

Документ подписан простой электронной подписью

Информация о владельце:

ФИО: Порохня Андрей Алексеевич

Должность: И.о. директора института перспективной инженерии

Дата подписания: 22.10.2026 13:25:38

Уникальный программный ключ:

990bea3aeec48c23bd8699e48288f8d1960c600

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
"Probability Theory and Mathematical Statistics"

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	3

Developed by

Associate Professor of the
Department of Computational
Mathematics and Cybernetics,
Candidate of Physical and
Mathematical Sciences, Associate
Professor Tarasenko E.O.

Stavropol 2026

1. Purpose and objectives of mastering the discipline (module)

The purpose of studying the discipline "Probability Theory and Mathematical Statistics" is to form the general professional competence of a student in the field of training 11.03.02 Infocommunication Technologies and Communication Systems by obtaining basic knowledge and skills of a holistic, highly cultured modern personality, capable of further applying knowledge, skills and personal qualities in the professional activities of a future specialist.

The objectives of the discipline "Probability Theory and Mathematical Statistics" are:

- to familiarize students with the basic laws of probability theory and mathematical statistics;
- to teach the solution of practical problems using modern achievements of science and technology.

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

The discipline "Probability Theory and Mathematical Statistics" belongs to the disciplines of the compulsory part. Its development takes place in the 3rd semester. Intermediate certification - in the 3rd semester of credit.

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
OPK-1. Able to use the provisions, laws and methods of natural sciences and mathematics to solve problems of engineering activities	ID-1 OPK-1 understands the fundamental laws of nature and the basic physical mathematical laws and methods of accumulating, transmitting and processing information.	knows and understands the fundamental laws of nature and the basic physical mathematical laws and methods of accumulating, transmitting and processing information.
	ID-2 OPK-1 applies physical laws and mathematical methods to solve problems of a theoretical and applied nature.	is able to apply physical laws and mathematical methods to solve problems of a theoretical and applied nature.
	ID-3 OPK-1 uses knowledge of physics and mathematics to solve practical problems	uses knowledge of physics and mathematics in solving practical problems

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

Scope of classes: total: 3 EC 108 academic hours.	OFO, in acad. hours
Contact work:	
Lectures/from them practical training	-
Practical training/of which practical training	48

Independent work	60
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

5.1. Thematic plan of the discipline (module)

№	Section (topic) of the discipline and summary	Emerging competencies, indicators	Contact work of students with the teacher / of them in the form of practical training, hours			Independent work, hours	Forms of current monitoring of progress
			Lectures	Practical exercises	Laboratory work		
1	Elements of set theory 1. Basic operations on sets and events 2. Axiomatics of probability theory	OPK-1	-	2		6	Solving practical problems
2	Probabilistic spaces 1. Probabilistic space with geometric probability type 2. Conditional probability	OPK-1	-	4		6	Solving practical problems
3	Full probability, Bayes, Bernoulli formulas 1. The formula of total - probability. The -Bayesian formula 2. Bernoulli's formula	OPK-1	-	6		6	Solving practical problems
4	Discrete random variables 1. The law of distribution of a discrete random variable 2. Distribution function of a discrete random variable	OPK-1	-	6		6	Solving practical problems
5	Numerical Characteristics of Discrete Random Variables 1. Mathematical expectation of a discrete random variable 2. Dispersion of a discrete random variable	OPK-1	-	6		6	Solving practical problems

	Numerical Characteristics of Continuous Random Variables 1. Mathematical expectation of a continuous random variable 2. Variance of a continuous random variable						
6	Primary static processing of random sampling Calculation of the main characteristics of samples. Variation and statistical series 2. Estimation of general numerical characteristics using a grouped statistical series	OPK-1	-	6		6	Solving practical problems
7	Point estimation of numerical characteristics and distribution parameters of the general population 1. Calculation of point estimates of the general average 2. Calculation of point estimates of the general variance of the general population	OPK-1	-	6		6	Solving practical problems
8	Obtaining estimates of the parameters of the general distribution using the methods of moments and maximum likelihood 1. Obtaining estimates of the parameters of general distribution by the method of moments 2. Obtaining estimates of the parameters of the general distribution by the method of maximum likelihood	OPK-1	-	6		8	Solving practical problems
9	Interval estimation of numerical characteristics 1. Construction of a confidence interval for the sample average of the normal population 2. Estimating the confidence interval for expected value	OPK-1	-	6		10	Solving practical problems
	TOTAL for the 3rd semester		-	48		60	
	TOTAL		-	48		60	

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

The Assessment Tools Fund (WF) for a discipline (module) is based on a list of mastered competencies with an indication of indicators. 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) 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 program of the discipline (module).

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

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

The discipline (module) 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 learned information, to acquire skills for its application in solving practical problems in the relevant subject area.

Independent work of students is aimed at independent study of additional material, preparation for practical and laboratory 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:

- Kolemaev, V.A. Teoriya veroyatnostey i matematicheskaya statistika Elektronnyi resurs: uchebnik [Theory of Probability and Mathematical Statistics] Elektronnyi resurs: uchebnik [Elektronnyi resurs: uchebnik] / V.N. Kalinina / V.A. Kolemaev; ed. by V.A. Kolemaev. - Probability Theory and Mathematical Statistics, 2020-10-10. - Moscow: UNITI-DANA, 2017. - 352 p. - The book is in the basic version of the IPRbooks EBS. - ISBN 5-238-00560-1
- Probability Theory and Mathematical Statistics: A Course of Lectures: A Textbook. E. O. Tarasenko; Author: I. V. Zaitseva; Author: P. K. Korneev; Author: A. V. Gladkov; Ministry of Science and Higher Education of the Russian Federation; Federal State Autonomous Educational Institution of Higher Education "North Caucasus Federal University". - Stavropol: NCFU, 2018. - 229 p.: ill.

8.1.2. List of additional literature:

- Ventsel E. S. Teoriya probirovotelnostey: uchebnik dlya vuzov [Probability theory: a textbook for higher education institutions]. - 9th ed., ster. - Moscow: Vysshaya shkola, 2003. - 576 p.: ill. - Grief: Rek. MO. - Appendix. pp. 551-563. - Predm. decree. pp. 564-567. - ISBN 5-7695-0984-8
- Gmurman V. E. Teoriya probirovotelnostey i matematicheskaya statistika: uchebnik dlya prikladnogo bakalavrata [Probability Theory and Mathematical Statistics: A Textbook for Applied Bachelor's Degree]. - 12th ed. - Moscow: Yurayt, 2016. - 480 p.: ill. - (Bachelor). - Grief: Rek. UMO i MO. - Predm. Op. cit.: p. 474-479. - ISBN 978-5-9916-6110-2

- Matalytskiy M.A., Khatskevich G.A. Teoriya probaznostey i matematicheskaya statistika: uchebnik [Probability Theory and Mathematical Statistics: Textbook]. - Minsk: Higher School, 2017. - 592 p. - <http://biblioclub.ru/>. - Bibliogr. in. - ISBN 978-985-06-2855-8
- Gmurman V. E. Rukovodstvo k resheniya zadach po teorii verobnostey i matematicheskoy statistiki: uchebnoe posobie dlya prikladnogo bakalavratka: dlya studentov vuzov [A guide to solving problems in the theory of probability and mathematical statistics: a textbook for applied bachelor's degree: for university students]. - 11th ed., revised and supplemented - Moscow: Yurayt, 2016. - 405 p.: ill., tabl. - (Bachelor's Degree). - Appendix: pp. 388-404. - ISBN 978-5-9916-6505-6

8.2. List of educational and methodological support for students' independent work in the discipline (module)

- Probability Theory and Mathematical Statistics: A Course of Lectures: A Textbook. E. O. Tarasenko; Author: I. V. Zaitseva; Author: P. K. Korneev; Author: A. V. Gladkov; Ministry of Science and Higher Education of the Russian Federation; Federal State Autonomous Educational Institution of Higher Education "North Caucasus Federal University". - Stavropol: NCFU, 2018. - 229 p.: ill.

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

- https://ru.wikipedia.org/wiki/Probability_Theory. Wikipedia Free Encyclopedia.
- <https://intuit.ru/studies/courses/2263/219/info> Probability Theory and Mathematical Statistics: INTUIT National Open University
- <http://exponenta.ru/> Educational mathematical website EXPONENTA.ru

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, demonstrations of presentation multimedia materials. At seminars and practical classes, students present presentations 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.	https://ru.wikipedia.org/wiki/Probability_Theory : Wikipedia Free Encyclopedia
2.	https://intuit.ru/studies/courses/2263/219/info Probability Theory and Mathematical Statistics: INTUIT National Open University

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	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 of 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 interim certification using distance learning technologies and e-learning, the Methodological Recommendations for the Use of Technical Means That Ensure the Objectivity of Results in the Conduct of 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 Education 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.