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MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION

Federal State Autonomous

Educational institution of higher education

"NORTH CAUCASUS FEDERAL UNIVERSITY"

APPROVED BY

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Advanced Engineering

Cand. Tech. Sci., Associate Professor

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INTERNSHIP PROGRAM

"Pre-graduation practice"

Field of study	11.03.02 Infocommunication Technologies and Communication Systems
Profile	Intelligent Data Processing in Infocommunication Systems and Networks
Year of start of training	2026
Form of study	Full-time
Implemented in a semester	8

Developed by

Associate Professor at the School of Digital Studies,

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Stavropol, 2026

1. Internship Goals

The objectives of the pre-diploma practice in the field of training 11.03.02. Infocommunication technologies and communication systems are to ensure the continuity and consistency of students' mastery of skills and abilities of professional activity, to consolidate and deepen universal and professional competencies in the field of information and communication systems and networks formed in students in the process of training and as a result of independent work on the study of the subject area, the study of the information and communication network existing at the enterprise, the study of hardware and software used at the enterprise, the identification of problem situations, the formulation of the preliminary topic of the graduate qualification work and the justification of the expediency of its development, familiarization with standard solutions to the problem posed in the graduation work.

2. Objectives of the practice

The objectives of the practice are:

- acquaintance with the basics of designing information and communication systems;
- study of technologies for the design of information and communication systems;
- research of the methodology for surveying the subject area;
- examination of the subject area, identification of problem situations and development of approaches to solving problems using hardware and software;
- selection of means for solving problems using information and communication systems;
- acquaintance with the principles of documenting information and communication networks and systems;
- conducting a bibliographic search on the topic of the final qualification work using domestic and foreign periodicals, guidance documents of the Ministry of Information and Communications of Russia, ITU recommendations, monographs and textbooks;
- familiarization with standard solutions to the problem posed in the graduation work;
- conducting an in-depth study and elaboration of technical issues related to the topic of the graduation work.

3. The Place of Practice in the Structure of the Educational Program of Higher Education

The place of the internship in the structure of the EP HE: B2.V.03 (PD) "Industrial Pre-Diploma Practice" refers to the B2 cycle "Practice".

The practice is based on the following disciplines: Introductory Practice, Technological (Design and Technological) Practice, Operational Practice.

4. Place and time of the internship

The bases of pre-diploma practice are departments, laboratories of the university and other organizations of the city, which have: modern equipment, hardware and software for conducting research in the field of infocommunications, appropriate technologies and the necessary personnel scientific and technical potential.

Internship in third-party organizations is based on contracts, according to which students are provided with internship places, organizational and informational and methodological assistance in the process of internship. Such organizations are: PJSC Rostelecom Stavropol, PJSC Signal Stavropol, LLC Telecom-S Stavropol, JSC Concern Energomera Stavropol, JSC Concern Energomera Stavropol, JSC Monocrystal Stavropol, LLC Orintex Stavropol, LLC Infocom-S Stavropol, LLC Stilsoft Stavropol. Students can independently search for places of internship. In this case, students submit to the department a petition (consent) of the organization to provide a place for internship with an indication of the period of its implementation. If there are vacant positions, students can be enrolled in them if the work performed meets the requirements of the internship program.

The choice of places for practical training for disabled persons and persons with disabilities is carried out taking into account the requirements of their accessibility for this category of students. When determining places of practical training for disabled persons and persons with disabilities, the

recommendations of medical and social expertise reflected in the individual rehabilitation program of a disabled person regarding the recommended conditions and types of work must be taken into account.

Pre-graduation practice is held in the 8th semester for 8 weeks.

5. List of planned results of the internship, correlated with the planned results of the development of the educational program

Code, formulation of competence	Indicator code, wording	Planned results characterizing the stages of the formation of competencies, indicators
UK-1, Able to carry out search, critical analysis and synthesis of information, apply a systematic approach to solving problems	ID-1 ^{UK-1} identifies a problem situation, carries out its multivariate analysis and diagnosis based on a systematic approach	The ability to identify a problem situation, carry out its multifactorial analysis and diagnosis based on a systematic approach has been formed
	ID-2 ^{UK-1} searches, selects and systematizes information to determine alternative options for strategic solutions in a problem situation	The ability to search, select and systematize information to determine alternative options for strategic solutions in a problem situation has been formed
	ID-3 ^{UK-1} identifies and assesses the risks of possible solutions to a problem situation, chooses the best option for its solution	The ability to identify and assess the risks of possible solutions to a problem situation, to choose the best option for its solution has been formed
UK-2, Able to determine the range of tasks within the framework of the set goal and choose the best ways to solve them, based on the current legal norms, available resources and constraints	ID-1 ^{UK-2} formulates the goal of the project, defines a set of interrelated tasks that ensure its achievement and determines the expected results of solving the tasks	The ability to formulate the goal of the project, determine a set of interrelated tasks that ensure its achievement and determine the expected results of solving problems has been formed
	ID-2 ^{UK-2} develops an action plan to solve the tasks of the project, choosing the best way to solve them, based on the current legal norms and available resources and constraints	The ability to develop an action plan to solve the tasks of the project, choosing the best way to solve them, based on the current legal norms and available resources and constraints, has been formed
	ID-3 ^{UK-2} ensures the implementation of the project in accordance with the established goals, deadlines and costs, based on the current legal regulations, available resources and restrictions, including the use of digital tools	The ability to ensure the implementation of the project in accordance with the established goals, deadlines and costs has been formed, based on the current legal regulations, available resources and constraints, including the use of digital tools
UK-3, Able to carry out social interaction and fulfill his role in the team	ID-1 ^{UK-3} participates in interpersonal and group interaction, using an inclusive approach, effective communication, methods of team building and team interaction when working together within the framework of the task	The ability to participate in interpersonal and group interaction was formed, using an inclusive approach, effective communication, methods of team building and team interaction when working together within the framework

		of the task
	ID-2 ^{UK-3} ensures the work of the team to obtain optimal results of joint work, taking into account the individual capabilities of its members, the use of methodology for achieving success, methods, information technologies and foresight technologies	The ability to ensure the work of the team is formed to obtain optimal results of joint work, taking into account the individual capabilities of its members, the use of methodology for achieving success, methods, information technologies and foresight technologies
	ID-3 ^{UK-3} ensures the fulfillment of tasks based on monitoring teamwork and timely response to significant deviations	The ability to ensure the implementation of tasks based on monitoring teamwork and timely response to significant deviations has been formed
UK-6, Able to manage their time, build and implement a trajectory of self-development based on the principles of lifelong learning	ID-1 ^{UK-6} sets personal and professional goals in accordance with the level of its resources and priorities of actions, for successful development in the chosen field of professional activity	The ability to set personal and professional goals in accordance with the level of their resources and priorities for action, for successful development in the chosen field of professional activity, has been formed
	ID-2 ^{UK-6} implements and adjusts the strategy of personal and professional development, taking into account the conditions, means, personal capabilities, stages of career growth, the time perspective of the development of activities and the requirements of the labor market	The ability to implement and adjust the strategy of personal and professional development has been formed, taking into account the conditions, means, personal capabilities, stages of career growth, the time perspective of the development of activities and the requirements of the labor market
	ID-3 ^{UK-6} critically assesses the effectiveness of the use of time and other resources in solving the tasks set in the chosen field of professional activity	The ability to critically assess the effectiveness of the use of time and other resources in solving tasks in the chosen field of professional activity has been formed
UK-7. Able to maintain the proper level of physical fitness to ensure full-fledged social and professional activities	ID-1 ^{UK-7} knows the basics of physical education, health-saving technologies to ensure full-fledged social and professional activities, taking into account the physiological characteristics of the body and living conditions	The ability to maintain the proper level of physical fitness to ensure full-fledged social and professional activities has been formed
	ID-2 ^{UK-7} plans his working and free time for the optimal combination of physical and mental load and ensuring efficiency in professional activities	
	ID-3 ^{UK-7} maintains the proper level of physical fitness to ensure full-fledged social and professional activities and observes the norms of a healthy lifestyle	
UK-8, is able to create and maintain safe living conditions in everyday life and in	ID-1 ^{UK-8} is familiar with the general characteristics of ensuring security and sustainable development in various spheres of life; classification of military emergencies, principles and methods of organizing the protection of the	The ability to create and maintain safe living conditions in everyday life and in professional activities has been formed to preserve the natural

professional activities to preserve the natural environment, ensure the sustainable development of society, including in the threat and occurrence of emergencies and military conflicts	population from dangers arising in peacetime and during hostilities	environment, ensure the sustainable development of society, including in the threat and occurrence of emergencies and military conflicts
	ID-2UK-8 assesses the probability of potential danger in everyday life and professional activities and takes measures to prevent it	
	ID-3 UK-8 applies the basic methods of protection in the threat and occurrence of emergencies and military conflicts in everyday life and professional activities	
UK-9, Able to make informed economic decisions in various areas of life	ID-1 UK-9 understands the basic principles of the functioning of the economy and economic development, the goals and forms of state participation in the economy	The ability to make informed economic decisions when solving practical problems has been formed
	ID-2 UK-9 applies personal economic and financial planning techniques to achieve current and long-term financial goals	
	ID-3 UK-9 uses financial instruments to manage personal finances, controls its own economic and financial risks	
UK-10. Able to form an intolerant attitude to corrupt behavior	ID-1 UK-10 is familiar with the current legal norms that ensure the fight against corruption in various areas of life, with ways to prevent corruption and form an intolerant attitude towards it	The ability to form an intolerant attitude to corrupt behavior has been formed
	ID-2 UK-10 prevents corruption risks in professional activities; excludes interference in one's professional activities in cases of inducement to corruption offenses	
	ID-3 UK-10 interacts in society on the basis of intolerance of corruption	
PC-1, Capable of developing switching subsystems and network platforms, data transmission networks, transport networks and radio access networks, satellite communication systems	ID-1PK-1 understands and is guided by the principles of construction and operation of communication networks, including their constituent subsystems, and signaling protocols, standards for the quality of data, voice and video transmission used in communication networks, in the legislation of the Russian Federation in the field of communications.	The ability to develop switching subsystems and network platforms, data transmission networks, transport networks and radio access networks, satellite communication systems has been formed
	ID-2PK-1 analyzes statistical parameters of traffic, develops solutions for operational reconfiguration of the network, changing the parameters of the switching subsystem, network platforms, for the use of equipment of new technologies; changing and adjusting the parameters of the switching subsystem, transport networks and data transmission networks, for organizing new and expanding existing communication directions.	
	ID-3PK-1. analyzes the statistics of the main performance indicators of radio systems and data transmission systems, develops measures to maintain them at the required level, calculates the capacity of telecommunications networks.	
	ID-4PC-1 develops communication schemes and integration of new network elements, builds and expands the switching subsystem and network	

	platforms; performs work on switching equipment, deploys service platform equipment, equipment of new technologies on the network, fulfills plans to expand existing equipment of network platforms and new technologies.	
PC-2, Able to apply modern theoretical and experimental research methods in order to create new promising means of infocommunication, use and implementation of research results	ID-1PK-2 understands the basics of electrical engineering, network technologies, principles of operation, indicators of the use and functioning of telecommunication equipment, the requirements of technical regulations, international and national standards and other regulatory documents in the field of assessing the quality indicators of information and communication equipment.	The ability to apply modern theoretical and experimental research methods in order to create new promising means of infocommunications, the use and implementation of research results has been formed
	ID-2PK-2 complies with the requirements of programs and methods for conducting experimental tests of communication facilities and systems (information and communication equipment).	
	ID-3PC-2 works with software used in the processing of information of infocommunication systems and their components, technical means of data collection and processing, with various information systems and databases.	
	ID-4PK-2 controls the quality indicators of the operation of information and communication equipment in accordance with their standard indicators.	
	ID-5PK-2 to conduct experimental studies on the existing programs and methods of testing objects and communication systems (information and communication equipment) in order to assess their quality performance.	
PC-3, Able to carry out calculations on the design of networks, structures and infocommunication facilities in accordance with the terms of reference using both standard methods, techniques and design automation tools, and independently created original programs	ID-1PK-3 understands regulatory, regulatory, technical, organizational and methodological documents that regulate the design preparation, implementation and operation of communication systems (telecommunication systems), the construction of facilities and communication lines.	The ability to carry out calculations on the design of networks, structures and infocommunication tools in accordance with the terms of reference using both standard methods, techniques and design automation tools, and independently created original programs has been formed
	ID-2PC-3 operates with technologies used in the transport network, modern requirements for performance, availability, security, scalability, integration of technologies, manageability of communication systems (telecommunications); principles of planning the capacity of radio access networks.	
	ID-3PK-3 calculates the parameters and characteristics of the network and infocommunication facilities, analyzes their qualitative indicators based on statistics and radio measurements, and uses specialized design software.	
	ID-4PK-3 identifies and analyzes the advantages and disadvantages of design solutions, assesses the risks associated with the implementation of the project.	
	ID-5PK-3 collects initial data for the design of the network and infocommunication facilities, determination of the optimal configuration and topology of the transport network; develops	

	technical solutions for the implementation of the communication system (telecommunication system) and its components.	
	ID-6PK-3 develops circuit design solutions for the components of radio-electronic facilities, selects the element base for the development of circuit solutions, conducts automated modeling and experimental work to check the technical characteristics of the modernized radio-electronic facilities.	
PC-4, Able to prepare standard technical projects and primary control of the compliance of the developed projects and technical documentation for various information and communication facilities with national and international standards and technical regulations	ID-1PK-4 complies with the principles of a systematic approach in the design of communication systems (telecommunications), infocommunication facilities and their components, requirements for the development of technical documentation.	The ability to prepare standard technical projects and primary control of the compliance of the developed projects and technical documentation for various information and communication facilities with national and international standards and technical regulations has been formed
	ID-2PK-4 understands and is guided by the principles of construction and operation of infocommunication tools and their components, modern technical solutions for the implementation of communication systems (telecommunication systems) and its components, the software used.	
	ID-3PK-4 develops design documentation in accordance with standards and technical regulations; develops and submits presentation materials on the project.	
	ID-4PK-4 develops technical solutions for the creation of a communication system (telecommunication system) and its components; preparation of a communication organization scheme, equipment placement plan, passage scheme and other necessary documents; estimation of costs for the creation (modernization) of a communication system (telecommunication system).	
PC-5. Ability to carry out installation, configuration, adjustment, testing of equipment, development of operating modes, control of design parameters of operation and testing of communication equipment, ensuring compliance of technical parameters of information and communication systems and/or their components with established operational and technical standards	ID-1PK-5 understands the current industry standards that determine the requirements for the parameters of the operation of equipment, channels and paths; methods for checking the technical condition of equipment, paths and transmission channels.	The ability to carry out installation, configuration, adjustment, testing of equipment, development of operating modes, control of design parameters of operation and testing of communication equipment, ensuring the compliance of technical parameters of information and communication systems and / or their components with the established operational and technical standards has been formed
	ID-2PK-5 complies with the technologies for setting up, adjusting and testing communication (telecommunications) equipment, operating rules and methods of using measuring and testing equipment.	
	ID-3PK-5 performs settings, adjustments and tests of communication equipment (telecommunications) using technical and technological documentation; maintains technical and technological documentation in accordance with the established forms; checks the quality of equipment and communication facilities.	
	ID-4PK-5 carries out incoming inspection of equipment, preparation of testing equipment, measuring equipment, devices; testing of equipment and development of equipment operating modes.	
	ID-5PC-5 selects and uses the appropriate test and measurement equipment, uses the equipment software when setting it up.	

PC-6, Able to administer network subsystems of information and communication systems and/or their components	ID-1PK-6 understands the architecture and general principles of operation, hardware, software and software and hardware of the administered network, the procedure for configuring network elements of the infocommunication system.	The ability to administer network subsystems of infocommunication systems and/or their components has been formed
	ID-2PC-6 uses modern standards in the administration of devices and software; uses standard and external software and hardware to monitor the performance of the network infrastructure of the administered network.	
	ID-3PC-6 diagnoses failures and errors of network devices and software.	
	ID-4PK-6 carries out routine maintenance on network devices and software of the information and communication system.	
	ID-5PK-6 installs and configures the system and application software necessary for the functioning of the IS in accordance with the work assignment, carries out standard design and parameterization of the IS in accordance with the regulations of the organization.	
PC-7, Capable of administering remote access security tools (operating systems and specialized protocols)	ID-1PC-7 understands and uses the basic principles, protocols and software cryptographic tools for ensuring the information security of network devices.	The ability to administer remote access security tools (operating systems and specialized protocols) has been formed
	ID-2PC-7 understands the general principles of operation and architecture of hardware, software, software and hardware of the administered network; protocols of the channel, network, transport and application layers of the open systems interaction model.	
	ID-3PK-7 uses software, hardware and software and hardware to protect network devices from unauthorized access; configures the parameters of modern software and hardware firewalls.	
	ID-4PC-7 connects and configures modern remote access security tools (operating systems and specialized protocols); works with control and measurement hardware and software.	
	ID-5PC-7 installs additional software products to ensure remote access security and parameterization.	
PC-8, Capable of routine maintenance on network devices and software of the information and communication system	ID-1PK-8 complies with the instructions for the installation and operation of the administered network devices and software; the regulations for preventive maintenance on the administered information and communication system.	The ability to carry out routine maintenance on network devices and software of the information and communication system has been formed
	ID-2PC-8 installs operating systems of network devices; monitors administered network devices; uses standard data recovery procedures, works with archiving servers and operating system management tools; draws up a backup schedule for the operating systems of network devices; disassembles and assembles administered network devices.	
	ID-3PC-8 uses modern means of monitoring the performance of the administered network; it uses regulatory and technical documentation in the field of information and communication technologies to	

	solve problems.	
	ID-4PC-8 performs work on rebooting the operating systems of network devices, planning the schedule for copying the software of the network infocommunication system, restoring parameters using archiving servers and management tools of specialized operating systems of network equipment.	
	ID-5PK-8 carries out routine maintenance of equipment in accordance with the manufacturer's recommendations.	

6. Structure and content of the internship

The total labor intensity of industrial pre-diploma practice is 27 credits, 972 hours.

Sections (stages) of practice	Implemented competencies / indicators	Types of educational work in practice, including independent work of students	Labor intensity (hours)	Forms of current control
Preparatory stage	UK-1, UK-2, UK-3, UK-6, UK-7, UK-8, UK-9, UK-10	Kick-off conference.	4	Interview
		Introductory briefing at the place of internship.	1	Interview
		Familiarization with the technical equipment of the enterprise.	6	Interview
		Drawing up an individual internship plan together with the supervisor. Approval by the supervisor.	5	Interview
Total			16	
Main stage	UK-1, UK-2, UK-3, UK-6, UK-7, UK-8, UK-9, UK-10, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PP-7, PP-8	Preparation for research on the topic of thesis, selection of literature, methodological materials.	40	Report, interview
		Study of research methods and experimental work on the topic of thesis.	60	Review, interview
		Study of methods of analysis and processing of experimental data.	50	Report, interview
		Study of the requirements for the preparation of documentation.	30	Report, interview
		Study of the procedure for implementing the results of scientific research.	44	Report, interview
		Development of research methods.	60	Methodology, interview
		Conducting research on the topic of thesis.	560	Report, interview
		Writing scientific articles on the topic of thesis.	60	Report, interview.
		Speech at a scientific	16	Report,

		conference on the topic of thesis.		interview.
		Processing of the results obtained, preparation of materials and their design.	10	Feedback from the manager.
Total			956	
Final stage	UK-1, UK-2, UK-3, UK-6, UK-7, UK-8, UK-9, UK-10, PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8	Preparation of reporting documents for the internship and preparation of the report.	12	Report Protection
		Final conference.	4	Performance, test in practice
Total			16	
Total			972	Credit with a grade

7. Methodical recommendations for students on the passage of practice

7.1. Use of the material of the educational and methodological complex of practice

At the first stage, it is necessary to familiarize yourself with the structure of the internship, mandatory types of work and reporting forms, which are reflected in the Methodological Guidelines for the organization and conduct of practice, developed at the department.

For the successful completion of tasks on industrial pre-diploma practice, the student needs to independently study the presented sources of literature in detail

No p/n	Type of independent work	Recommended sources of information (No source)			
		Main	Additional	Methodical	Internet Resources
1	Collection, processing and systematization of factual and literary material	1, 2	1, 2, 3, 4	1, 2	1, 2, 3
2	Formulation of the problem, implementation of all stages of solving the problem, collection and preliminary processing of initial data, development of algorithms and programs, calculations	1, 2	1, 2, 3, 4	1, 2	1, 2, 3
3	Preparation of the report	1, 2	1, 2, 3, 4	1, 2	1, 2, 3

7.2. Fund of Assessment Tools for Practice

The Fund of Assessment Tools (ESF) for pre-diploma practice is based on a list of competencies to be mastered with an indication of the stages of their formation in the process of internship. The FAT provides objective control over the achievement of the planned learning outcomes. The FAT includes:

- description of indicators and criteria for assessing competencies at various stages of their formation, description of assessment scales;
- methodological materials that determine the procedures for assessing knowledge, skills, and (or) experience of activity, characterizing the stages of competence formation;
- standard control tasks and other materials necessary to assess knowledge, skills and the level of mastery of the formed competencies in the process of internship.

The FAT is an appendix to this internship program.

8. Educational, methodological and information support of practice

8.1. Recommended reading

8.1.1. Reference citations:

1. Akulinichev Yu.P., Berngardt A.S. Theory and Technique of Information Transmission: Textbook. - Tomsk: Tomsk State University of Control Systems and Radioelectronics, 2022. - 209 p. : ill., tabl., schemes. - ISBN 978-5-4332-0035-7; [Electronic resource]. - URL: <http://biblioclub.ru/index.php?page=book&id=208952>.

2. Shpakov P.S., Yunakov Yu.L. Mathematical processing of measurement results: a textbook / Publisher: Siberian Federal University, 2024. - URL: http://biblioclub.ru/index.php?page=book_red&id=435837&sr=1

8.1.2. Further reading:

1. Kuritsyn S.A. Telecommunication Technologies and Systems: Textbook. Textbook / S. A. Kuritsyn. – Moscow: Academy, 2021. – 298 p. : ill. – (Higher Professional Education. Radio Engineering) (Textbook). – Bibliogr.: p. 295. – ISBN 978-5-7695-2999-3.

2. Bitner V.I. Networks of the new generation – NGN. – Moscow: Goryachaya liniya – Telekom, 2021. – 226 p.

3. Nefedov E.I. Antenna-feeder devices and radio wave propagation. Moscow, Akademiya Publ., 2022. 320 p. (in Russian).

8.1.3. Methodical literature:

1. Regulations on the organization and conduct of student practices in the Federal State Autonomous Educational Institution of Higher Education "North Caucasus Federal University".- Stavropol: NCFU, 2018.

2. "Pre-diploma industrial practice": guidelines for the passage of practice / compiled by M.V. Samus. - Stavropol: NCFU, 2023. - 25 p. : ill. (electronic var).

8.1.4. Internet resources:

1. www.biblioclub.ru - Electronic library system "University Library Online";

2. www.eLibrary.ru - Scientific Electronic Library;

3. www.iprbookshop.ru - Electronic library system IPRbooks.

8.2. Software:

1. Operating system: Microsoft Windows 8: Perpetual license. Contract No 01-ea/13 dated 25.02.2013.

2. Operating system: Microsoft Windows 10: Perpetual license. Contract No 544-21 dated 06/08/2021.

3. Basic package of Microsoft Office programs (Word, Excel, PowerPoint). Microsoft Office Standard 2013: contract No 01-ea/13 dated 25.02.2013, Microsoft Office <https://support.microsoft.com/ru-ru/lifecycle/search/16674> License

8.3. Material and technical support of the internship

Specialized computer class with MS Windows XP/7/8/10, MS Office 2003/2007/2010 operating system and NI Multisim 12 NI Lab environment installed.

8.4 Features of the development of practice by persons with disabilities:

If there are students with disabilities, this practice is adapted taking into account the recommendations of the psychological, medical and pedagogical commission, the individual rehabilitation program of the disabled person and is carried out at the Department of Infocommunications of the University.