

Syllabus of the educational discipline
«THEORY OF INFORMATION AND CODING»

Cycle of Higher Education	<i>First cycle of higher education (Bachelor's degree)</i>
Field of Study	<i>F Information Technologies</i>
Specialty	<i>F7 Computer engineering</i>
Educational program	<i>Computer systems and networks</i>
Discipline status	<i>Normative</i>
Teaching language	<i>English</i>
Year of studies, semester	<i>1 year (2 semester)</i>
Number of credits ECTS	<i>3 credits</i>
Distribution by types of trainings and hours of study	<i>Lectures, Practical studies, Independent training</i>
Form of final assessment	<i>Exam</i>
Teacher	<i>Syniavska Olga Olexandrivna, associate professor of department of probability theory and mathematical analysis, PhD</i>
Teacher's contacts	<i>olga.synyavska@uzhnu.edu.ua</i>
Course Schedule	<i>According to the timetable</i>
<p>The course aims to introduce to the students the concepts of amount of information, entropy, channel capacity, source coding (data compression), error-detection and error-correction codes, repetition and Hamming codes.</p> <p>At the end of this course, students should:</p> <p><i>know:</i></p> <ul style="list-style-type: none"> - basic concepts of information theory; - estimation of quantity of information and methods of their definition; - ways to encode and decode information; - systems of calculation, methods of information transmission; - methods of increasing the speed of transmission and protection of information. <p><i>be able to</i></p> <ul style="list-style-type: none"> - calculate the entropy of the information source; - write numbers in any number system and translate numbers from one number system to another; - use effective encoding of information for its transmission through communications channels. 	
<p>Prerequisites for learning High School Mathematics Course</p>	
<p>Content of the educational discipline</p>	
<p>Module 1</p> <p>Topic 1. Introduction.</p> <p>Topic 2. Error-detecting codes .</p> <p>Topic 3. Repetition and Hamming codes .</p> <p>Topic 4. Variable-Length Codes: Huffman Codes.</p> <p>Topic 5. Data compression: efficient coding of a random message .</p> <p>Modular control work</p> <p>Module 2</p> <p>Topic 6. Entropy and Shannon's First Theorem.</p> <p>Topic 7. Mutual information and channel capacity.</p> <p>Topic 8. Some Mathematical Preliminaries.</p> <p>Topic 9. Shannon's Main Theorem</p> <p>Topic 10. Other aspects of coding theory .</p> <p>Modular control work</p> <p>Examination</p>	

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

1. Lindell Y. *Introduction to Coding Theory Lecture Notes*. https://u.cs.biu.ac.il/~lindell/89-662/coding_theory-lecture-notes.pdf
2. Moser Stefan M.; Chen Po-Ning *A student's guide to coding and information theory*. Cambridge; New York: Cambridge University Press, 2012. <https://sites.google.com/a/id.books-now.com/orechcosbo11/9781280774812-97valforGEafim50>
3. Cover T. M., Thomas J. A. *Elements of information theory*, Wiley Interscience, 2nd Edition, 2006
4. Zhurakovsky Yu.P., Poltorak V.P. *Theory of information and coding: A textbook*. K.: Higher School. 2001. 255 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). The final course grade will be distributed as follows: Homework and quizzes 20 %, Midterm test 30 %, Modular control work 50 %.
Final (semester) control is carried out in the form of exam and evaluated in points (max is 100 points, min is 35 points).

ECTS and national grading scale

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