

Документ подписан простой электронной подписью
Информация о владельце:
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Должность: и.о. директора Института цифрового развития
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Discipline annotation

Discipline name	Теория вероятностей и математическая статистика / Probability Theory and Mathematical Statistics
Summary	Elements of set theory. Axiomatics of the theory of probability. Basic concepts and subject of probability theory. Algebras and σ-algebras of subsets. Sets and operations on them. Classical definition of probability Statistical definition of probability Geometric definition of probability Basic formulas of combinatorics Theorems of addition and multiplication of probabilities and their corollaries. Theorems of addition and multiplication of probabilities Corollaries of addition and multiplication theorems Test repetition Random variables and random vectors. Numerical characteristics of random variables. Random variables. Function and probability density. Basic discrete and absolutely continuous distributions. Basic numerical characteristics of discrete random variables. Basic numerical characteristics of continuous random variables. Numerical characteristics of random variables with some standard distribution laws. Characteristic and generating functions. Convergence of random variables and limit theorems. Characteristic functions Generating functions Convergence of a sequence of random variables. Law of Large Numbers Statement of the central limit theorem Multivariate normal distribution and related distributions. Multivariate normal distribution Distributions related to the normal Basic concepts of mathematical statistics. Point estimation of numerical characteristics and distribution parameters of the general population. Subject and main tasks of mathematical statistics Descriptive statistics The concept of a point statistical estimate Estimate Requirements Estimate properties. Methods for obtaining estimates of the parameters of the general distribution Interval estimation of numerical characteristics and distribution parameters of the general population. Statistical hypotheses. Testing statistical hypotheses. Confidence interval. Accuracy and Reliability of Estimation Accuracy and Reliability of estimating the probability of an event using its relative frequency Confidence interval for the expectation m of a normal population Types of statistical hypotheses Significance criterion Errors of the first and second kind

	Hypothesis about the equality of two normal populations Hypothesis about the equality of the mathematical expectations of two general populations Hypothesis about the equality of the probabilities of two events with large sample sizes Testing the hypothesis about the law of distribution of the general population. Correlation and regression analysis. One-way analysis of variance. Testing the hypothesis about the law of distribution of the general population Correlation analysis Understanding Regression Analysis The concept of analysis of variance Total, factor and residual variance Comparison of several means by analysis of variance Statistical theory of pattern recognition The history of the emergence of artificial systems of automatic recognition and their implementation. Basic definitions Pattern recognition methods Analysis of the current state of pattern recognition Statistical theory of signal selection against the background of noise Random noise filtering by the Kalman-Bucy method Fixed Delay Kalman-Bucy Filter
Learning outcomes of the discipline (Module)	- operates with elements of numerical fields, linear spaces, linear operators, matrices, vectors, linear and non-linear geometric objects; solves systems of linear equations; applies algebraic methods to solve geometric problems; applies algebraic and geometric methods to solve applied problems, as well as evaluates the quality of the solutions obtained; demonstrates the ability to abstract, including the ability to logically develop individual formal theories and establish a connection between them. - able to use mathematical methods and software technologies for working with algebraic structures to solve professional tasks.
Workload, c. u.	4 c. u.
Reporting Forms	Graded credit - 4th semester
List of essential and supplementary literature necessary for mastering the discipline	
Essential literature	1. Kolemaev, V. A. Probability theory and mathematical statistics / Electronic source: textbook / 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 IPRbooks ELS. - ISBN 5-238-00560-1 2. Probability theory and mathematical statistics: a course of lectures: textbook / ed. by E. O. Tarasenko; compiled by I. V. Zaitseva, P. K. Korneev, 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. - http://biblioclub.ru/. - Bibliography in book.
Supplementary literature	1. Venttsel, E. S. Probability theory: a textbook for universities / E. S. Venttsel. - 9th ed., reprint. - M.: Vysshaya shkola, 2003. - 576 p.: ill. - Stamp: recommended by the AMA & MA. - App. p. 551-563. – Subject index p. 564-567.- ISBN 5-7695-0984-8 2. Gmurman, V. E. Probability theory and mathematical statistics: a textbook for applied Bachelor studies / V. E. Gmurman. - 12th ed. - Moscow: Yurayt,

	2016. - 480 p.: ill. - (Bachelor). - Stamp: recommended by the AMA & MA. - Subject index: p. 474-479. - ISBN 978-5-9916-6110-2 3. Matalytsky, M. A. Probability theory and mathematical statistics: textbook / M. A. Matalytsky, G. A. Khatskevich. - Minsk: Vysshaya shkola, 2017. - 592 p. - http://biblioclub.ru/. - Bibliography in the book. - ISBN 978-985-06-2855-8 4. Gmurman, V. E. A guide to solving problems in probability theory and mathematical statistics: a textbook for applied Bachelor studies: for university students / V. E. Gmurman. - 11th ed., revised and enlarged - Moscow: Yurayt, 2016. - 405 p.: ill., tab. - (Bachelor's Applied course). - App.: p. 388-404. - ISBN 978-5-9916-6505-6 5. http://el.ncfu.ru/ – learning management system of NCFU. Remote support of the discipline "Probability Theory and Mathematical Statistics"
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