11 класс

	Software categories		• justify the choice of applied software and choice criteria based on the goals • classify application software
	Operating systems		• describe the purpose and main functions of operating systems • compare single- user and multi-user operating systems • compare one-task and multitasking operating systems
	Von Neumann architecture		• describe the interaction of CPU with peripheral devices • describe the purpose of CPU components, system bus and main memory
	Memory types		• explain the differences between RAM and ROM memory • explain the purpose of virtual memory • explain the purpose of cache memory
	Laws of Boolean logic `		• build truth tables AND, OR, NOT, NAND, NOR, XOR • distinguish between laws of Boolean logic • simplify logical expressions using the laws of Boolean logic
	Generalization of material		• Revision
	Classification and categories of programming languages		• distinguish between generations of programming languages • classify programming languages into low and high-level • analyze the advantages and disadvantages of high-level languages • analyze the advantages and disadvantages of low-level languages • analyze a simple program in assembler • use trace tables to find and validate the algorithm
	Translators		• advantages and disadvantages of compilers • advantages and disadvantages of interpreters

	Generalization of material	• Revision
	System lifecycle stages	• analyse the advantages and disadvantages of cyclical, waterfall and spiral models
	System lifecycle model	• analyse the advantages and disadvantages of cyclical, waterfall and spiral models
	Data analysis	• Describe data collection methods • compare different data analysis techniques • compare alternative solutions to a problem in order to choose the most effective algorithm • develop a system requirement based on collected information
	Data flow diagrams	• use data flow diagrams (DFD) to input, process, store and output data in computing systems
	Process flowcharts	• use flow charts to input, process, store and output data in computing systems
	Project report Practice(project situations and cases)	• Write a project report
	Project presentation Generalization of material	• Present project report
2 четверть (48 часа)		
	Database basics	• describe relational databases and their purpose • define data types when creating a database • use the terms attribute, object, index, record, table and tuple to describe databases • explain the difference between primary composite and foreign key
	Entity Relationship diagrams	• define the connections between tables in database • create an entity-relationship (ER) model
	Normalization	• define relationships between tables in the database (1-3 NF)
	SQL query language	• explain the purpose of data dictionary • compare the data definition language (DDL), and the data manipulation language (DML)

		• describe the basic SQL queries for working with tables in a database: CREATE, ALTER and DROP • describe the basic SQL queries for working with one table in a database: SELECT, UPDATE, INSERT and DELETE • use SQL SELECT for data selection in more tables
	Generalization of material COP	• Revision
	Data flow diagrams	• use data flow diagrams (DFD) to input, process, store and output data in computing systems
	Flowcharts of processes	• use flow charts to input, process, store and output data in computing systems
	Prototyping	• discuss the advantages and disadvantages of using prototypes when developing solutions • discuss the use of prototypes based on a specific example • develop a prototype for a new system
	Advantages and limitations of the system	• analyze the advantages of new system • analyze the restrictions of new system
	Development environment	• describe the characteristics of a development framework
	Technical specification	• define minimum requirements for hardware when implementing • justify their choice of applied software and choice criteria based on the goals
	Generalization of material COP	• Revision
3 четверть (62 часов)		
	The structure of one-dimensional and two-dimensional arrays.	• use technical terms related to arrays, including upper and lower bounds • select an appropriate data structure for the given task (one-dimensional or two-dimensional array) • write code using a one-dimensional and two-dimensional array • write an algorithm/pseudo-code for sorting by insert and bubble

			• write a pseudo-code of binary search for the solution of a specific problem
	Algorithm efficiency		• understand the temporal efficiency of algorithms • to understand the spatial efficiency of algorithms
	Generalization of material		• Revision
	HTML markup language. Basic HTML tags		• create a site using basic HTML tags • create forms for data entry using HTML tags
	CSS stylesheet		• use the CSS stylesheet when creating a site content
	Script language		• use script language to connect a database • use script language to work with databases
	Using scripts to create site content		• use various algorithmic structures in script language • use script language in site design • use script language to provide interactivity
	Generalization of material		• Revision
	Application interface		• describe the characteristics of a development framework • create a mobile application interface using the components of an application designer • edit properties of components in a program code
	Mobile application development		• create an application for mobile devices using conditional operators • create an application for mobile devices using conditional operators • create an application for mobile devices using loop structures • use the technical capabilities of smartphones when developing
	Publishing mobile application		• publish the results of a project on the network (application store)
	Project presentation		• present the mobile application
4 term (52 часов)			
	Project development		• write a program code using a basic algorithmic "following"

			structure when developing a project • write a program code using a basic algorithmic "branching" structure when developing a project • write a program code using a basic algorithmic "loop" structure when developing a project • use the rules of good programming style when writing code
	Project presentation		• present the course project
	Security, privacy and data integrity		• explain the difference between the terms security, privacy and data integrity
	Safety methods		• provide arguments for the necessity of the protection of data and computer system • describe data protection measures such as data backup and disk mirroring • describe data protection measures such as encryption and access rights to data (authorisation)
	Validation and verification		• explain the difference between the terms verification and validation
	Blockchain technology		• explain the function and operation of Blockchain technologies
	Ethics and ownership		• follow the copyright law when developing applications • describe specifics of open source software • describe specifics of closed source software • restrict access to data made available through the Internet using a variety of methods • evaluate risks of using cloud technologies
	Generalization of material		• Revision
	Computer networks		• compare features of local (LAN) and wide area networks (WAN) • describe the advantages and disadvantages of network topologies bus, ring, star, mixed

		- explain the purpose of network equipment
	Principles of Internet operation	- describe the role of universal resource locator (URL) - explain the format of the IP address and how the IP address is connected to the device on the network - explain the differences between public and private IP addresses and how they affect security - describe the purpose and organization of a domain name system (DNS) - explain the features of the client-server model
	Protocols	- explain the role of protocols in the network (HTTP, FTP, POP3, SMTP, HTTPS, FTPS)

12 класс

	Artificial intelligence	- describe spheres where artificial intelligence is applied: industry, education, medicine, gaming industry, society
	Virtual and augmented reality	- explain the purpose of virtual and augmented reality
	Declarative and imperative programming languages	- compare declarative and imperative programming languages
	Expert systems	- create a simple expert system
	Programme compilation stages	- describe programme compilation stages: lexical and syntactic analysis, code generation and optimization - demonstrate understanding of the programme compilation stages: lexical, syntactic analysis

		• demonstrate understanding of the programme compilation stage: code generation • demonstrate understanding of code optimization as the programme compilation stage
	Types of test data	• describe execution errors at programme startup • perform testing using normal data
	Types of errors	• perform testing using extreme data • perform testing using erroneous data • describe a syntax error in a programme code
	Preparation for External SA	
	Data protection measures	• describe data and computer systems protection measures such as: physical risks, inter-network screens, information encryption, biometrics, computer virus • use data protection measures such as data backup and disk mirroring
	Methods of information systems protection	• analyse ethical problems arising due to computer system cracking • protect data from unauthorised access • analyse problems arising due to malware • explain privacy policies
	Methods of intellectual property protection	• analyse problems arising due to disseminating and using information • use E-gov resourses

	• Making a text document	• use headers and footers when documenting a project • use footnotes when documenting a project • use tables when documenting a project
	• Formatting a text document	• use headers and footers when documenting a project • use footnotes when documenting a project • use tables when documenting a project
	• Use resources to check for plagiarism	• check documents using antiplagiarism resources • name copyright protection rules
	• Methods of system implementation	• list system implementation methods • compare the advantages and disadvantages of system implementation methods
	• New system implementation	• explain the importance of making a system implementation plan • make a system implementation plan
	Preparation for External SA	
	• OS types	• describe a real-time operating system • describe a network operating system • describe a batch processing operating system
	• CPU architectures	• define the advantages and disadvantages of a graphical user interface (GUI) • define the advantages and disadvantages of natural-language and gesture-recognition user interfaces

			• describe the RISC architecture • describe the CISC architecture • compare RISC and CISC
	• Memory addressing principle		• explain the principle of memory addressing • explain the principle of storing programmes and data • explain the concept of virtual machine
	• System bus		• explain how data is transferred between different components of a computer system through the address bus, data bus and control bus
	• Fetch-execute		• explain the command execution cycle (sampling /decoding /execution) • explain how the clock rate, word length and bus width affect the performance
	• Boolean logic		• reduce formulas to normal logic using the laws of formal logic and rules of logical transformation • build logical structures • simplify logical expressions using the laws of logic • analyze logical structures
	• Number representation methods		• convert binary numbers to hexadecimal • explain the advantages of using hexadecimal numbers in computer systems
	• Addition and multiplication of binary numbers		• perform the arithmetic operations: addition and

		multiplication of binary numbers • represent positive and negative numbers in binary using complement in n-bit range • perform complement subtraction • use binary numbers with a fixed point to represent fractional numbers with a given number of bits • represent positive and negative floating-point decimal numbers in binary.
	• Stacks and queues	• describe the operation of stack and queue data types
	• Binary tree	• build a binary tree
	• Internet and the World Wide Web	• distinguish features of the Internet, the World Wide Web and the Internet
	• OSI models	• describe the functions of the OSI network model levels
	• Channel switching and packet switching	• explain the difference between packet switching and circuit switching
	• Packet routing • Subnet mask, network devices	• describe the role of MAC addresses in packet routing • identify the MAC address of a computer