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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
Acting Director of the Institute
Advanced Engineering
A.A. Porokhnya

WORK PROGRAM OF THE DISCIPLINE
"Introduction to Engineering Culture"

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	2

Developed by
Associate Professor at the School of
Digital, Robotic Systems and
Electronics
N.Y. Bratchenko

The purpose of the discipline is the formation of universal and professional competencies among students based on the development of the features of the learning process in the direction of "Infocommunication Technologies and Communication Systems", understanding the history, state, application and prospects for the development of information and communication technologies.

Objectives of mastering the discipline:

1. Formation of an idea of educational activities at the university, the main regulatory documents governing the educational activities of the student, the code of ethics of the NCFU student, the principles and forms of education, as well as teaching methods.
2. Acquisition, assimilation and transfer of knowledge. Organization and planning of independent work by the student.
3. Study of application packages necessary for the educational activities of students in this direction.
4. Study of the objects and characteristics of the professional activity of bachelors in the field of training "Infocommunication Technologies and Communication Systems".
5. Acquaintance of students with the basics of the theory of information transmission, modern communication systems, history and prospects for their development.
6. Formation of modern ideas about computer technology and the Internet, the history of computer development, Neumann computer architecture and various generations of computers.
7. Acquaintance with the history of the development of electronics and radio electronics.
8. Formation of an idea of passive radioelectronic components: resistors, capacitors, inductors; active radioelectronic components: electron tubes, transistors; basics of microelectronics, functional electronics and nanoelectronics.
9. Introduction to the basics of robotics.

2. Place of the discipline (module) in the structure of the educational program

The discipline "Introduction to Engineering Culture" refers to the disciplines of the part formed by the participants of educational relations.

3. List of planned learning outcomes in the discipline (module) correlated with the planned results of the development of the educational program

Code, formulation of competence	Indicator code, wording	Planned learning outcomes in the discipline (module), characterizing the stages of the formation of competencies, indicators
UK-6. Is able to manage his time, build and implement a trajectory of self-development based on the principles of lifelong education	ID-1 UK-6 sets personal and professional goals in accordance with the level of his resources and priorities of actions, for successful development in the chosen field of professional activity;	Understands his/her own and professional goals in accordance with the level of his/her resources and priorities for action, for successful development in the chosen field of professional activity

4. Scope of the academic discipline (module) and forms of control *

Volume of classes: total: 4 EC 144 academic hours.	OFO, in academia. hours
Contact work:	
Lectures/from them practical training	-
Laboratory work/from them practical training	-

Practical training/of which practical training	16,0/-
Independent work	128,0
Forms of control	
Exam	-
Credit	Yes
Credit with a grade	-
Course work	no

* The discipline (module) provides for the use of e-learning, distance learning technologies (unless otherwise established by the educational standard)

5. The content of the discipline (module), structured by topics (sections) with an indication of the number of hours and types of classes

№	Section (topic) of the discipline and summary	Emerging competencies, indicators	Full-time				Forms of current monitoring of progress
			Contact work of students with the teacher / of them in the form of practical training, hours				
			Lectures	Laboratory work	Practical exercises	Independent work, hours	
1	Organization of educational activities at the university. The main regulatory documents regulating the educational activities of the student. The Code of Ethics of the NCFU student. PRACTICAL WORK: Information Retrieval	UK-6 ID-1UK-6	-	-	2,00/-	14,00	Testing
2	Objects and characteristics of the professional activity of bachelors in the field of training "Informatics and Computer Engineering". General characteristics of the direction of training "Informatics and Computer Engineering", the objects of the graduate's professional activity, the types of tasks of the graduate's professional activity, the competencies of the graduate formed as a result of the development of this EP HE, the schemes of study at the university.	UK-6 ID-1UK-6	-	-	-	14,00	Testing

3	Principles and forms of education, teaching methods. Acquisition, assimilation and transfer of knowledge. Organization and planning of independent work by the student. Packages of applied programs for educational activities of students. PRACTICAL WORK Application packages	UK-6 ID-1UK-6	-	-	2,00/-	14,00	Testing
-4	Fundamentals of the theory of information transmission. information, amount of information, speed of information transfer. Structural diagram of the communication system. Founders of the theory of communication. PRACTICAL WORK Cisco Packet Tracer Interface PRACTICAL WORK Exploring the capabilities of the Cisco Packet Tracer network simulator software simulator PRACTICAL WORK Network Services PRACTICAL WORK Wireless Computer Technology Research	UK-6 ID-1UK-6	-	-	2,00/-	14,00	Testing
5	A brief history of the development of message transmission and telecommunications. Stages of development of telephone and telegraph communications. Multichannel transmission systems, switching methods. Fiber-optic communication lines. PRACTICAL WORK Study of fiber-optic communication lines PRACTICAL WORK Explore video parameters PRACTICAL WORK IP telephony	UK-6 ID-1UK-6	-	-	4,00/-	14,00	Testing
6	Radio communication: the history of the development of radio communication, the	UK-6 ID-1UK-6	-	-	-	14,00	Testing

	inventions of Popov, Marconi and Tesla, radio frequency ranges, types of radio communication.						
7	Mobile cellular communication: prerequisites for its origin, principles of construction, structure of the cellular network, cell sizes, standardization of cellular systems.	UK-6 ID-1UK-6		-	-	14,00	Testing
8	Computer technology and the Internet: the history of the development of computers, Neumann computer architecture, computer generations, the history of the development of the Internet. PRACTICAL WORK Hardware of personal computers	UK-6 ID-1UK-6	-	-	2,00/-	14,00	Testing
9	Development of Electronics and Radio Electronics. Passive Radioelectronic Components: Resistors, Capacitors, Inductors. Active Radioelectronic Components: Electron Tubes, Transistors. Microelectronics, Functional Electronics, Nanoelectronics. PRACTICAL WORK Active radioelectronic components: transistors PRACTICAL WORK Passive radio-electronic components PRACTICAL WORK Introduction to the WEBOTS mobile robot simulator	UK-6 ID-1UK-6	-	-	4,00/-	16,00	Testing
	TOTAL for the 2nd semester		-	-	16,00/-	128,00	
	TOTAL		-	-	16,00/-	128,00	

6. Fund of assessment tools for the discipline (module)

The Fund of Assessment Tools (ESF) for the discipline "Introduction to Engineering Culture" is based on a list of mastered competencies with an indication of indicators. The CSF provides objective control over the achievement of the planned learning outcomes. The CSF 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) work experience that characterize the stages of competence formation (included in the methodological guidelines for those types of work that are provided for by the curriculum and provide for the assessment of the formation of competencies);
- standard assessment tools necessary for assessing knowledge, skills and the level of competence formation.

The FAT is an appendix to this discipline program.

7. Methodical instructions for students on the development of the discipline

Starting work, each student should take into account the following provisions.

The discipline is built on a thematic principle, each topic is a logically complete section.

The lecture material is devoted to the consideration of the key, basic provisions of the courses and the explanation of educational tasks submitted for independent work of students.

Practical classes are conducted in order to consolidate the information learned, to acquire skills for its application in solving engineering problems in the relevant subject area.

Independent work of students is aimed at independent study of additional material, preparation for laboratory and lecture classes, as well as the performance of all types of independent work.

For the successful development of the discipline, it is necessary to perform all types of independent work, using the recommended sources of information.

8. Educational, methodological and information support of the discipline

8.1. List of basic and additional literature necessary for mastering the discipline (module)

8.1.1. List of basic literature:

1. Kulpinov A.A. Vvedenie v spetsial'nost': ucheb. posobie: Napravlenie – Infokommunikatsionnye tekhnologii i sistemy svyazi. Profile of training "Communication Networks and Switching Systems". Bachelor's degree. - Stavropol: NCFU, 2014. - 130 p., unlimited copies.

2. Levchenko V.I. Radio Electronics: Introduction to the Specialty: Textbook / V.I. Levchenko; Ministry of Education and Science of Russia; Omsk State Technical University. - Omsk: OmSTU Publishing House, 2017. - 202 p.: tabl., schemes, ill. - <http://biblioclub.ru/>. - ISBN 978-5-8149-2476-6, unlimited copies.

8.1.2. List of additional literature:

1. Shcheglov, A. Yu. - Models, Methods and Means of Access Control to Computing Systems. - Models, Methods and Means of Access Control to Computing Systems, 2022-10-01. - St. Petersburg: ITMO University, 2014. - 95 p. - The book is in the premium version of EBS IPR BOOKS. - ISBN 2227-8397

2. Mandra A. G., Popov A. V., Dyakonov A. I. Informatics and Information Technologies: Laboratory Practicum. - Informatics and Information Technologies, 2026-09-20. - Electron. dan. (1 file). - Samara: Samara State Technical University, EBS ASV, 2020. - 64 p. - Electronic. - The book is in the premium version of EBS IPR BOOKS. - ISBN 2227-8397

3. Mathematical and Computer Modeling Elektronnyi resurs / Bugrov A. N., Kirpicheva E. Yu., Milovidova A. A., Makhalkina T. O.: textbook. - Dubna: State University "Dubna", 2019. - 71 p. - Recommended by the Educational and Methodological Council of the University "Dubna" as a textbook for students studying in the areas of training "Informatics and Computer Engineering", "Applied Informatics", "Business Informatics", "Fundamental Informatics and Information Technologies" (bachelor's degree). - ISBN 978-5-89847-570-3

4. Bratchenko, N. Y. (North Caucasian Federal University). Fundamentals of Programming in High-Level Languages: Textbook. Manual: Direction 230100 - Informatics and Computer Engineering. Specialty 230102.65 - Automated Information Processing and Control Systems. Bachelor's Degree / N. Y. Bratchenko; Sev.-Kav. Feder. University. - Stavropol: NCFU, 2013. - 179 p.: ill. - Grif: Add. UMO. - ISBN 978-5-88648-878-4

8.3. List of resources of the information and telecommunication network "Internet" necessary for mastering the discipline (module)

1	Electronic Library System "University Library On-Line" – www.biblioclub.ru
2	IPRbooks Electronic Library System – http://iprbooks.ru
3	Electronic Library System Lan – https://e.lanbook.com/

9. List of information technologies used in the implementation of the educational process in the discipline (module), including a list of software and information reference systems

When reading lectures, computer equipment is used, demonstration of presentation multimedia materials. In laboratory classes, students perform laboratory work and demonstrate the result by means of computer technology and reports in electronic form, prepared by them during the hours of independent work.

Information reference systems:

Information and reference and information and legal systems used in the study of the discipline:

1	http://catalog.ncfu.ru/catalog/ncfu – Official website of the Scientific Library of the FGAOU HE NCFU.
2	http://www.consultant.ru – Official website of Consultant Plus

Software:

1	Viola Workstation 10
2	Alt Workstation K
3	Viola "Server"
4	Office software package - P7-Office

10. Description of the material and technical base necessary for the implementation of the educational process in the discipline (module)

Lectures	Classroom for training sessions, equipped with multimedia equipment and technical teaching aids.
Practical exercises	Classroom for training sessions, equipped with multimedia equipment and technical teaching aids.
Independent work	A room for independent work of students, equipped with computer equipment with the ability to connect to the Internet and the ability to access the electronic information and educational environment of the university.
Practical training	It is carried out in the structural divisions of the university and (or) in organizations that carry out activities in the profile of the relevant educational program, including its structural subdivision.

11. Features of mastering the discipline (module) by persons with disabilities

Students with disabilities are provided with special textbooks, teaching aids and didactic materials, special technical teaching aids for collective and individual use, the services of an assistant (assistant) who provides students with the necessary technical assistance, as well as the services of sign language interpreters and typhlo-sign interpreters.

The development of a discipline (module) by students with disabilities can be organized together with other students, as well as in separate groups.

The development of a discipline (module) by students with disabilities is carried out taking into account the characteristics of psychophysical development, individual capabilities and health status.

In order to ensure the accessibility of higher education under the educational program by persons with disabilities when mastering the discipline (module), the following is ensured:

1) for visually impaired persons:

- the presence of an assistant who provides the student with the necessary technical assistance, taking into account individual characteristics (helps to take a workplace, move, read and complete the task, including by writing down by dictation),
- written tasks, as well as instructions on the procedure for their implementation, are drawn up in enlarged font,
- special textbooks, teaching aids and didactic materials (with large print or audio files),
- individual uniform lighting of at least 300 lux,
- if necessary, the student is provided with a magnifying device to complete the task;

2) for persons with hearing disabilities:

- the presence of an assistant who provides the student with the necessary technical assistance, taking into account individual characteristics (helps to take a workplace, move, read and complete the task, including by writing down by dictation),
- the availability of sound-amplifying equipment for collective use is ensured, if necessary, the student is provided with sound-amplifying equipment for individual use;
- is provided with appropriate sound means of reproducing information;

3) for persons with disabilities with musculoskeletal disorders (including those with severe disorders of the motor functions of the upper extremities or the absence of upper limbs):

- written tasks are performed on a computer with specialized software or dictated to an assistant;
- At the request of the student, tasks can be performed orally.

12. Features of the implementation of the discipline using distance educational technologies and e-learning

According to Part 1 of Article 16 of the Federal Law of December 29, 2012 No 273-FZ "On Education in the Russian Federation", *e-learning* is understood as the organization of educational activities with the use of information contained in databases and used in the implementation of educational programs and information technologies, technical means, as well as information and telecommunication networks that ensure the transmission of this information through communication lines, the interaction of students and teachers. Distance *educational technologies* are understood as educational technologies implemented mainly with the use of information and telecommunication networks with indirect (at a distance) interaction between students and teachers.

The discipline can be implemented using distance learning technologies and e-learning in whole or in part. The components of the discipline's teaching materials (the discipline's work program, assessment and methodological materials, forms of certification), implemented using distance learning technologies and e-learning, contain an indication of their use.

When organizing educational activities with the use of distance educational technologies and e-learning, asynchronous and synchronous ways of interacting with participants in educational relations through the information and telecommunication network "Internet" may be provided.

When using distance learning technologies and e-learning, the schedule for the discipline indicates: ways of interaction between participants in educational relations through the information and telecommunication network "Internet" (videoconferencing, ET - electronic testing); links to the electronic information and educational environment of NCFU, to educational platforms and resources of other organizations to which open access is provided through the information and telecommunication network "Internet"; for synchronous learning - the time of online classes and teachers; for asynchronous learning - the authors of online courses.

When organizing intermediate certification using distance educational technologies and e-learning, the Methodological Recommendations for the Use of Technical Means Ensuring the Objectivity of Results in Conducting Interim and State Final Certification in Educational Programs of Higher Education - Bachelor's Degree Programs, Specialist Programs and Master's Degree Programs with the Use of Distance Educational Technologies (Letter of the Ministry of Education and Science of Russia dated 07.12.2020 No MN-19/1573-AN "On the Direction of Methodological Recommendations") are used.

The implementation of the discipline using e-learning and distance learning technologies is carried out using the electronic information and educational environment of NCFU, to which students have access through the information and telecommunication network "Internet", or using the resources of other organizations, including platforms that provide services for video conferences, online meetings and distance learning (MTS-Link), as well as using the capabilities of social networks for communication between students and teachers.

Educational and methodological support of the discipline implemented with the use of e-learning and distance educational technologies includes a work program, teaching aids or a course of lectures presented in electronic form, guidelines for the implementation of various types of educational activities of students provided for by the discipline, and other educational materials posted in the information and educational environment of NCFU.