

**Syllabus of the educational discipline**  
**«PROBABILITY THEORY AND MATHEMATICAL STATISTICS»**

<b>Cycle of Higher Education</b>	<i>First cycle of higher education (Bachelor's degree)</i>
<b>Field of Study</b>	<i>12 Information Technologies</i>
<b>Specialty</b>	<i>123 Computer engineering</i>
<b>Educational program</b>	<i>Computer systems and networks</i>
<b>Discipline status</b>	<i>Normative</i>
<b>Teaching language</b>	<i>English</i>
<b>Year of studies, semester</b>	<i>2 year (4 semester)</i>
<b>Number of credits ECTS</b>	<i>3 credits</i>
<b>Distribution by types of trainings and hours of study</b>	<i>Lectures, Laboratory studies, Independent training</i>
<b>Form of final assessment</b>	<i>Exam</i>
<b>Teacher</b>	<i>Syniavska Olga Olexandrivna, associate professor of department of probability theory and mathematical analysis, PhD</i>
<b>Teacher's contacts</b>	<i>olga.synyavska@uzhnu.edu.ua</i>
<b>Course Schedule</b>	<i>According to the timetable</i>
<p>The purpose of teaching the discipline is to introduce students with the basic concepts, theoretical positions and modern mathematical models of Probability theory and mathematical statistics for the improvement of processes of mastering general engineering and special disciplines; statistical processing of experimental data, education of mathematical culture, promotion of the development of logical and analytical thinking of students.</p> <p>As a result of studying the discipline the student must:</p> <p><i>know:</i></p> <ul style="list-style-type: none"> <li>- basic axioms and theorems of probability theory;</li> <li>- mathematical models for working with random events, random discrete and continuous quantities and their systems, as well as random processes;</li> <li>- basic theoretical concepts of mathematical statistics, methods for assessing the reliability of measurement results, hypothesis testing, decision making, correlation and regression analysis;</li> <li>- basic theoretical provisions of the theory of random processes, flows, Markov chains and processes.</li> </ul> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li>- independently analyze random events, calculate their probability;</li> <li>- analyze discrete and continuous random variables, as well as their systems, calculate probabilistic characteristics of quantities with different distribution laws;</li> <li>- process the results of measurements, obtain estimates of the characteristics of random variables and their systems, determine estimates of the reliability of measurements, perform correlation and regression analysis;</li> <li>- to solve problems of the theory of probabilities and mathematical statistics with the proof of the solution to a practically satisfactory result;</li> <li>- to determine the parameters of the transient process and stationary characteristics of discrete and continuous random Markov processes</li> <li>- independently understand the mathematical apparatus, which is contained in the literature for the specialty.</li> </ul>	
<b>Prerequisites for learning</b> Mathematical Analysis	
<b>Content of the educational discipline</b>	
<p><b>Module 1</b>  <b>Content module 1. Random events.</b>  <b>Topic 1.</b> Basic concepts of probability theory.  <b>Topic 2.</b> Bernoulli trials.</p>	

Calculation work  
**Content module 2. Random variables. Systems and functions of random variables.**  
**Topic 3.** Random variables.  
**Topic 4.** Basic distribution laws and numerical characteristics of discrete random variables.  
**Topic 5.** Basic distribution laws and numerical characteristics of continuous random variables.  
**Topic 6.** Systems of random variables.  
**Topic 7.** The concept of the law of large numbers.  
Calculation work  
Modular control work  
**Module 2**  
**Content module 3. Elements of mathematical statistics.**  
**Topic 7.** Subject and tasks of mathematical statistics.  
**Topic 8.** Point and interval estimations of parameters of distribution.  
**Topic 9.** Elements of the theory of correlation  
Calculation work  
**Topic 10.** Statistical hypothesis testing.  
**Content module 4. Markov chains. Random functions.**  
**Topic 10.** Homogeneous Markov chains.  
**Topic 11.** Random Functions.  
Calculation work  
Modular control work  
Test

<b>Course page on the Moodle platform (personal training system)</b>	<i>Syllabus of the educational discipline, hyperlinks to electronic publications of the discipline, recommended literature, students' attendance, lecture materials, presentations, questions for self-control, methodical materials for laboratory works, tests, task for checking students' knowledge.</i> <a href="https://moodle.uzhnu.edu.ua">https://moodle.uzhnu.edu.ua</a>
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**Recommended literature**

1. Bandura A. I. *Theory of probability and mathematical statistics: lectures* / A. I. Bandura, L. I. Kryshchtopa, I. Ye. Ovchar, IFNTUOG. Ivano-Frankivs'k: IFNTUOG, 2015. 169 p.
2. Bandura A. I. *Theory of probability and mathematical statistics: practices* / Bandura A. I., Kryshchtopa L. I., Ovchar I. Ye. // Ivano-Frankivs'k: IFNTUOG, 2016. 163 p.
3. *Higher mathematics: manual: in 4 pt.* Kyiv: NAU, 2009. Pt. 4: *Theory of probability and elements of mathematical statistics* / V. P. Denysiuk [et al.]; Nat. aviation univ. - 2013. - 246 p.
4. Havdzynskyi V.N., Korobova L.N. *Theory of Probability. Educational Aid. For Students Studying a Course of Higher Mathematics in English.* Odessa: ODESSA NATIONAL A.S. POPOV ACADEMY OF TELECOMMUNICATIONS. 2008. 40 p.

**Assessment system of learning outcomes**

*Current control carried out the semester and evaluated by the amount of points (max is 100 points). A minimum amount, that allows a student to get credit is 35 (max is 100 points).*  
*Modular control work is divided into two control works; maximum number of points for each test: 50 points (dilution of tasks is specified in the test). During the semester, students perform 4 computational works. Maximum number of points for each calculated work: 25 points.*  
*Final (semester) control is carried out in the form of test and evaluated in points (max is 100 points, min is 35 points).*

<b>ECTS and national grading scale</b>			
Mark scale	ECTS	Exam	Test
90 - 100	A	Excellent	Satisfied
82 - 89	B	Good	
74 - 81	C		
64 - 73	D	Satisfactory	
60 - 63	E		

35 - 59	FX	“Unsatisfactory” with possibility to pass the exam again	“Not satisfied” with possibility to pass the exam again
1 - 34	F	“Unsatisfactory” with obligatory repeated study of the discipline	“Not satisfied” with obligatory repeated study of the discipline