The syllabus of the discipline
Higher mathematics (special sections)

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Field name	Detailed content, comments
Name of the faculty	Faculty of Infocommunications
Level of higher education	First (bachelor's)
Code and name of the specialty	172 Telecommunications and radio engineering
Type and name of educational program	EPP "Information and Network Engineering"
Name of the discipline	Higher mathematics (special sections)
Number of ECTS credits	3
Discipline structure (distribution by types and hours of study)	18 hours - 9 lectures, 18 hours - 9 practice classes, 6 hours - 3 consultations, 46 hours - homework, **type of control**: credit
Schedule (terms) of studying the discipline	1st year, II semester
Prerequisites for studying the discipline	students must have a basic knowledge of higher mathematics
Competences, knowledge, skills, understanding, which is acquired by the applicant in higher education in the learning process	The discipline is used for formation the following competencies: calculate numerical characteristics of random variables for classical probability distribution laws.
The quality of the educational process	Educational-methodical and material-technical resource provision of the educational program, within the framework of which the discipline is studied, meets the licensing requirements and accreditation conditions of the educational activity of the university. Annual monitoring and revision of the curriculum of the discipline in accordance with the requirements and recommendations of the Ministry of Education and Science, state certification of acquired competencies of graduates, standards of cooperation with employers to ensure a competitive level of training. Adherence to the principles of academic integrity (https://lib.nure.ua/plagiat). Contains public information on the requirements, competencies, level of education within the current educational program.

Description and content of the discipline

The purpose of studying the discipline - the formation of students' knowledge of the main sections of probability theory and mathematical statistics and, thus, providing a theoretical basis for studying special disciplines (telecommunication theory, communication networks, information distribution networks, information protection in telecommunications and comp. user networks), as well as the development of students' skills and abilities in solving applied problems, which are typical in the activities of a specialist in the field of telecommunications.

He aims to build a mathematical foundation from the sections of probability theory and its branches for the study of this discipline and a number of other disciplines in the field of telecommunications.

The course continues the study of higher mathematics - the concepts and main results of probability theory, mathematical statistics and random processes that are not studied in the general course "Higher Mathematics". The peculiarities of this course in comparison with all known courses in probability theory are the motivation of the theory, providing concepts and definitions of the theory of probabilities of physical understanding in the field of theory and communication technology.

Content

Content module 1. Provisions of classical probability theory.
Topic 1. Basic approaches to the construction of probability theory.
Topic 2. Random events.
Topic 3. Random variables.
Content module 2. Random events.
Topic 1. The main problems and relations of combinatorics.
Topic 2. Convergence of distribution laws.
Content module 3. Special concepts of the theory of random processes.
Topic 1. Definitions and directions of studying random processes.
Topic 2. Integral representation of random processes.
Topic 3. Examples of random processes.
Topic 4. Markov processes with continuous and discrete time.
Content module 4. Mathematical statistics.
Topic 1. Basic concepts and problems of mathematical statistics.

Learning outcomes of higher education

As a result of studying the discipline, students must:

know: the concepts and properties of random events, random variables, vectors and processes, as well as have the concepts of statistical hypothesis selection, parameter estimation and filtering;

be able to: calculate the numerical characteristics of random variables for the classical laws of probability distribution.

Assessment system according to each task for passing the test / exam

As a form of final control for the discipline is used credit. To evaluate the student's work during the semester, the final rating Pp is calculated as the sum of grades for different types of classes and control activities.

Type of lesson / control measure	Rating
Pr № 1, 2, 3, 4	4x5=20
Control testing 1	20
Checkpoint **1**	40
Pr №5, 6, 7, 8, 9,10	6x5=30
IHW (abstract)	30
Checkpoint **2**	60
Total for the semester	100

Qualitative evaluation criteria in the national scale and ECTS

Satisfactory, D, E (60-74). Show the required minimum of theoretical knowledge. Know the ways and methods of solving practical problems and be able to use them in practice.

Well, C (75-89). Firmly know a minimum of theoretical knowledge. Demonstrate the ability to solve a practical problem and justify all stages of the proposed solution.

Excellent, A, B (90-100). Show complete knowledge of basic and additional theoretical material. Unmistakably solve a practical problem, explain and justify the chosen method of solution.

Assessment scale: national and ECTS

The sum of points for all types of educational activities	ECTS assessment	Score on a national scale	
		for exam, course project (work), practice	for offset
90 – 100	**A**	perfectly	credited
82-89	**B**	fine	credited
74-81	**C**	fine	credited
64-73	**D**	satisfactorily	credited
60-63	**E**	satisfactorily	credited
35-59	**FX**	unsatisfactory with the possibility of reassembly	not credited with the possibility of re-assembly
0-34	**F**	unsatisfactory with mandatory re-examination	not credited with compulsory re-study of the discipline

Methical support

Basic literature

1. Konspekt lektsii z dystsypliny "Vyshcha matematyka (spetsrozdily)" dlia studentiv usikh form navchannia napriamu 6.050903 "Telekomunikatsii"; S.V. Omelchenko; MONMS Ukrainy, Khark. nats. un-t radioelektroniky. - Kh. : KhNURE - 2012. - 164 s.

2. Konspekt lektsii y zadachnyk po kursu «Veroiatnostnыe modely sluchainыkh syhnalov y polei dlia obrabotky syhnalov». Omelchenko V.A., Bezruk V.M.., Drahan Ya.P., Kolesnykov O.A., Omelchenko A.V. – Kharkov: KhTURЭ, 1994.— 285s.

3. Hykhman Y.Y., Skorokhod A.V., Yadrenko M.Y. Teoryia veroiatnostei y matematycheskaia statystyka. —K.: Vyshcha shkola, 1979.—408s.

Supporting literature

4. Babak V.P., Marchenko B.H., Fryz M.Ie. teoriia ymovirnostei, vypadkovi protsesy, ta matematychna statystyka. – K., Tekhnika, 2004. -288 s.

5. Venttsel E.S., Ovcharov L.A. Teoryia veroiatnostei y ee inzhenernye prylozhenyia.

6. Kovalenko Y.N., Fylyppova A.A. Teoryia veroiatnostei y matematycheskaia statystyka.: 1982.

7. Yvchenko H.Y., Medvedev Yu.Y. Matematycheskaia statystyka. M.,1984.

8. Yvchenko H.Y., Medvedev Iu.Y. Sbornyk zadach po matematycheskoi statystyke: Uchebnoe posobye dlia vtuzov - M.,1989-255 s.