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

7M06201 Telecommunication systems and networks

Code and classification of the field of education: 7M06 Information and communication technologies

Code and classification of training area: 7M062 Telecommunications

Group of educational programs: M096 Communications and communications technologies

ISCED level: 7

NQR level: 7

ORC level: 7

Academic degree awarded Master of Technical Sciences in the educational program «7M06201 Telecommunication systems and networks»

Duration of study: 2 years

Number of credits: 120

AGREED

Director of «Institute of space technique and technology» LLP

O.K. Toishibekov
«__» _____ 2025 y.

AGREED

President of «ASTEL» JSC

V.Y. Breusov
«__» _____ 2025 y.

Almaty, 2025

The code and name of the educational program: 7M06201 Telecommunication systems and networks

№	Educational program developers (Position, scientific degree, academic degree, Full name)	Signature
1	Head of the Department of Radio Engineering, Electronics and Telecommunications, associate Professor, candidate of Technical Sciences Bakhtiyarova Yelena Azhibekovna	
2	Professor of the Department of Radio Engineering, Electronics and Telecommunications, Candidate of Technical Sciences, Aitmagambetov Altay Zufarovich	
3	Associate Professor of the Department of Radio Engineering, Electronics and Telecommunications, PhD, Ospanova Nurzhamal Akbaevna	
4	Deputy Director for Advanced Projects of the LLP «Institute of space technique and technology», Sultanbekova Leila Ermekovna	
5	President «ASTEL» JSC, Breusov Vladimir Yevgenievich	
6	Senior Engineer of the Urban Access Networks Group at «Mobile Telecom-Service» LLP, Sypatay Torekhan Maratuly	
7	Master's student of the educational program «7M06201 TSN» Talgat Aruzhan	

Contents

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 «7M06201 Telecommunication Systems and Networks» is developed on the basis of the main regulatory documents that determine the content of training in the direction «7M062 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 educational program "7M06201 Telecommunications Systems and Networks" trains highly qualified specialists focused on the development and implementation of mobile communication and fiber-optic communication networks. The program is oriented towards the field of science and technology, which encompasses a set of technologies, tools, methods, and techniques of human activity aimed at creating conditions for remote information exchange, transforming information using electronic means, as well as solving research tasks, developing new telecommunications products, and maintaining existing ones. Graduates of the program possess a pronounced engineering and scientific mindset, a high level of general cultural development, and proficiency in foreign languages.

2. Aim and objectives of the educational program

The purpose of the EP - Training of qualified personnel in the field of radio engineering, telecommunication and electronic systems that are in demand in the modern labor market.

AP objectives:

1. in-depth study of modern methods of designing electronic and telecommunications equipment and systems, computer networks and systems;
2. the generation of knowledge on how to develop and design equipment and radio networks and telecommunications, microprocessor-based systems for various applications;
3. develop the skills of the research studies, modeling of objects and processes of radio, telecommunication systems;
4. promote the application of knowledge acquired during the training for the development, modernization and design of electronics and telecommunication systems, to continue their studies in doctoral studies.

3. Passport of the academic program

№	Name	Description
1.	Education area code and classification	7M06 Information and Communication Technologies
2.	Training direction code and classification	7M062Telecommunications
3.	Group of academic programs	M096 Communication and communication technologies
4.	Name of the educational program	7M06201Telecommunication systems and networks
5.	Aim of the educational program	Training of qualified specialists in the field of radio engineering, telecommunications, and electronic systems that are in demand on the modern labor market."
6.	Type of the educational program	Current EP
7.	Level according to the National Classifications Framework	7
8.	Level according to the Sectoral Qualifications Framework	7
9.	Distinctive features of the program	-
10.	Partner University	-
11.	Academic degree awarded	Master of Science in Engineering in the educational program "7M06201 – Telecommunication Systems and Networks"
12.	Duration of study	2 years
13.	Volume of credits	120 ECTS credits
14.	Language of education	russian
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	LO1: To demonstrate knowledge and understanding in the field of study, based on advanced knowledge of the field, in the development and / or application of ideas in the context of research, as well as the learning skills necessary to independently continue further education in the field of study. LO 2: To apply practical skills in code modeling and explain the general methodological foundations of software development, and to collect and interpret information to form judgments, taking into account social, ethical, and scientific considerations. LO 3: Independently and critically analyze modern sources, draw conclusions, argue them and make decisions on the basis of information. LO 4: To simulate the redundancy of subnetwork paths, in terms of the choice of the length of the sections, and the determination of the general population and random sampling. LO 5: To implement the knowledge gained in the maintenance and organization of the operation of mobile systems, design a mobile communication network at all levels of the hierarchy, carry out basic operational

		measurements of channels, paths, and nodes of mobile communication equipment, calculate the parameters of telecommunication networks and systems, and calculate the transmission parameters of optical communication cables. LO 6: Drawing up diagrams of a single-channel and multichannel information transmission system, knowing the methodology for determining the redundancy of message sources and the main characteristics of a discrete channel, being able to calculate the number of amplifying sections depending on the total losses, and determining intersymbol interference. LO 7: To apply the knowledge gained in the maintenance and organization and operation of video surveillance systems, calculate the basic geometric parameters in the construction of video surveillance systems, simulate digital television broadcasting systems, and justify the choice of the frequency range. LO 8: To define a problem, formulate hypotheses, and research objectives; develop a research plan; apply the principles of metrological support and methods of instrumental measurements used in the field of infocommunication technologies and communication systems. LO 9: To analyze the safety of radio-electronic and telecommunication systems and to conduct monitoring. LO 10: Explain and understand the legal framework of the Republic of Kazakhstan and other countries of the world, as well as the procedures for standardization and certification in the field of radio-electronic and telecommunication systems. Apply at a professional level their knowledge, understanding, and ability to solve problems in a new environment, and in a broader interdisciplinary context. LO 11: To organize and carry out an inspection of the technical condition and resource of equipment, apply modern methods and their maintenance and repair, determine the main characteristics of modern telecommunication systems, the feasibility and prospects of their use for solving specific problems of organizing information transmission networks. LO 12: To apply data protection technologies in radio electronic and telecommunication systems. LO 13: To apply cryptographic information protection in radio-electronic and telecommunication systems. LO 14: To demonstrate knowledge of the quantitative assessment of information, algorithms for error-correcting coding, cryptographic protection of information. Clear and unambiguous communication of information, ideas, conclusions, problems, and solutions, both to specialists and non-specialists. LO 15: To analyze the basic techniques of technical operation and metrological support of equipment.

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

№	Name of the PS	Profession card	Labor functions
1	Development of IoT Systems	Cloud IoT Systems Engineer	- Ensuring functionality at the network level;
2	Professional Standard: for Educators (Faculty and Teaching Staff) of Institutions of Higher and/or Postgraduate Education	Lecturer, Senior Lecturer in the Field of Education, Higher and (or) Postgraduate Education (HPGE)	- Teaching; - Conducting scientific research; - Carrying out scientific and methodological work
3	Creation and Management of Information Technologies	1) Technical Documentation Specialist (Technical Writer)	- Leading a team of technical documentation specialists in IT (technical writers); - Providing technological support for the preparation of technical publications

5. List of the EP competencies

BC 1: understand the role of science and education in the social life of the current trends in the development of scientific knowledge

BC 2: be aware of the current trends in the development of scientific knowledge

BC 3: have an idea about the actual methodological and philosophical problems of natural (social, humanitarian, economic) sciences

BC 4: have an idea about the professional competence of the teacher of high school

BC 5: be aware of the contradictions and the socio-economic consequences of globalization

BC 6: know the methodology of scientific knowledge, principles and structure of the scientific activities of the organization

PC 7: know the psychology of cognitive activity of students in the learning process, psychological methods and means to improve the efficiency and quality of education

PC 8: use this knowledge for original development and application of ideas in the context of scientific research, to critically analyze existing concepts, theories and approaches to the analysis of processes and phenomena

PC 9: be fluent in a foreign language at a professional level, allowing to carry out scientific research and to implement the teaching of special disciplines

PC 10: creative thinking and creative approach to solving new problems and situations

PC 11: have the skills of professional communication and cross-cultural communication and oratory, correct and logical registration of the thoughts in oral and written form

PC 12: to know the social and ethical values based on public opinion, traditions, customs, social norms and navigate to them in their professional activity

PC 13: know the traditions and culture of the peoples of Kazakhstan; be tolerant to the traditions and culture of other peoples of the world

PC 14: to be able to work in a team, properly to defend his point of view, to offer new solutions; be able to find compromises, to relate their views to the collective opinion; strive for professional and personal growth

PC 15: to be able to self-improvement and professional growth of the individual with diverse humanitarian and scientific knowledge and interests.

6. List of learning outcomes of the EP

LO1: To demonstrate knowledge and understanding in the field of study, based on advanced knowledge of the field, in the development and / or application of ideas in the context of research, as well as the learning skills necessary to independently continue further education in the field of study.

LO 2: To apply practical skills in code modeling and explain the general methodological foundations of software development, and to collect and interpret information to form judgments, taking into account social, ethical, and scientific considerations.

LO 3: Independently and critically analyze modern sources, draw conclusions, argue them and make decisions on the basis of information.

LO 4: To simulate the redundancy of subnetwork paths, in terms of the choice of the length of the sections, and the determination of the general population and random sampling.

LO 5: To implement the knowledge gained in the maintenance and organization of the operation of mobile systems, design a mobile communication network at all levels of the hierarchy, carry out basic operational measurements of channels, paths, and nodes of mobile communication equipment, calculate the parameters of telecommunication networks and systems, and calculate the transmission parameters of optical communication cables.

LO 6: Drawing up diagrams of a single-channel and multichannel information transmission system, knowing the methodology for determining the redundancy of message sources and the main characteristics of a discrete channel, being able to calculate the number of amplifying sections depending on the total losses, and determining intersymbol interference.

LO 7: To apply the knowledge gained in the maintenance and organization and operation of video surveillance systems, calculate the basic geometric parameters in the construction of video surveillance systems, simulate digital television broadcasting systems, and justify the choice of the frequency range.

LO 8: To define a problem, formulate hypotheses, and research objectives; develop a research plan; apply the principles of metrological support and methods of instrumental measurements used in the field of infocommunication technologies and communication systems.

LO 9: To analyze the safety of radio-electronic and telecommunication systems and to conduct monitoring.

LO 10: Explain and understand the legal framework of the Republic of Kazakhstan and other countries of the world, as well as the procedures for standardization and certification in the field of radio-electronic and telecommunication systems. Apply at a professional level their knowledge, understanding, and ability to solve problems in a new environment, and in a broader interdisciplinary context.

LO 11: To organize and carry out an inspection of the technical condition and resource of equipment, apply modern methods and their maintenance and repair, determine the main characteristics of modern telecommunication systems, the feasibility and prospects of their use for solving specific problems of organizing information transmission networks.

LO 12: To apply data protection technologies in radio electronic and telecommunication systems.

LO 13: To apply cryptographic information protection in radio-electronic and telecommunication systems.

LO 14: To demonstrate knowledge of the quantitative assessment of information, algorithms for error-correcting coding, cryptographic protection of information. Clear and unambiguous communication of information, ideas, conclusions, problems, and solutions, both to specialists and non-specialists.

LO 15: To analyze the basic techniques of technical operation and metrological support of equipment.

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

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO 10	LO 11	LO 12	LO 13	LO 14	LO 15
BC1	V														
BC2	V														V
BC3	V		V												
BC4				V											
BC5	V				V										
BC6		V				V									
PC7															V
PC8								V	V	V	V	V			
PC9									V						
PC10						V	V			V					
PC11													V		
PC12	V														
PC13	V														
PC14							V							V	
PC15	V														V

8. The relationship of LO with labor functions

№	LO	Labor functions
1.	LO1: To demonstrate knowledge and understanding in the field of study, based on advanced knowledge of the field, in the development and / or application of ideas in the context of research, as well as the learning skills necessary to independently continue further education in the field of study.	Training
2.	LO 5: To implement the knowledge gained in the maintenance and organization of the operation of mobile systems, design a mobile communication network at all levels of the hierarchy, carry out basic operational measurements of channels, paths, and nodes of mobile communication equipment, calculate the parameters of telecommunication networks and systems, and calculate the transmission parameters of optical communication cables.	Ensuring operability at the network level
3.	LO 8: To define a problem, formulate hypotheses, and research objectives; develop a research plan; apply the principles of metrological support and methods of instrumental measurements used in the field of infocommunication technologies and communication systems.	Carrying out scientific and methodological work
4.	LO 9: To analyze the safety of radio-electronic and telecommunication systems and to conduct monitoring.	Conducting scientific research

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
Basic competencies			
BC 1: understand the role of science and education in the social life of the current trends in the development of scientific knowledge	LO1: To demonstrate knowledge and understanding in the field of study, based on advanced knowledge of the field, in the development and / or application of ideas in the context of research, as well as the learning skills necessary to independently continue further education in the field of study	To speak clearly and express one's thoughts coherently	Discussion
		To respond to questions accurately, comprehensively, and convincingly	Round Table Discussio
		To manage clerical work and document flow	Essay
BC 2: be aware of the current trends in the development of scientific knowledge	LO1: To demonstrate knowledge and understanding in the field of study, based on advanced knowledge of the field, in the development and / or application of ideas in the context of research, as well as the learning skills necessary to independently continue further education in the field of study	To speak clearly and express one's thoughts coherently	Discussion
		To respond to questions accurately, comprehensively, and convincingly	Round Table Discussio
		To manage clerical work and document flow	Essay
	LO 15: To analyze the basic techniques of technical operation and metrological support of equipment	To conduct experimental tests	Report
		To take measurements	Creative Assignment
		To interpret the results of measurements and experiments	Discussion
BC 3: have an idea about the actual methodological and philosophical problems of natural (social, humanitarian, economic) sciences	LO1: To demonstrate knowledge and understanding in the field of study, based on advanced knowledge of the field, in the development and / or application of ideas in the context of research, as well as the learning skills necessary to independently continue further education in the field of study	To speak clearly and express one's thoughts coherently	Discussion
		To respond to questions accurately, comprehensively, and convincingly	Round Table Discussio
		To manage clerical work and document flow	Essay
	LO 3: Independently and critically analyze modern sources, draw conclusions, argue them and make decisions on the basis of information.	To speak clearly and express one's thoughts coherently	Discussion
		To respond to questions accurately, comprehensively, and convincingly	Round Table Discussio
		To manage clerical work and document flow	Essay
BC 4: have an idea about the professional competence of the teacher of high school	LO 4: To simulate the redundancy of subnetwork paths, in terms of the choice of the length of the sections, and the determination of the general population and random sampling	To perform reliability analysis and diagnostics of radio engineering and telecommunication devices	Project
		To interpret the results of measurements	Project
		To be able to work with measuring instruments	Report
BC 5: be aware of the contradictions and the socio-	LO1: To demonstrate knowledge and understanding in the field of study, based on advanced knowledge of the field, in the	To speak clearly and express one's thoughts coherently	Discussion

economic consequences of globalization	development and / or application of ideas in the context of research, as well as the learning skills necessary to independently continue further education in the field of study	To respond to questions accurately, comprehensively, and convincingly	Round Table Discussio
		To manage clerical work and document flow	Essay
	LO 5: To implement the knowledge gained in the maintenance and organization of the operation of mobile systems, design a mobile communication network at all levels of the hierarchy, carry out basic operational measurements of channels, paths, and nodes of mobile communication equipment, calculate the parameters of telecommunication networks and systems, and calculate the transmission parameters of optical communication cables	To interpret the results of measurements	Report
		To interpret the results of measurements and experiments	Creative Assignment
		To be able to use reference materials	Discussion
BC 6: know the methodology of scientific knowledge, principles and structure of the scientific activities of the organization	LO 2: To apply practical skills in code modeling and explain the general methodological foundations of software development, and to collect and interpret information to form judgments, taking into account social, ethical, and scientific considerations.	To conduct experimental tests	Report
		To take measurements	Creative Assignment
		To interpret the results of measurements	Report
	LO 6: Drawing up diagrams of a single-channel and multichannel information transmission system, knowing the methodology for determining the redundancy of message sources and the main characteristics of a discrete channel, being able to calculate the number of amplifying sections depending on the total losses, and determining intersymbol interference	To interpret the results of measurements	Report
		To be able to work with measuring instruments	Report
		To be able to use reference materials	Creative Assignment
Professional competencies			
PC 7: know the psychology of cognitive activity of students in the learning process, psychological methods and means to improve the efficiency and quality of education	LO 15: To analyze the basic techniques of technical operation and metrological support of equipment	To conduct experimental tests	Report
		To take measurements	Creative Assignment
		To interpret the results of measurements and experiments	Discussion
PC 8: use this knowledge for original development and application of ideas in the context of scientific research, to critically analyze existing concepts, theories and approaches to the analysis of processes and phenomena	LO 8: To define a problem, formulate hypotheses, and research objectives; develop a research plan; apply the principles of metrological support and methods of instrumental measurements used in the field of infocommunication technologies and communication systemsи систем связи.	To solve professional problems	CGW
		To know research method	Report
		To formulate scientific and technical problems	Report
	LO 9: To analyze the safety of radio-electronic and telecommunication systems and to conduct monitoring	To interpret research results	Report
		To be able to work with telecommunication equipment	Presentation
		To develop regulatory and technical documentation	Creative Assignment
	LO 10: Explain and understand the legal framework of the Republic of Kazakhstan and other countries of the world, as well as the	To know the fundamentals of the legal system and legislation	Essay

	procedures for standardization and certification in the field of radio-electronic and telecommunication systems. Apply at a professional level their knowledge, understanding, and ability to solve problems in a new environment, and in a broader interdisciplinary context	To work with national standard	Presentation
		To work with international standards and guidelines	Presentation
	LO 11: To organize and carry out an inspection of the technical condition and resource of equipment, apply modern methods and their maintenance and repair, determine the main characteristics of modern telecommunication systems, the feasibility and prospects of their use for solving specific problems of organizing information transmission networks	To be aware of current trends in the development of the telecommunications industry	Report
		To know the methods of scientific and experimental research	Creative Assignment
		To interpret measurement results	Report
	LO 12: To apply data protection technologies in radio electronic and telecommunication systems	To know modern digital signal processing (DSP) methods	Report
		To know the methods of scientific and experimental research	Creative Assignment
		To solve professional problems	CGW
PC 9: be fluent in a foreign language at a professional level, allowing to carry out scientific research and to implement the teaching of special disciplines	LO 9: To analyze the safety of radio-electronic and telecommunication systems and to conduct monitoring	To interpret measurement results	Report
		To be able to work with telecommunication equipment	Presentation
		To develop regulatory and technical documentation	Creative Assignment
PC 10: creative thinking and creative approach to solving new problems and situations	LO 6: Drawing up diagrams of a single-channel and multichannel information transmission system, knowing the methodology for determining the redundancy of message sources and the main characteristics of a discrete channel, being able to calculate the number of amplifying sections depending on the total losses, and determining intersymbol interference	To interpret measurement results	Report
		To be able to work with measuring instruments	Report
		To be able to use reference materials	Creative Assignment
	LO 7: To apply the knowledge gained in the maintenance and organization and operation of video surveillance systems, calculate the basic geometric parameters in the construction of video surveillance systems, simulate digital television broadcasting systems, and justify the choice of the frequency range	Знать теоретические и экспериментальные методы исследований	Creative Assignment
		To solve professional problems	CGW
		Работать с научно-технической литературой	Report
	LO 10: Explain and understand the legal framework of the Republic of Kazakhstan and other countries of the world, as well as the procedures for standardization and certification in the field of radio-electronic and telecommunication systems. Apply at a professional level their knowledge, understanding, and ability to solve problems in a new environment, and in a broader interdisciplinary context	Знать основы правовой системы и законодательства	Essay
		To work with national standard	Report
		To work with international standards and guidelines	Report

PC 11: have the skills of professional communication and cross-cultural communication and oratory, correct and logical registration of the thoughts in oral and written form	LO 13: To apply cryptographic information protection in radio-electronic and telecommunication systems	To perform reliability analysis and diagnostics of radio engineering and telecommunication devices	Discussion
		To interpret measurement results	Creative Assignment
		To analyze results	Creative Assignment
PC 12: to know the social and ethical values based on public opinion, traditions, customs, social norms and navigate to them in their professional activity	LO1: To demonstrate knowledge and understanding in the field of study, based on advanced knowledge of the field, in the development and / or application of ideas in the context of research, as well as the learning skills necessary to independently continue further education in the field of study	To speak clearly and express one's thoughts coherently	Discussion
		To respond to questions accurately, comprehensively, and convincingly	Round Table Discussio
		To manage clerical work and document flow	Essay
PC 13: know the traditions and culture of the peoples of Kazakhstan; be tolerant to the traditions and culture of other peoples of the world	LO1: To demonstrate knowledge and understanding in the field of study, based on advanced knowledge of the field, in the development and / or application of ideas in the context of research, as well as the learning skills necessary to independently continue further education in the field of study	To speak clearly and express one's thoughts coherently	Discussion
		To respond to questions accurately, comprehensively, and convincingly	Round Table Discussio
		To manage clerical work and document flow	Essay
PC 14: to be able to work in a team, properly to defend his point of view, to offer new solutions; be able to find compromises, to relate their views to the collective opinion; strive for professional and personal growth	LO 7: To apply the knowledge gained in the maintenance and organization and operation of video surveillance systems, calculate the basic geometric parameters in the construction of video surveillance systems, simulate digital television broadcasting systems, and justify the choice of the frequency range	To know theoretical and experimental research methods	Creative Assignment
		To solve professional problems	CGW
		To work with scientific and technical literature	Report
	LO 14: To demonstrate knowledge of the quantitative assessment of information, algorithms for error-correcting coding, cryptographic protection of information. Clear and unambiguous communication of information, ideas, conclusions, problems, and solutions, both to specialists and non-specialists	To interpret measurement results	Report
		To be able to work with measuring instruments	Report
		To be able to use reference materials	Creative Assignment
PC 15: to be able to self-improvement and professional growth of the individual with diverse humanitarian and scientific knowledge and	LO1: To demonstrate knowledge and understanding in the field of study, based on advanced knowledge of the field, in the development and / or application of ideas in the context of research, as well as the learning skills necessary to independently continue further education in the field of study	To speak clearly and express one's thoughts coherently	Discussion
		To respond to questions accurately, comprehensively, and convincingly	Round Table Discussio
		To manage clerical work and document flow	Essay
		To conduct experimental tests	Report

interests.	LO 15: To analyze the basic techniques of technical operation and metrological support of equipment	To take measurements	Creative Assignment
		To interpret measurement results	Discussion
		To use the foundations of philosophical knowledge to form a worldview position	Project

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
BASIC MODULES				
BM7600-Humanitarian and pedagogical	20	As a result of studying the discipline, the undergraduate must: - have a holistic view of science, its history and place in the system of general knowledge; - be able to navigate the scientific and philosophical concepts of the past and present; - To develop the ability to consider science as a social phenomenon, a value institution and a system of disciplinary field of knowledge.	1. Oral survey 2. Testing 3. Midterm exam 4. Exam	SPS 7001 - History and Philosophy of Science
		A study of undergraduate discipline must: - know: the specifics of stylistic aspects of the evolution of media language, functional styles characteristic of speech and the main genre types of texts - - be able to: prepare texts for the media, relevant rules and norms of the literary language, use the language communication skills.	1. Oral survey 2. Testing 3. Midterm exam 4. Exam	LAN 7001A - Foreign language (professional)
		The discipline is aimed at developing the competencies of the psychological and pedagogical cycle and the managerial competencies of designing and organizing the educational process. Undergraduates will master modern psychological and pedagogical approaches to teaching, methodology and methods of teaching, as well as technologies of digital and inclusive education. Special attention is paid to the development of pedagogical, research and communication skills, as well as the prevention of ocuppational burnout of teachers. As a result of mastering the course, students will be able to develop and implement effective educational strategies in universities.	1. Oral survey 2. Testing 3. Midterm exam 4. Exam	SPS7007 - Higher education: psychological and pedagogical development strategies
		The goal of Pedagogical practice: consolidation, expansion, deepening and systematization of knowledge on the methodology of teaching special and professional disciplines. The theoretical foundations and patterns of functioning of reforms in the field of education and	1. Oral survey 2. Preparation and defense of a report	PP 7004 - Teaching practice

		science, legislative and regulatory legal acts that carry out the activities of educational institutions are studied; principles of making and implementing pedagogical and managerial decisions		
BM7601–Design of telecommunication systems	15	As a result of studying the course graduate should: - to design, operate and maintain fiber optic; - be able to carry out technical and economic analysis of the network and to justify decisions taken and implemented at the FOL operation; - apply and implement theoretical knowledge in FOL operation; - to find a compromise between the different requirements for long-term and short-term planning, to make better decisions in the design and operation of fiber-optic; - apply theoretical knowledge practice in the design and operation of fiber-optic line.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7601- Reliability of fiber-optic communication lines
		As a result of studying the discipline, undergraduates should know: - features of the construction of modern satellite systems of broadband access and their components; - classification, features of the choice of the orbit and the use of the radio frequency spectrum; - international regulation of the orbital-frequency resource for modern non-geostational satellite systems; - issues related to frequency assignment, entry into the Master International Frequency Register and obtaining the right to international recognition.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7614 - Modern satellite broadband access systems
		As a result of studying the course, undergraduates should know: - basic concepts from the field of modeling theory; - classification of models, typical mathematical modeling schemes; - issues of planning experiments with models; - methods for processing simulation results; - mastering the processes of creating models of telecommunication systems and networks; - study of the principles of modeling and analysis of the results of the process of modeling various telecommunication systems and networks.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7615 - Methods for modeling telecommunication systems and communication networks

		As a result of studying the course graduate should: - Know the basic and advanced techniques to ensure protection and security of information in telecommunication systems, basic methods of information protection and their possibilities. - be able to apply in practice today, and basic technologies of information protection in telecommunication systems. - be competent: in modern systems and information protection technology applications available cryptographic systems, methods of cryptanalysis.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7602 -Modern technologies of Telecommunication Networks
		As a result of studying the course graduate should: - to know and classify the main spectrum management processes at national and international levels; - Use regulations of the International Telecommunication Union in the design, implementation and operation of radio systems and networks for different purposes; - own methods of electromagnetic compatibility in the implementation of radio systems and networks of new generations; - use the knowledge gained in the preparation of the position of the Communications Administration of the Republic of Kazakhstan to the ITU World Radiocommunication Conference.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7611- Modern methods and prospects for the use of RFS
PROFESSIONAL MODULES				
PM7600–The current state of RET	24	As a result of studying the course graduate should: Know: the scientific and technical problems of implementation of communication systems, radio engineering and electronics, the strategic directions of the development of radio and telecommunications systems; Be able to: carry out an analysis of modern telecommunications systems for use in the organization of information networks, as well as analysis of the prospects of micro-, nano- and optoelectronics, functional electronics; Have an idea: on the development of science in the field of telecommunications in the modern conditions of informatization and computerization of society, as well as the use of new network and radio technologies.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7604 - Scientific and technical problems of Radio Engineering, Electronics and Telecommunications

		As a result of studying the course graduate should: - know the theoretical and physical foundations of the theory of electromagnetic compatibility and basic methods for solving problems of electromagnetic compatibility; - to have information about the features of the electromagnetic environment (EME) networks and groupings RES connection, sources of unintentional electromagnetic interference (NEMP), and their characteristics evaluation methods electromagnetic environment (EME); - EMC describe analysis methods in RES groupings as the RES based on mathematical modeling and NEMP propagation environment, and on the basis of an experimental evaluation using CEM different EMC and criteria; - to know the essence of the basic organizational and technical methods to ensure EMC and their possible use in service of radio networks (mobile, microwave and satellite). - to provide high-quality interpretation of the results obtained to practice the regulations in the field of electromagnetic compatibility; - to conduct analysis of EMC in the RES group using mathematical models of radio transmitters, radio receivers and antenna devices; - carry out the calculation for EMC.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7607 - Electromagnetic Compatibility Problems of radio electronic devices
		As a result of studying the course graduate should: - explain the principles of scientific research experimental work; - to plan an experiment; - select an object of experimental studies; - to justify the usefulness of the selected experiments; - determine the presentation of the resulting material; - to understand the experimental data.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7608 -Theory and technique of scientific experiment

		As a result of studying the course, undergraduates should know: - basics of methodology and methods of scientific research; - stages of scientific research; - choice of research direction; - formulation of a scientific and technical problem; - carrying out theoretical and experimental research; - recommendations for the presentation of the results of scientific work; - consideration of the basics of inventive creativity, - patent search and an approximate master's thesis plan.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7616 - Methodology and methods of scientific research
		As a result of studying the course graduate should: Know: methods and technologies used in the production of works using radio positioning, types of modern equipment; Be able to: use the equipment and positioning technology for a wide range of geodesy, cartography and navigation, and the results of the processing methods; Have an idea: the development of science in the field of navigation in modern conditions of informatization and computerization of society.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7605 - Modern radio positioning
		Upon completion of the research internship, the master's student should be able to: - conduct scientific research in a step-by-step manner; - carry out both theoretical and experimental studies.	1. Oral survey 2. Preparation and defense of a report	PP 7613-Research practice
PM7601-Modern telecommunication systems	18	As a result of studying the course graduate should be able to: - describe the basic components of an embedded system. - distinguish the difference between Android platforms, Linux and Windows CE. - Identify the main ways to load embedded system. - possess the principles of design and development of embedded systems. - explain the principle debugging software used in embedded systems. - explain the principles of operation of a typical microprocessor and microcontroller; expand the functions of microprocessor systems, the introduction of these additional peripherals.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7609 -Embedded systems ICT

		As a result of studying the course, undergraduates should know: - about the main global trends in the development of the next generation mobile communications industry 6G; - the main stages of development and implementation of 6G mobile communication technologies; - know the transition strategies to SDN / NFV and the place of implementation of SDN / NFV in 5G networks; - including LTE-Advanced Pro; - Internet of things technology (M2M/IoT/IoE), - different scenario of heterogeneous networks; - opportunities to use unlicensed spectrum, - sharing of network infrastructure by operators, - innovative approaches to the use of the radio frequency spectrum.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7617 - Approaches to the development of standards for mobile networks of new generations
		Upon completion of the course, master's students should be able to: - design and develop fully optical communication networks capable of transmitting large volumes of information over ultra-long distances with extremely high speed and reliability.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7622 - Optoelectronic technologies in infocommunications
		As a result of studying the course, undergraduates should know: - theoretical foundations for the use of space technology for communications; - television and radio broadcasting; - use of satellite navigation systems; - as well as Earth remote sensing systems.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7620 - Space technics and technologies
		As a result of studying the course, undergraduates should know: - features of using the 6G network; - spectrum in the terahertz range and optical communication for extremely high data rates; - as well as the integration of terrestrial and non-terrestrial networks for ubiquitous access on the entire earth's surface using artificial intelligence (AI).	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7621 - Features of 6G technologies and services

		As a result of studying the course, undergraduates should have an idea of: - theoretical foundations of artificial intelligence; - theory of technologies of artificial neural networks; - know the mathematical description of the expert system, its logical conclusion, - artificial neural networks, - settlement and logical systems, - systems with genetic algorithms, - multi-agent systems. Also have an idea about the use of neural network technologies for solving telecommunication problems.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7618 - Artificial intelligence in telecommunication systems
		As a result of studying the course graduate should: have an idea: - the architecture of computer networks; - on the problems and prospects of development of network technologies, protocols and systems operators diet. know: - the architecture of computer networks, - basic and high-speed technology of local networks, wide area networks; - routing protocols; - Web-based. be able to: - to administer networks; - to evaluate and analyze the results. - apply their knowledge in practice. - be competent in matters of contemporary design of wireless devices.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7610 - New Generations Network technologies
PM7602-Modern methods of transmission and processing	11	As a result of studying the course masters will be able to: - state and critically analyzing basic position signal converting methods, the basic position of the analog-digital conversion and digital signal processing, and their feasibility; - to choose and develop efficient algorithms and methods for the conversion of signals set out in the framework of a specific task; - using the experimental equipment set up and operate the device the analog-to-digital conversion;	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7619 -Modern methods of signal conversion

		- apply and use the obtained theoretical knowledge of the transformation and processing signals for applications future specialty; - possess modern methods of mathematical algorithms describing digital signal conversion, practical experience implementation methods and devices of the analog-to-digital and digital-analog conversion and digital signal processing; practical skills of experimental work with devices analog-digital and digital-analog conversion.		
		As a result of training course graduate should: - understand the basic theoretical methods and means of digital signal processing; - reproduce the physical and mathematical foundations of signal conditioning for digital processing; - select the most effective algorithm for signal processing; - producing a synthesis digital filter, simulation processing; - assess and apply their theoretical knowledge in the field of digital signal processing solutions for the applications of the future specialty.	1. Oral survey 2. Testing 3. Midterm exam 4. Settlement drawings 5. Exam	EEC 7603 -Methods of Digital Signal Processing
		Upon completion of the research internship, the master's student should be able to: - conduct scientific research in a step-by-step manner; - carry out both theoretical and experimental studies.	1. Oral survey 2. Preparation and defense of a report	PP 7612-Research practice

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 basic disciplines (BD) University component (UC)						
1.	SPS 7001- History and philosophy of science	The purpose of the discipline is to form the skills of working with scientific literature; logical, systemic, and critical thinking skills. The discipline will study: the main stages of the development of science; history and philosophy of science to form a conscious attitude to the environment and history, the basic principles of research activities.	5	LO1, LO2, LO3, LO12, LO13	-	-
2.	Foreign language (professional)	English Language is a compulsory component of the program offered to the 1st-year IITU Master's students. It is a one-semester practical course that tailors the English language program to the Master's students' professional/research needs. During the course the Master's students will work on an individual project and a research portfolio. By the end of the course, students will organize and present research portfolio.	5	LO9	-	-
3.	SPS7007 - Higher education: psychological and pedagogical development strategies	The discipline is aimed at developing the competencies of the psychological and pedagogical cycle and the managerial competencies of designing and organizing the educational process. Undergraduates will master modern psychological and pedagogical approaches to teaching, methodology and methods of teaching, as well as technologies of digital and inclusive education. Special attention is paid to the development of pedagogical, research and communication skills, as well as the prevention of ocuppational burnout of teachers. As a result of mastering the course, students will be able to develop and implement effective educational strategies in universities.	6	LO4, LO7, LO11, LO15	-	PP 7004
4.	PP7004 - Teaching practice	Teaching practice is a form of practice of undergraduates, including the teaching of special disciplines, organization of educational activity of students, scientific and methodological work on the subject, obtaining skills in the work of the teacher.	4	LO 4, LO11, LO14	SPS 7002	PP 7612
Cycle of basic disciplines (BD) Elective component (EC)						
5.	EEC 7601- Reliability of fiber-optic communication lines	In this discipline, graduate study features required for the design and operation of fiber-optic line, payment methods and design principles of modern active and passive fiber optic devices, multiplexing methods for the formation of graduate ready to develop technical documentation and training materials, proposals and activities VOLS effective use.	5	LO6, LO8	-	MT
6.	EEC 7614 - Modern satellite broadband access systems	Studying the features of building modern satellite broadband access systems and their components, classification, features of the choice of orbit and the use of the radio frequency spectrum, international regulation of the orbital-frequency resource for modern non-geostation satellite systems. Study of issues related to frequency	5	LO6, LO8	-	-

		assignment, entry into the Master International Frequency Register and obtaining the right to international recognition.				
7.	EEC 7602 - Modern technologies of Telecommunication Networks	This discipline deals with the protection of information in telecommunication networks using encryption methods and cryptanalysis. Undergraduates studying various methods and encryption algorithms. Versed in the peculiarities of symmetric and asymmetric algorithms. With cryptanalysis decipher texts. Apply methods for creating electronic signature and a hash function. These cryptographic algorithms are used for storage and transmission of information over telecommunications networks.	5	LO6, LO8	-	MT
8.	EEC 7615 - Methods for modeling telecommunication systems and communication networks	The study of basic concepts from the field of modeling theory, classification of models, typical mathematical modeling schemes, as well as the study of planning experiments with models and methods for processing modeling results, mastering the processes of creating models of telecommunication systems and networks, studying the principles of modeling and analyzing the results of the modeling process of various telecommunication systems and networks.	5	LO6, LO8	-	-
9.	EEC 7611- Modern methods and prospects for using RFS	A study of the major management problems using the radio frequency spectrum and ensuring electromagnetic compatibility of radio electronic means.	5	LO6, LO8	-	-
Cycle of major disciplines (MD) University component (UC)						
10.	EEC 7604- Scientific and technical problems of Radio Engineering, Electronics and Telecommunications	The purpose of mastering the discipline "Modern radio positioning" is: to form undergraduates' understanding of the methods of transmitting and receiving radio signals carrying information; the main methods of radio navigation measurements used in radar and radio navigation, radio direction finding - the ability to build generalized structural schemes of radar and radio navigation systems. The study of this discipline considers the measurement of the range and speed of radio waves, methods of measuring distances, measuring angular coordinates, methods of measuring the speed of movement of objects, measuring the orientation angles of aircraft, radar survey of space, determining the location of objects, measuring the angular velocity of objects.	5	LO2, LO8	-	EEC 7609
11.	EEC 7605- Modern radio positioning	The purpose of the discipline is to study methods for processing the main types of data of radio engineering transmission systems using the methods and capabilities of digital data processing in the transmitter and receiver, as well as the possibilities of using digital RTS PI, associated with signal processing in digital construction and the use of elements of the element base.	4	LO6, LO8	-	-
12.	EEC 7622 - Optoelectronic technologies in infocommunications	To equip master's students with the theoretical knowledge and practical skills necessary to design fully optical communication networks capable of transmitting large volumes of information over ultra-long distances with ultra-high speed and reliability.	4	LO6, LO8	-	-
13.	EEC 7607- Electromagnet	This discipline provides the theoretical basis of a systematic approach to the problem of	5	LO6, LO8	-	-

	ic Compatibility Problems of radio electronic devices	electromagnetic compatibility, the types of interference, ways to combat interference, technical ways and means of protection from interference, software and technical means EMC arrangements EMC software.				
14.	PP 7612- Research practice	Research practice is a form of training undergraduates to research and teaching and research activities, which is a kind of practical activity of undergraduates related to the conduct of scientific research within the chosen topic of scientific research work (dissertation research topics).	5	LO6, LO8	-	-
15.	PP 7613- Research practice	Research practice is a form of training undergraduates to research and teaching and research activities, which is a kind of practical activity of undergraduates related to the conduct of scientific research within the chosen topic of scientific research work (dissertation research topics).	6	LO6, LO8	-	-
Cycle of major disciplines (MD) Elective component (EC)						
16.	EEC 7608- Theory and technique of scientific experiment	"The study of the principles of scientific research experimental work, including proper planning of the experiment, the choice of the object of experimental research, the rationale of the selected experiments, the presentation of the material obtained, study of modern methods of planning, organization and optimization of research and experiment, experimentation and processing of the results, the study of methods for calculating the parameters of a mathematical model of the object of research, methods of calculation of the adequacy of the resulting model. Formation of system of representations about the content and methods of scientific research, obtain reliable information, the study of domestic and foreign experience of scientific research and scientific methods of research, the development of a variety of data analysis and processing methods, and learn the planning and organization of the experiment, the study methods of mathematical processing of measurements, the study results methods of performing scientific research and methodologies of theoretical and experimental studies, the analysis of theoretical and experimental research and the formulation of conclusions and recommendations."	5	LO1, LO6, LO8, LO10	EEC 7604	EEC 7609
17.	EEC 7616 - Methodology and methods of scientific research	The study of the problems of the organization of scientific research, including the typology of methodology, methods and conduct of research work, processing of research results. The study of the basics of methodology and methods of scientific research, including the stages of research, including the choice of research direction, the formulation of scientific and technical problems, conducting theoretical and experimental research, recommendations for the design of the results of scientific work, as well as consideration of the basics of inventive creativity, patent search and the approximate plan of the master"s thesis.	5	LO6, LO8	-	-

18.	EEC 7609-Embedded systems ICT	"The course examines the key principles for building embedded systems, provides an overview of the embedded real-time operating systems, and systems. described architecture processor nodes, and memory hierarchy technology, the structure of the interrupt controllers, devices, and input-output interfaces embedded system. Discusses the key principles of digital electronics, especially digital signals, ways of organizing the interaction of elements, assemblies and systems of digital devices. Investigated algorithms of the basic elements and basic circuits including them, and their associations composed of devices and systems."	5	LO6, LO8	EEC 7604	MT
19.	EEC 7617 - Approaches to the development of standards for mobile networks of new generations	Studying the main global trends in the development of the next generation 6G mobile communications industry, as well as the main stages in the development and implementation of 5G mobile communications technologies, the transition strategy to SDN / NFV and the place of implementation of SDN / NFV in 5G networks, including LTE-Advanced Pro, Internet of things technology (M2M/IoT/IoE), heterogeneous network scenarios, unlicensed spectrum opportunities, operator sharing of network infrastructure, innovative approaches to radio spectrum use.	5	LO6, LO8	-	-
20.	EEC 7618 - Artificial intelligence in telecommunication systems	Studying the theoretical foundations of artificial intelligence, the theory of artificial neural networks technologies: mathematical description of an expert system, inference, artificial neural networks, calculation and logic systems, systems with genetic algorithms, multi-agent systems. Also, the study of practical issues of using neural network technologies for solving telecommunication problems. Formation of students" competencies that provide theoretical and practical training in the field of application of artificial intelligence in telecommunication systems.	5	LO6, LO8	-	-
21.	EEC 7610-New Generations Network technologies	In the lectures will be given the basic concepts and definitions of network technologies, the issues of standardization of network technologies of new generations of communications in the ITU, 3GPP and the ETSI, principles of construction and architecture of networks of new generations of communication, problems and principles of the radio access network virtualization SDR and core networks SDN	5	LO6, LO8	-	-
22.	EEC 7620 - Space technics and technologies	In this discipline, undergraduates study the theoretical foundations of the use of space technology for communications, television and radio broadcasting, the use of satellite navigation systems, as well as Earth remote sensing systems	4	LO5, LO6, LO13	-	-
23.	EEC 7621 - Features of 6G technologies and services	In this discipline, undergraduates will study the features of using the 4G / 5G / 6G network, the spectrum in the terahertz range and optical communication for extremely high data rates, as well as the integration of terrestrial and non-terrestrial networks for ubiquitous access throughout the earth's surface using artificial intelligence (AI).	4	LO5, LO6, LO11, LO12	-	-

24.	EEC 7603 - Methods of Digital Signal Processing	Discipline "Methods of digital signal processing 'includes the study of signal analysis and analog systems theory, the theoretical basis of the theory of discrete signals and systems, spectral analysis and filtering of digital signals, the digital filter synthesis techniques.	5	LO6, LO8, LO14	-	MT
25.	EEC 7619 - Modern methods of signal conversion	Discipline "Modern Methods signal conversion" exploring methods of transformation signals, the methods and descriptions of discrete digital signals and systems in a time and frequency domain, spectral analysis and filtering of digital signals, the basic methods of synthesis and characteristics of digital and adaptive filters.	5	LO6, LO8, LO14	-	-
26.	RW 7001, 7002, 7003, 7008 The research work of the undergraduate internship including the passage and implementation of the master's thesis	Research work - a way to express themselves masters, as It allows them to show their best qualities of intelligence. This work at the university is carried out under the supervision of the faculty of the university in accordance with the recommended their subjects.	24	LO8	PP 76 13	-

12. Curriculum of the educational program (Platonus) 7M06201 Telecommunication systems and networks»

Module code	Module name	Discipline cycle	Discipline component	Code of subject	Subject name	Academic credits	Control in the academic period					Volume of hours							Distribution of credits per academic period			
							Exams	Differentiated test(practice)	Differentiated test(course paper)	Practice/SRW	Term paper/project	Total	In-class learning	including			MSIWT	MSIW	1 course		2 course	
														Lectures	Practice	Lab practicals			1	2	3	4
																			Number of weeks in the academic period			
																			15	15	15	15
Modules of specialty/education programm																						
1	BM7600 - Humanitarian and pedagogical	BD	UC	SPS7001	History and philosophy of science	5	1					150.0	45.0	30	15	0	15	90	5.0			
2		BD	UC	SPS7007	Higher education: psychological and pedagogical development strategies	6	1					180.0	60.0	30	30	0	15	105	6.0			
3		BD	UC	LAN 7001A	Foreign language (professional)	5	2					150.0	45.0	0	45	0	15	90		5.0		
4		BD	UC	PP 7004	Teaching practice	4				120		120.0		0	0	0	0	0		4.0		
5	PM7602- Modern methods of transmission and processing	MD	UC	PP7613	Research practice	6				180		180.0		0	0	0	0	0				6.0
6		MD	EC	EEC 7603	Methods of Digital signal processing	5	2					150.0	45.0	15	30	0	15	90		5.0		
7				EEC7619	Modern methods of signal conversion		2						45.0	15	30	0	15	90				
8	PM7601 – Modern telecommunication systems	MD	UC	EEC 7622	Optoelectronic technologies in infocommunications	4	3					120.0	45.0	30	15	0	15	60			4.0	
9		MD	EC	EEC 7620	Space technics and technologies	4	3					120.0	45.0	30	15	0	15	60			4.0	
10				EEC 7621	Features of 6G technologies and services		3						45.0	30	15	0	15	60				
11		MD	EC	EEC 7609	Embedded systems in ICT	5	1					150.0	45.0	15	30	0	15	90	5.0			
12				EEC 7617	Approaches to the development of standards for mobile networks of new generations		1						45.0	15	30	0	15	90				
13		MD	EC	EEC 7610	New Generations Network technologies	5	3					150.0	45.0	15	30	0	15	90			5.0	
14				EEC 7618	Artificial intelligence in telecommunication systems		3						45.0	15	30	0	15	90				
15	PM7600 – The current state of RET	MD	UC	EEC7604	Scientific and technical problems of radio engineering, electronics and telecommunications	5	1					150.0	45.0	15	30	0	15	90	5.0			

16		MD	UC	EEC7607	Electromagnetic Compatibility Problems of radio electronic devices	5	1					150.0	45.0	15	30	0	15	90	5.0			
17		MD	UC	EEC 7605	Modern radio positioning	4	3					120.0	45.0	30	15	0	15	60			4.0	
18		MD	UC	PP7612	Research practice	5				150		150.0		0	0	0	0	0			5.0	
19		MD	EC	EEC 7608	Theory and technique of a scientific experiment	5	1					150.0	45.0	15	30	0	15	90	5.0			
20				EEC 7616	Methodology and methods of scientific research		1						45.0	15	30	0	15	90				
21	BM7601 – Design of telecommunication systems	BD	EC	EEC 7615	Methods for modeling telecommunication systems and communication networks	5	3					150.0	45.0	15	30	0	15	90			5.0	
22				EEC7602	Modern technologies of telecommunication networks		3						45.0	15	30	0	15	90				
23		BD	EC	EEC 7601	Reliability of fiber-optic communication lines	5	2					150.0	45.0	15	30	0	15	90		5.0		
24				EEC7614	Modern satellite broadband access systems		2						45.0	15	30	0	15	90				
25		BD	EC	EEC 7611	Modern methods and prospects for using RFS	5	2					150.0	45.0	15	30	0	15	90		5.0		
26	Scientific research work	RW	UC	RW 7002	The research work of a student, including an internship and implementation of master's thesis	2						0.0		0	0	0	0	0	2.0			
27		RW	UC	RW 7001	The research work of a student, including an internship and implementation of master's thesis	3						0.0		0	0	0	0	0		3.0		
28		RW	UC	RW 7003	The research work of a student, including an internship and implementation of master's thesis	3						0.0		0	0	0	0	0			3.0	
29		RW	UC	RW7008	The research work of a mas-ter"s student, including an in-ternship and implementation of master"s thesis	16						0.0		0	0	0	0	0				16.0
Weekly average workload at hours																			0	0	0	0
1	**General education subjects(GER)**					**0**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Core subjects(GER/CS)					0		0	0	0	0	0	0	0	0	0	0	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

	Electives(GER/ES)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	**Base requirements(BS)**	**35**		**0**	**0**	**120**	**0**	**1050**	**285**	**105**	**180**	**0**	**90**	**555**	**11**	**19**	**5**	**0**
	Core subjects(BS/CS)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	University component(BS/UC)	20		0	0	120	0	600	150	60	90	0	45	285	11	9	0	0
	Electives(BS/ES)	15		0	0	0	0	450	135	45	90	0	45	270	0	10	5	0
3	**Profession requirements(VRS)**	**53**		**0**	**0**	**330**	**0**	**1590**	**405**	**180**	**225**	**0**	**135**	**720**	**20**	**5**	**22**	**6**
	Core subjects(VRS/CS)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	University component(VRS/UC)	29		0	0	330	0	870	180	90	90	0	60	300	10	0	13	6
	Electives(VRS/ES)	24		0	0	0	0	720	225	90	135	0	75	420	10	5	9	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**
	Core subjects(BDFPC/CS)	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
	Electives(BDFPC/ES)	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**
	Core subjects(BDPD/CS)	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
	Electives(BDPD/ES)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total of theoretical course		88	15	0	0	450	0	2640	690	285	405	0	225	1275	31.0	24.0	27.0	6.0
USRW/UERW/DSRW		24	0	0	0	0	0	0	0	0	0	0	0	0	2.0	3.0	3.0	16.0
AC	**Additional courses**								0									
FA	**Final attestation**	8						240.0										
	Registration and protection of the master's thesis (RPMT)	**8**				**4**		**240**										
	Total	**120**				**454**		**2880**	**690**	**285**	**405**	**0**	**225**	**1275**				