	4	PO6; PO7	EEC 6611	RW6001

		purposes, as well as the development of positive motivation for independent work and self-education for the design of microprocessor systems.				
38	LAN 6003PA - Professionally oriented foreign language	Orienting students to topics of professional interest, such as future trends in IT, the computer as a friend, the computer as an enemy, minimizing the negative impacts of IT, magnetic storage, optical storage, flash memory, programming languages, web design, graphics. design, etc. Designed to increase students' language awareness, improve their speaking skills and professional English communication skills.	3	PO1; PO3	LAN 6002DA	RW6001
39	EEC 6660 - Intelligent telecommunicati on 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 based on formal logical 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	PO10; PO12	NET 6602	RW6001
40	PP6601 - Professional Internship	Study of characteristics of radio engineering devices, telecommunication systems, linear cable structures.	4	PO8-PO10	PP6600	PP6602
41	PP6602 - Professional Internship	Studying the basics of operation and design of networks and telecommunication systems.	4	PO8-PO10	PP6601	PP6603
42	PP6603 -Pre-diploma Internship	Collection of materials for writing a thesis project.	5	PO3; PO10; PO12	PP6603	RW6001
43	EEC 6617 - 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 receiving devices of radio access systems.	6	PO7-PO9	EEC 6636	EEC 6613
44	EEC 6619 - Broadcasting systems	Studying the principles of constructing the transmitting and receiving paths of digital television and radio broadcasting systems of the DVB-T2 standard	6	PO9-PO10	EEC 6617	EEC 6660

		and their elements, devices, television antenna-feeder path. Studying the principles of building VHF FM sound broadcasting, also systems MMDS, DRM, DAB.				
45	EEC 6613 - 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	PO9-PO10	EEC 6617	EEC 6660
46	EEC 6629 - M2M Networks and IoT	Studying the principles of building the Internet of Things and M2M networks, including the features of 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.	6	PO7-PO10	EEC 6617	EEC 6660
47	EEC 6611 - 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	PO6; PO8	EEC 6610	EEC 6607
Cycle of majors Optional component						
Elective Discipline 3 -Minor 2						
48	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	PO5	-	-
Elective Discipline 4 -Minor 3						
49	MIN603-Minor 3	Additional educational program (Minor) (minor) - a set of	5	PO5	-	-

		disciplines and (or) modules and other types of educational work, determined by students for study in order to form additional competencies				
Final State Examination						
50	RW6001	Writing and defending a diploma thesis, diploma project or preparation and passing of a comprehensive exam.	8	-	-	-

4. Curriculum of the academic program

№	Module code	Module name in three languages (kaz / rus / eng)	Discipline Code	Discipline name in three languages (kaz / rus / eng)	Cycles (GED, CD, M)	Components (RC, OC, UC)	Total number of credits (ECTS)	Total number of academic hours	Number of classroom hours				Number of SIS hours		Form of control (Midterm, End-of-term, examination, CP defense, differential test, DP defense)	Prerequisites (Discipline Code)
									Total number of classroom hours	Including			Total number of SIS hours	Including TSIS		
										lectures	practical classes (sem.)	laboratory classes				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 year																
1 semester																
1	OMM 6602/OMM 6602/OMM 6602	Тілдер модуль/Языковой модуль/Languages module	LAN6001A/LAN6001A/LAN6001A	Шет тілі/Иностранный язык/Foreign language	ЖББП/ООД/GED	ОК	5	150	45		45		90	15	Аралас/Комбинированный/Composite exam	LAN6002A
2	OMM 6602/OMM 6602/OMM 6602	Тілдер модуль/Языковой модуль/Languages module	LAN6001KR/LAN6001KR/LAN6001KR	Қазақ (орыс) тілі/Казахский (русский) язык/Kazakh (Russian) language	ЖББП/ООД/GED	ОК	5	150	45		45		90	15	Аралас/Комбинированный/Composite exam	LAN6002KR
3	BM 6600/BM 6600/BM 6600	Физико- математикалық модуль/Физико-математический модуль/Physics and Mathematics module	MAT6081/MAT6081/MAT6081	Сызықтық алгебра және аналитикалық геометрия/Линейная алгебра и аналитическая геометрия/Linear Algebra and Analytical Geometry	БП/БД/BD	ВК	4	120	45	15	30		60	15	Жазбаша/Письменный/Written exam	MAT6002
4	BM 6600/BM 6600/BM 6600	Физико- математикалық модуль/Физико-математический модуль/Physics and Mathematics module	PHY6002/PHY6002/PHY6002	Физика 1/Физика 1/Physics 1	БП/БД/BD	ВК	6	180	60	15	15	30	105	15	Жазбаша/Письменный/Written exam	PHY6004
Total number for a semester:							**20**	**600**	**195**	**30**	**135**	**30**	**345**	**60**		
2 semester																

1	ОММ 6600/ОММ 6600/ОММ 6600	Тарихи-әлеуметтік модуль/Историко-социальный модуль/Historical and social module	HK6002/HK6002/HK6002	Қазақстан тарихы/История Казахстана/History of Kazakhstan	ЖББП/ООД/GED	ОК	5	150	45	15	30		90	15	Аралас/Комбинированный/Composite exam	RW6001
2	ОММ 6601/ОММ 6601/ОММ 6601	Жалпы білім беру модуль/Общеобразовательный модуль/General education module	PhC6005/PhC6005/PhC6005	Дене шынықтыру/Физическая культура/Physical Culture	ЖББП/ООД/GED	ОК	4	120	45		45		60	15	Аралас/Комбинированный/Composite exam	PhC6003
3	ОММ 6600/ОММ 6600/ОММ 6600	Тарихи-әлеуметтік модуль/Историко-социальный модуль/Historical and social module	SPS6002/SPS6002/SPS6002	Әлеуметтану/Социология/Sociology	ЖББП/ООД/GED	ОК	2	60	30	15	15		15	15	Аралас/Комбинированный/Composite exam	SPS6004
4	ОММ 6600/ОММ 6600/ОММ 6600	Тарихи-әлеуметтік модуль/Историко-социальный модуль/Historical and social module	SPS6003/SPS6003/SPS6003	Саясаттану/Политология/Political science	ЖББП/ООД/GED	ОК	2	60	30	15	15		15	15	Аралас/Комбинированный/Composite exam	RW6001
5	ОММ 6602/ОММ 6602/ОММ 6602	Тілдер модуль/Языковой модуль/Languages module	LAN6002A/LAN6002A/LAN6002A	Шет тілі/Иностранный язык/Foreign language	ЖББП/ООД/GED	ОК	5	150	45		45		90	15	Аралас/Комбинированный/Composite exam	LAN6002DA
6	ОММ 6602/ОММ 6602/ОММ 6602	Тілдер модуль/Языковой модуль/Languages module	LAN6002KR/LAN6002KR/LAN6002KR	Қазақ (орыс) тілі/Казахский (русский) язык/Kazakh (Russian) language	ЖББП/ООД/GED	ОК	5	150	45		45		90	15	Аралас/Комбинированный/Composite exam	RW6001
7	ОММ 6601/ОММ 6601/ОММ 6601	Жалпы білім беру модуль/Общеобразовательный модуль/General education module	ICT6001/ICT6001/ICT6001	Ақпараттық-коммуникациялық технологиялар/Информационно-коммуникационные технологии/Information and Communication Technologies	ЖББП/ООД/GED	ОК	5	150	45	15		30	90	15	Аралас/Комбинированный/Composite exam	EEC6608
8	ВМ 6600/ВМ 6600/ВМ 6600	Физико- математикалық модуль/Физико-математический модуль/Physics and Mathematics module	PHY6004/PHY6004/PHY6004	Физика (2)/Физика (2)/Physics (2)	БП/БД/BD	ВК	4	120	45	15		30	60	15	Жазбаша/Письменный/Written exam	EEC6635

9	BM 6600/BM 6600/BM 6600	Физико- математикалық модуль/Физико-математический модуль/Physics and Mathematics module	MAT6002/MAT6002/MAT 6002	Математикалық анализ/Математический анализ/Mathematical analysis	БП/БД/BD	ВК	6	180	60	30	30		105	15	Жазбаша/Письменный/Written exam	MAT 6007
10	BM 6601/BM 6601/BM 6601	Негізгі модуль/Базовый модуль/Basic module	PP6600/PP6600/PP6600	Учебная практика/Учебная практика/Educational Internship	БП/БД/BD	ВК	2	60	30		30		15	15	Басқа/Другое/Other exam	PP 6601
Total number for a semester:							**40**	**1200**	**420**	**105**	**255**	**60**	**630**	**150**		
TOTAL NUMBER FOR THE YEAR:							**60**	**1800**	**615**	**135**	**390**	**90**	**975**	**210**		
2 year																
3 semester																
1	OMM 6601/OMM 6601/OMM 6601	Жалпы білім беру модуль/Общеобразовательный модуль/General education module	PhC6006/PhC6006/PhC6006	Дене шынықтыру/Физическая культура/Physical Culture	ЖББП/ООД/GED	ОК	4	120	45		45		60	15	Аралас/Комбинированный/Composite exam	PhC 6004
2	OMM 6600/OMM 6600/OMM 6600	Тарихи-әлеуметтік модуль/Историко-социальный модуль/Historical and social module	SPS6001/SPS6001/SPS6001	Философия/Философия/Philosophy	ЖББП/ООД/GED	ОК	5	150	45	15	30		90	15	Аралас/Комбинированный/Composite exam	RW 6001
3	BM 6602/BM 6602/BM 6602	Радиотехника, электроника және метрология модулі/Модуль Радиотехники, электроники и метрологии/Radio Engineering, Electronics and Metrology module	EEC6634/EEC6634/EEC6634	Радиотехникалық құрылғылардың электроникасы мен сұлбатехникасы/Электроника и схемотехника радиотехнических устройств/Electronics and circuitry of radio engineering devices	БП/БД/BD	ВК	7	210	75	30	15	30	120	15	Жазбаша/Письменный/Written exam	EEC 6637
4	BM 6602/BM 6602/BM 6602	Радиотехника, электроника және метрология модулі/Модуль Радиотехники, электроники и метрологии/Radio Engineering, Electronics and Metrology module	EEC6635/EEC6635/EEC6635	Электр тізбектерінің теориясы/Теория электрических цепей/Basic Circuit Theory	БП/БД/BD	ВК	6	180	60	15	15	30	105	15	Жазбаша/Письменный/Written exam	EEC 6605

5	BM 6600/BM 6600/BM 6600	Физико- математикалық модуль/Физико-математический модуль/Physics and Mathematics module	MAT6007/MAT6007/MAT 6007	Комплекс айнымалылар функцияларының теориясы/Теория функций комплексного переменного/Theory of functions of a complex variable	БП/БД/BD	ВК	4	120	45	15	30		60	15	Жазбаша/Письменный/Written exam	EEC 6636
6	BM 6602/BM 6602/BM 6602	Радиотехника, электроника және метрология модулі/Модуль Радиотехники, электроники и метрологии/Radio Engineering, Electronics and Metrology module	EEC 6604/EEC 6604/EEC 6604	Электромагниттік толқындардың таратылу теориясы/Теория передачи электромагнитных волн/Theory of Electromagnetic Waves Transmission	БП/БД/BD	ВК	6	180	60	15	15	30	105	15	Жазбаша/Письменный/Written exam	EEC 6651
Total number for a semester:							**32**	**960**	**330**	**90**	**150**	**90**	**540**	**90**		
4 semester																
1	OMM 6600/OMM 6600/OMM 6600	Тарихи-әлеуметтік модуль/Историко-социальный модуль/Historical and social module	SPS6004/SPS6004/SPS6004	Мәдениеттану/Культурология/Cultural studies	ЖББП/ООД/GED	ОК	2	60	30	15	15		15	15	Аралас/Комбинированный/Composite exam	RW6001
2	OMM 6600/OMM 6600/OMM 6600	Тарихи-әлеуметтік модуль/Историко-социальный модуль/Historical and social module	SPS6005/SPS6005/SPS6005	Психология/Психология/Psychology	ЖББП/ООД/GED	ОК	2	60	30	15	15		15	15	Аралас/Комбинированный/Composite exam	RW 6001
3	BM 6605/BM 6605/BM 6605	Компьютерлік модельдеу модулі/Модуль Компьютерное моделирование/Computer Simulation module	EEC 6608/EEC 6608/EEC 6608	Компьютерлік және математикалық модельдеу/Компьютерное и математическое моделирование/Computer and mathematical modeling	БП/БД/BD	КВ (КВ 3)	4	120	45	15		30	60	15	Аралас/Комбинированный/Composite exam	EEC 6610

4	BM 6605/BM 6605/BM 6605	Компьютерлік модельдеу модулі/Модуль Компьютерное моделирование/Computer Simulation module	EGR6600/EGR6600/EGR6600	Инженерлік және компьютерлік графика/Инженерная и компьютерная графика/Engineering and computer graphics	БП/БД/BD	КВ (КВ 3)	4	120	45	15		30	60	15	Аралас/Комбинированный/Composite exam	RW6001
5	BM 6602/BM 6602/BM 6602	Радиотехника, электроника және метрология модулі/Модуль Радиотехники, электроники и метрологии/Radio Engineering, Electronics and Metrology module	EEC6636/EEC6636/EEC6636	Электр байланыс теориясы және телетрафика/Теория электрической связи и телетрафика/Telecommunication theory and teletraffic engineering	БП/БД/BD	ВК	6	180	60	15	15	30	105	15	Жазбаша/Письменный/Written exam	EEC6610
6	BM 6602/BM 6602/BM 6602	Радиотехника, электроника және метрология модулі/Модуль Радиотехники, электроники и метрологии/Radio Engineering, Electronics and Metrology module	EEC 6605/EEC 6605/EEC 6605	Радиотехникалық тізбектер мен сигналдардың негіздері/Основы радиотехнических цепей и сигналов/Basics of radio circuits and signals	БП/БД/BD	ВК	4	120	45	15		30	60	15	Жазбаша/Письменный/Written exam	EEC6610
7	BM 6604/BM 6604/BM 6604	Телекоммуникациялық жүйелер мен ақпараттық қауіпсіздік модулі/Модуль Телекоммуникационные системы и информационная безопасность/Telecommunication systems and information security module	NET6602/NET6602/NET6602	Желілік технологияларға кіріспе/Введение в сетевые технологии/Introduction to networking techologies	БП/БД/BD	ВК	6	180	60	15	15	30	105	15	Компьютерлік тестілеу/Компьютерное тестирование/Computer testing	NET6603
8	PM 6600/PM 6600/PM 6600	Кәсіби модуль/Профессиональный модуль/Professional module	PP6601/PP6601/PP6601	Өндірістік тәжірибе/Производственная практика/Professional Internship	БПЦ/ПД/СМ	ВК	4	120	45		45		60	15	Басқа/Другое/Other exam	PP6602
Total number for a semester:							**28**	**840**	**315**	**90**	**105**	**120**	**420**	**105**		
TOTAL NUMBER FOR THE YEAR:							**60**	**1800**	**645**	**180**	**255**	**210**	**960**	**195**		

3 year															
5 semester															
1	BM 6604/BM 6604/BM 6604	Телекоммуникациялық жүйелер мен ақпараттық қауіпсіздік модулі/Модуль Телекоммуникационные системы и информационная безопасность/Telecommunication systems and information security module	NET6601/NET6601/NET6601	Маршрутизациялау және коммутациялау негіздері/Основы маршрутизации и коммутации/The basics of routing and switching	БП/БД/BD	ВК	6	180	60	15	15	30	105	15	Компьютерлік тестілеу/Компьютерное тестирование/Computer testing	EEC 6659
2	BM 6602/BM 6602/BM 6602	Радиотехника, электроника және метрология модулі/Модуль Радиотехники, электроники и метрологии/Radio Engineering, Electronics and Metrology module	EEC6656/EEC6656/EEC6656	Радиотехникалық құрылғылар/Радиотехнические устройства/Radio engineering devices	БП/БД/BD	ВК	6	180	60	15	15	30	105	15	Жазбаша/Письменный/Written exam	EEC 6619
3	BM 6602/BM 6602/BM 6602	Радиотехника, электроника және метрология модулі/Модуль Радиотехники, электроники и метрологии/Radio Engineering, Electronics and Metrology module	EEC6637/EEC6637/EEC6637	Метрология және радиоөлшеу/ Метрология и радиоизмерения/ Metrology and radio measurements	БП/БД/BD	ВК	4	120	45	15		30	60	15	Жазбаша/Письменный/Written exam	RW6001
4	BM 6603/BM 6603/BM 6603	Телекоммуникациядағы компьютерлік модельдеу модулі/Модуль Компьютерное моделирование в телекоммуникации/Computer modeling in telecommunications module	EEC 6610/EEC 6610/EEC 6610	Сигналдарды цифрлық өңдеу/ Цифровая обработка сигналов/ Digital signal processing	БП/БД/BD	ВК	4	120	45	15		30	60	15	Жазбаша/Письменный/Written exam	EEC 6611

5	BM 6604/BM 6604/BM 6604	Телекоммуникациялық және радиотехникалық жүйелер мен желілер модулі/Модуль Телекоммуникационные и радиотехнические системы и сети/Telecommunications and radio engineering systems and networks module	EEC 6630/EEC 6630/EEC 6630	Талшықты-оптикалық тарату жүйелері/Волоконно-оптические системы передачи/Fiber optic transmission systems	БП/БД/ BD	ВК	6	180	60	15	15	30	105	15	Жазбаша/ Письменный/Written exam	EEC 6658
6			MIN601/ MIN601/ MIN601	Майнор 1/ Майнор 1/ Майнор 1	БП/БД/ BD	КВ	5	150	45	15		30	90	15	Жазбаша/ Письменный/Written exam	
Total number for a semester:							**31**	**930**	**315**	**90**	**45**	**180**	**525**	**90**		
6 semester																
1	BM 6604/BM 6604/BM 6604	Телекоммуникациялық жүйелер мен ақпараттық қауіпсіздік модулі/Модуль Телекоммуникационные системы и информационная безопасность/Telecommunication systems and information security module	EEC6674/EEC6674/EEC6674	NGN және пост - NGN желілері/Сети NGN и пост- NGN/NGN and post - NGN networks	БП/БД/ BD	ВК	6	180	60	15	15	30	105	15	Жазбаша/ Письменный/Written exam	BM 6604/ BM 6604/ BM 6604
2	BM 6601/BM 6601/BM 6601	Негізгі модуль/Базовый модуль/Basic module	LAN6002DA/ LAN6002DA/ LAN6002DA	STEM арналған ағылшын тілі/Английский язык для STEM/English for STEM	БП/БД/ BD	ВК	4	120	45		45		60	15	Аралас/Комбинированный/Composite exam	BM 6601/ BM 6601/ BM 6601
3	PM 6601/PM 6601/PM 6601	Телекоммуникациялық және радиотехникалық жүйелер мен желілер модулі/Модуль Телекоммуникационные и радиотехнические системы и сети/Telecommunications and radio engineering	EEC 6611/EEC 6611/EEC 6611	Цифрлық құрылғылар мен микропроцессорлар/Цифровые устройства и микропроцессоры/Digital devices and microprocessors	БПЦ/ПД/СМ	ВК	4	120	45	15		30	60	15	Жазбаша/ Письменный/Written exam	PM 6601/ PM 6601/ PM 6601

		systems and networks module														
4	PM 6601/PM 6601/PM 6601	Телекоммуникациялық және радиотехникалық жүйелер мен желілер модулі/Модуль Телекоммуникационные и радиотехнические системы и сети/Telecommunications and radio engineering systems and networks module	EEC 6617/EEC 6617/EEC 6617	Радиоқолжеткізу желілері мен жүйелері/Сети и системы радиодоступа/Radio access networks and systems	БПЦ/ПД/СМ	ВК	6	180	60	15	15	30	105	15	Жазбаша/ Письменный/Written exam	PM 6601/ PM 6601/ PM 6601
5	PM 6600/PM 6600/PM 6600	Кәсіби модуль/Профессиональный модуль/Professional module	PP6602/PP6602/PP6602	Өндірістік тәжірибе/Производственная практика/Professional Internship	БПЦ/ПД/СМ	ВК	4	120	45		45		60	15	Басқа/Другое/Other exam	PM 6600/ PM 6600/ PM 6600
6			MIN602/ MIN602/ MIN602	Майнор 2/ Майнор 2/ Майнор 2	БПЦ/ПД/СМ	КВ	5	150	45	15		30	90	15	Жазбаша/ Письменный/Written exam	
Total number for a semester:							**29**	**870**	**300**	**60**	**120**	**120**	**480**	**90**		
TOTAL NUMBER FOR THE YEAR:							**60**	**1800**	**615**	**150**	**165**	**300**	**1005**	**180**		
4 year																

7 semester																
1	ВМ 6604/ВМ 6604/ВМ 6604	Телекоммуникациялық жүйелер мен ақпараттық қауіпсіздік модулі/Модуль Телекоммуникационные системы и информационная безопасность/Telecommunication systems and information security module	EEC6675/EEC6675/EEC6675	Байланыс желілері мен жүйелерінің ақпараттық қауіпсіздік негіздері/Основы информационной безопасности сетей и систем связи/Basics of information security of networks and communication systems	БП/БД/BD	ВК	6	180	60	15	15	30	105	15	Аралас/Комбинированный/Composite exam	EEC 6660
2	РМ 6601/ РМ 6601/ РМ 6601	Телекоммуникациялық жүйелер мен ақпараттық қауіпсіздік модулі/Модуль Телекоммуникационные системы и информационная безопасность/Telecommunication systems and information security module	EEC 6607/EEC 6607/EEC 6607	Микропроцессорлық жүйелерде бағдарламалау/Программирование в микропроцессорных системах/Programming in microprocessor systems	БПЦ/ПД/СМ	ВК	4	120	45	15		30	60	15	Жазбаша/Письменный/Written exam	RW 6001
3	РМ 6602/РМ 6602/РМ 6602	Заманауи телекоммуникациялық жүйелер мен желілер модулі/Модуль Современные телекоммуникационные системы и сети/Modern telecommunication systems and networks module	EEC 6629/EEC 6629/EEC 6629	M2M желісі және Интернет заттар/Сети M2M и Интернета вещей/Network of M2M and Internet of things	БПЦ/ПД/СМ	ВК	6	180	60	15	15	30	105	15	Жазбаша/Письменный/Written exam	EEC 6660
4	РМ 6602/РМ 6602/РМ 6602	Заманауи телекоммуникациялық жүйелер мен желілер модулі/Модуль Современные телекоммуникационные системы и сети/Modern telecommunication systems and networks module	EEC 6613/EEC 6613/EEC 6613	Мобильді байланыс жүйелері/Системы мобильной связи/Mobile communication systems	БПЦ/ПД/СМ	ВК	6	180	60	15	15	30	105	15	Жазбаша/Письменный/Written exam	EEC 6660

5	PM 6602/PM 6602/PM 6602	Заманауи телекоммуникациялық жүйелер мен желілер модулі/Модуль Современные телекоммуникационные системы и сети/Modern telecommunication systems and networks module	EEC 6619/EEC 6619/EEC 6619	Телерадио хабарларын тарату жүйелері/Системы телерадиовещания/Broadcasting systems	БПЦ/ПД/СМ	ВК	6	180	60	15	15	30	105	15	Жазбаша/ Письменный/Written exam	RW 6001
6	PM 6600/PM 6600/PM 6600	Кәсіби модуль/Профессиональный модуль/Professional module	LAN6003PA/ LAN6003PA/ LAN6003PA	Кәсіби бағытталған шет тілі/Профессионально-ориентированный иностранный язык/Professionally oriented foreign language	БПЦ/ПД/СМ	ВК	3	90	30		30		45	15	Аралас/Комбинированный/Composite exam	RW6 001
7			MIN603/ MIN603/ MIN603	Майнор 3/ Майнор 3/ Майнор 3	БПЦ/ПД/СМ	КВ	5	150	45	15		30	90	15	Жазбаша/ Письменный/Written exam	
Total number for a semester:							**36**	**1080**	**360**	**90**	**90**	**180**	**615**	**105**		
8 semester																
1	OMM 6601/OMM 6601/OMM 6601	Жалпы білім беру модуль/Общеобразовательный модуль/General education module	ECO 6002/ ECO 6002/ ECO 6002	Экономика және өндірісті ұйымдастыру /Экономика и организация производства / Economics and organization of production	ЖББП/ ООД/GED	ВК	5	150	45	15	30		90	15	Аралас/Комбинированный/Composite exam	RW 6001
2	PM 6600/PM 6600/PM 6600	Кәсіби модуль/Профессиональный модуль/Professional module	PP6603/PP6603/PP6603	Диплом алдындағы тәжірибе/Преддипломная практика/Pre-diploma Internship	БПЦ/ПД/СМ	ВК	5	150	45		45		90	15	Басқа/Другое/Other exam	RW6 001
3	PM 6602/PM 6602/PM 6602	Заманауи телекоммуникациялық жүйелер мен желілер модулі/Модуль Современные телекоммуникационные системы и сети/Modern telecommunication systems and networks module	EEC6660/EEC6660/EEC6660	Телекоммуникацияның зияткерлік жүйелері/Интеллектуальные системы телекоммуникаций/Intelligent telecommunication systems	БПЦ/ПД/СМ	ВК	6	180	60	15	15	30	105	15	Аралас/Комбинированный/Composite exam	RW6 001

4			RW6001/RW6001/RW6001	Дипломдық жұмысты, дипломдық жобаны жазу және қорғау немесе кешенді емтиханды дайындау және тапсыру/Написание и защита дипломной работы, дипломного проекта или подготовка и сдача комплексного экзамена/Writing and defending a diploma thesis, diploma project or preparation and passing of a comprehensive exam	ҚА/ИА/FE	ОК	8	240					150	90	Басқа/Другое/Other exam	-
Total number for a semester:							24	720	150	30	90	30	435	135		
TOTAL NUMBER FOR THE YEAR:							**60**	**1800**	**510**	**120**	**180**	**210**	**1050**	**240**		
TOTAL:							**240**	**7200**	**2385**	**585**	**990**	**810**	**3990**	**825**		

Summary table of indicators of the academic program's number of credits in the context of cycles of disciplines and semesters

Cycles of disciplines / Semester	1 sem.	2 sem.	3 sem.	4 sem.	5 sem.	6 sem.	7 sem.	8 sem.	Total number of credits ECTS	Note (AP structure according to the National Mandatory Standards of Higher and Post-Graduate Education)
Cycle of general education disciplines (GED)	10	28	9	4				5	56	* No more than 56 cr.

- including the required component (GED RC)	10	28	9	4				5	56	* No more than 51 cr.
- including optional component (GED OC)	0	0	0	0				0		* Not less than 5 cr.
Cycle of core disciplines (CD)	10	12	23	20	31	10	6	0	107	* No more than 112 cr.
- including the university component (CD UC)	10	12	23	16	26	10		0	97	
- including optional component (CD OC)	0	0	0	4	5	0	6	0	10	
Cycle of majors (M)				4		19	30	11	69	* Not less than 60 cr.
- including the university component (M UC)				4		14	25	11	54	
- including optional component (M OC)				0		5	5	0	15	
Professional internship (PI)										
Additional types of training										
Final attestation (FA)								8	8	6 cr.
TOTAL number of credits for the academic program	**20**	**40**	**32**	**28**	**31**	**29**	**36**	**16**	**240**	**Not less than 240 cr.**

5. Minor

Name of Minors, indicating the list of disciplines that form them	Number of Minor credits / numbers of discipline credits	Semesters	Document issued on the basis of the results of mastering Minors
Telecommunication network technologies	**15**		**Certificate**
EEC 6637–Metrology and radio measurements	5	5	
EEC 6605–Basics of radio circuits and signals	5	6	
EEC 6630 – Fiber optic transmission systems	5	7	

6. Developer Approval Sheet

Code and name of the academic program «6B06201 - Telecommunication Systems and Networks»

No.	Academic program Developers (position, academic degree, full name)	Date	Signature	Note
1	Assistant Professor of the Department of Radio Engineering, Electronics and Telecommunications, C.T. Sc., Bakhtiyarova Yelena Azhibekovna			
2	Professor of the Department of Radio Engineering, Electronics and Telecommunications, C.T. Sc., Aitmagambetov Altay Zufarovich			
3	Senior lecturer of the Department of Radio Engineering, Electronics and Telecommunications, Master of RET, Kulakayeva Aigul Yergalievna			
4	Assistant Professor of the Department of Radio Engineering, Electronics and Telecommunications, PhD, Serikbolova Albina Askarovna			