Syllabus of the educational discipline
«COMPUTER LOGIC»

Cycle of Higher Education	*First cycle of higher education (Bachelor's degree)*
Field of Study	*12 Information Technologies*
Specialty	*123 Computer engineering*
Educational program	*Computer systems and networks*
Discipline status	*Normative*
Teaching language	*English*
Year of studies, semester	*2 year (3 semester, 4 semester)*
Number of credits ECTS	*7 credits*
Distribution by types of trainings and hours of study	*Lectures, Laboratory studies, Practice studies, Independent training*
Form of final assessment	*Test, Exam*
Teacher	*Korol Yuriy Yurievich, associate professor of department of computer systems and networks*
Teacher's contacts	*yuriy.korol@uzhnu.edu.ua*
Course Schedule	*According to the timetable*

The purpose of studying the discipline "Computer logic" is to investigate ways of representing numbers in computers, methods of performing major arithmetic and logical operations with numbers in different number systems, the basics of mathematical logic, analysis and synthesis of digital operational and control automata.

As a result of studying the discipline the student must:

know:

- forms and methods of number representation in computers, algorithms for performing basic arithmetic and logical operations on them in different numerical systems; logical foundations of digital automata based on Boolean algebra; methods of synthesis of combinational and sequential digital automata on elements of different bases.

be able to:

- develop algorithms for basic arithmetic operations for different numerical systems, in different codes with accuracy estimation; perform conversion of Boolean functions in different bases; conduct minimization of abstract and structural digital automata; make on this basis structural schemes of combinational digital automata and automata with memory.

Prerequisites for learning

Discrete mathematics, Theory of information and coding

Content of the educational discipline

Content module 1. Numerical Systems

Topic 1. Introduction. The subject of the "Fundamentals of Computer Arithmetic" discipline

Topic 2. Numerical systems and information representation in computers

Topic 3. Conversion of numerical information from one positional numerical system to another

Content module 2. Fundamentals of computer arithmetic

Topic 1. Representation of numbers in computers and computer systems

Topic 2. Algorithms for performing arithmetic operations

Content module 3. Performing multiplication and division operations on binary adders and digital automata

Topic 1. Performing multiplication operations on binary adders

Topic 2. Performing division operations on binary adders

Topic 3. Operations with Decimal Numbers in Digital Automata

Content module 4. Arithmetic operations in special purpose systems

Topic 1. Performing arithmetic operations in special-purpose systems

Topic 2. Monitoring the execution of operations

Content module 5. Boolean Algebra and Digital Electronics

Topic 1. Boolean functions

Topic 2. Analytical representation of Boolean functions
Topic 3. Functionally complete Boolean functions
Topic 4. Decomposition of logical functions by k-variables
Content module 6. Minimization of Boolean functions
Topic 1. Minimization of Boolean functions
Topic 2. Minimization of partially defined Boolean functions
Content module 7. Combination circuit design
Topic 1. Combination circuit design
Topic 2. Combination circuit design on encoders and decoders
Topic 3. Combination circuit design on Multiplexers and Demultiplexers
Content module 8. Designing digital automata with memory
Topic 1. Asynchronous and synchronous RS triggers
Topic 2. Triggers of types JK, T, D
Topic 3. Abstract Digital automata with memory

Course page on the Moodle platform (personal training system)	*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, tasks for checking students' knowledge. https://moodle.uzhnu.edu.ua*

Recommended literature

1. *Tony Gaddis, Starting Out with Programming Logic and Design (What's New in Computer Science) 5th Edition. - Pearson, 2018. - 832p.*
2. *Joyce Farrell, Programming Logic & Design, Comprehensive 9th Edition. - Cengage Learning, 2017. - 656p.*
3. *Jr. Charles H. Roth, Fundamentals of Logic Design 7th Edition. - Cengage Learning, 2013. - 816p.*

Assessment system of learning outcomes

The ECTS grade that a student receives after studying a credit module of a discipline is determined according to the student's rating. A student's credit module rating consists of the points the student receives during the semester for the following types of work:
1. Modular control work (MCW) duration of 2 acad. hours each. The maximum number of points for the MCW is 50 points.
2. Performance of laboratory works.
During an academic semester students perform laboratory works, maximum number of points for a type of work is 40 points
Scores on individual and independent work of students are awarded for: preparation of essays, modernization of tasks, creative approach to task performance, performance of tasks to improve didactic materials on the discipline: 0-10 points for each module.
Each module is assessed a maximum of 100 points. At the end of the discipline a rating score is derived as the arithmetic average of the points from the two modules.

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