

050620 - “Computer engineering”

Number of subjects	The name of subject	ECTS credit
	General subjects	30
1	<p>History of Azerbaijan This subject studies the emergence, formation and development of Azerbaijan's modern statehood traditions, the role of political, ideological, economic, and cultural factors in the formation of modern Azerbaijan statehood is analyzed and studied. The place and role of the Azerbaijani state in the modern world is systematically analyzed.</p>	5
2	<p>Business and academic communication in Azerbaijani language Within the framework of this subject, special attention should be paid to inculcating students' presentation, public speaking, academic and business writing skills in Azerbaijani language.</p>	4
3	<p>Business and academic communication in a foreign language Within the framework of this subject, special attention should be paid to giving students a presentation in one of the foreign languages of their major, oratory, academic and business writing, oral and written skills.</p>	15
	Elective subjects (<i>Elective subjects are determined by the higher education institution. Depending on the specifics of the major, additions can be made to elective subjects</i>)	6
4	<p>Philosophy This subject - the main stages of the creation and development of philosophy, philosophical teaching about existence, concept of matter. Modern science about the structure of matter, movement. Space and time, the main laws and categories of dialectics, the problem of consciousness in philosophy, the philosophical meaning of man, nature and society, cognition and its structure, scientific cognition and its methods, creativity and intuition, ethics of science, specificity of social cognition. Society is a self-developing system, the main spheres of social life. Philosophical structure of economic life, social sphere of society, philosophical analysis of political life, spiritual life of society, subjects and driving forces of historical process, culture and civilization, personality and social values are analyzed and studied.</p>	3
	<p>Sociology This subject considers social events and processes in the context of society as a whole social system, analyzes and studies the structure, subject, methodology, characteristics of sociology, theoretical levels of modern sociological knowledge, as well as the variety of</p>	

	<p>special sociological concepts. It studies possible perspectives of scientific research in this field.</p> <p>Constitution of the Republic of Azerbaijan and fundamentals of law Constitution of the Republic of Azerbaijan, constitutional status of the state of Azerbaijan, citizenship of the Republic of Azerbaijan, human and civil rights, freedoms and duties, state power, division of power based on the Constitution, legislative power, executive power and its bodies, judicial power, its structure and system, fundamentals of labor law , basics of civil law, basics of family law, basics of criminal law.</p> <p>Logic The subject of logic helps a person to objectively assess opportunities, make quick and correct decisions, express ideas clearly, convince the interlocutor using correct arguments, and stay away from uncertain situations. This subject evaluates the ability to think logically, measures the ability to perceive and apply logical patterns, and allows you to learn how rich the knowledge base is in various fields.</p> <p>Ethics and aesthetics Information about Ethical thought in this subject, the main stages of its evolution: ethical thought in ancient India and China, ethical thought in antiquity, medieval and new ethical thought. Information about ethical thought in Azerbaijan, Islamic ethics, the essence and main functions of morality, morality and other forms of social consciousness, moral consciousness and action, the main categories of ethics: good and evil, duty and conscience, honor and dignity, happiness and the meaning of life, applied ethics and profession ethics is provided.</p> <p>Multiculturalism This subject includes and teaches a number of issues, including the essence and importance of the subject of multiculturalism, the traditions of various minority peoples living in Azerbaijan, the effects of multiculturalism on socio-economic development, the effects of multiculturalism on foreign policy, analyzing multiculturalism as the state policy of the Republic of Azerbaijan, comparative analysis of samples between Azerbaijani multiculturalism and world multiculturalism so on.</p>	
	<p>Russian language To write and read the alphabet and words of the Russian language correctly, to know and correctly use the basic grammar, expressions and phraseology of the Russian language, to have the habits of speaking and listening in Russian, the skills to read, understand and translate various texts in Russian, Russian skills to write and use the language correctly.</p>	
	<p>Business technical English Besides being an international language, English is also the main business language. In this regard, a high level of business English is of particular importance. Thus, improving business English skills will help improve work efficiency, business and career prospects. Through this subject, students will have the opportunity to improve</p>	

	<p>business communication skills and self-confidence in oral English, develop language skills for discussion and negotiation, make presentations in English, rules of business correspondence, as well as study business culture and protocol issues of English-speaking countries.</p> <p>During the teaching of a foreign language, the development of language components (pronunciation, vocabulary and grammar) and language skills (reading, writing, listening and speaking) in students is in the center of attention.</p> <p>Regarding the sequence of the teaching material, it should be said that the goal here is to develop oral speech habits with students as quickly as possible, that is, first of all, it is necessary to learn the most common phenomena in the language. Grammar is given a special place in the teaching of this subject. In the training process, it is necessary to inculcate the skills and habits of working independently with students. The main goal of the subject is to familiarize students with the problems encountered in translation during conversation and direct communication. In each lesson, students are presented with new materials, terms related to the specialty of information technologies, the text, new words, phrases and their explanation are explained. In the teaching of the lesson, a wide space is given to the discussion of the terms related to the IT specialty.</p>	
5	<p>Information technologies (specialization) Provision and processing of information. Information technologies. Subject and content of information. Information processes and its automation. Aspects of the approach to the study of information. Information systems. Structure and main object of information systems. Hardware and software part of the information system. Classification of information systems according to various characteristics. Main components of information systems. Their schemes of action. Development trends of information systems. Digital computing systems. Principles of computer construction. The concept of command. Architecture and structure of computers. It teaches the logical structure of computers. Information technology (IT) basics, including various types of computer equipment and network technology, are presented. Various data representation schemes such as binary number systems are covered. This course provides a broad introduction to the tools and applications students need to become successful professionals in the IT environment. Students will explore the core information technologies of human-computer interaction, data management, programming, networking, web systems and technologies, as well as information assurance and security. Working experience with some important elements of the IT field is gained through various laboratory exercises.</p> <p>Information management This subject covers the basics of using information systems in management, the company's information infrastructure, the analysis of the development of electronic systems of customer relationship management, information systems and management, the system of</p>	3

	<p>enterprise models, the principles of the structure and creation of the system of interaction of enterprises with customers, the realization of the company's strategy using information technologies, Information Management of systems services: functions, processes, measurements, Information systems service effectiveness measurement, Information systems operation and development cost estimation, Information technology services and business, overview cost of ownership, Information technology development projects and organizational restructuring, Complex information systems standard methods of application, network provision of the system aimed at customer management</p>	
	<p>Fundamentals of Entrepreneurship and Introduction to Business Entrepreneurial environment and competition, small and medium entrepreneurship, taxation in entrepreneurial activity, price policy, management and marketing system. Organizational-legal forms of business. SWOT analysis, external and internal environment of entrepreneurship. Commercial, financial, consulting, production entrepreneurship. Accounting, redistribution, incentive, balancing and production placement.</p>	
	<p>Political science Political science is the science of politics. The main stages of the development of political thought. Development stages of Azerbaijan's political opinion. Politics is the regulatory, organizing and controlling function of society. Political power and its bearers. Political elite. Political system theory. Political regimes. Political parties and party systems. Democracy: basic institutions. Parliament is the main democratic institution. Electoral systems. The state is the main political institution. Political consciousness and political ideology. Political culture. Civil society. Theory of world politics and international political relations. The concept of modernization as a theoretical model of political development. Political technologies. Political studies and political analysis. Making political decisions. Political science of international relations. Global problems of international politics. Foreign policy activity of the state.</p>	
	Specialization subjects	120
6	<p>Linear algebra and analytic geometry This subject covers complex numbers, matrices and determinants, linear space and its basis, linear algebraic equations and their solution methods, linear transformations and quadratic forms, Cartesian coordinate system in plane and space, simple problems of analytic geometry, elements of vector algebra, equations of straight line and plane, bilinear algebraic lines and surfaces.</p>	3
7	<p>Mathematical analysis This subject introduces the elements of set theory, the concept of the limit of a sequence, the limit and basic properties of a univariate function, continuity of a univariate function at a point and set, regular continuous univariate functions in a set, differential and integral calculus of a univariate function, numerical and functional</p>	7

	series, multidimensional Euclidean space, limit of a multivariate function, teaches discontinuity and regular discontinuity, differential and integral calculus of multivariable function. General information is given about one-order ordinary differential equations and systems of equations, n-order ordinary differential equations	
8	Differential equations One-order ordinary differential equations and system of equations, methods of construction of solutions of n-order ordinary differential equations, existence, uniqueness and stability of solutions of Cauchy and boundary problems for these equations, application of differential equations to mathematical modeling of various processes of natural science, classification of special derivative differential equations, mathematical physics On the formulation and correctness of Cauchy and boundary value problems for the equations are taught.	3
9	Discrete mathematics This subject studies the basic elements and concepts of information theory, mathematical logic, graph theory, algorithm theory, set theory, including fuzzy sets and relations theory, combinatorics, and the principles of their application in computer engineering. Find algebra within the subject, relationships, fuzzy relationships, linguistic variables, predicate calculus, information coding, quantity calculation, measurement units, number systems are studied.	3
10	Probability theory and mathematical statistics This subject covers events and actions on them, various definitions of probability and its calculation rules, the application of full probability and Bayes formulas, distribution laws of discrete and random quantities and their numerical characteristics, the basic essence of the law of large numbers and central limit theorems, the main elements of mathematical statistics, planning statistical determination due to the selection of parameters, laws related to normal distribution.	3
11	Physics This subject covers classical mechanics, including vector algebra, particle kinematics and dynamics, energy and momentum, conservation laws, rotational dynamics, oscillatory motion, gravity, thermodynamics and kinetic theory of gases, electrostatics, including conductors and insulators; DC circuits; magnetic forces and fields; magnetic effect of moving loads and currents; electromagnetic induction; Maxwell's equations; electromagnetic oscillations and waves, geometrical and physical optics.	5
12	Fundamentals of computer engineering This subject describes and teaches the purpose and tasks of the computer engineering major, its relationship with other majors, perspectives, computer work habits; the history of the development of computer technology and the main theoretical provisions, modern computer and computing technologies, concepts of artificial intelligence and intelligent systems; concepts and basics of computer architecture and organization, computer systems, operating systems; general information about the stages and	8

	methods of problem solving on the computer, programming and algorithmization technologies, programming languages, general principles of building algorithms; concepts of program structure, correctness and efficiency, data types and control structures.	
13	<p>Fundamentals of programming</p> <p>Steps and methods of problem solving on the computer; general principles of building algorithms; concept of programming system; program structure; teaches how to create and use data types, operators and operations, control structures, arrays, strings, pointers, files, subroutines, object-oriented programming model, concept of classes and objects, properties and methods are taught.</p>	8
14	<p>Data structure and algorithms</p> <p>It teaches Basic data structures, static and dynamic data structure, arrays, stacks, trees and graphs, applications of trees and graphs, floating balanced trees, stacks, memory management, caching techniques, listening, searching, string operations, steps in computer problem solving, problem formulation , problem analysis and research, Creating a solution algorithm, Algorithm description in programming language, Testing and debugging, Obtaining and analyzing results. The history of the algorithm. The main properties of the algorithm - determinism, massiveness, consequentiality and discreteness. Algorithm description methods - verbal description (natural language), algorithmic language description (program), graphic description (block diagram), conventional signs used during description with block diagram. Algorithm structure (types) - linear, branching and cyclic (repetitive) algorithms, Simple and complex branching algorithms, Simple and complex cyclic algorithms, Algorithm description with pseudocode (false code), Concept of database, its structural elements, VB models - hierarchical model, network model, relational model, Relational and network model combination – object-oriented model, Database management systems (DBMS), its types and functions, DBMS classification, DBMS components, Server and client concepts, Database administrator, Concept of ratio, scheme of ratio. Elements of relational model – tuple, attribute, domain, key, Power of Ratio, Power of Ratio. Special attention is given to data types, Relational database basics, Unique and key fields, Primary key and foreign keys, Operations on ratios – union, intersection, difference, Cartesian product and graph algorithms. A number of other areas are covered, including fundamental algorithms, geometric algorithms, and some algorithms from operations research. The course focuses on developing programs, understanding their performance characteristics, and evaluating their potential effectiveness in applications.</p>	6
15	<p>Database systems</p> <p>Data modeling; normalization; relational model; database construction; query language; simple and complex queries; conceptual modeling, hierarchical, network, and relational models to establish database connectivity. As a result of teaching this subject, students should have extensive knowledge about NoSQL</p>	7

	<p>database systems. One should know their similarities and differences with classic SQL systems. In particular, you should be familiar with the MongoDB database management system, and you should know in what form data is entered into this system in the form of documents. In addition, students should know how to perform manipulation operations on the data available in the system.</p>	
16	<p>Operating systems This course provides a convenient and efficient interface between user programs and computer hardware. One should know the basic principles of building modern operating systems, the architecture of Windows, Unix, Linux, Mac OS and mobile operating systems, how to compile and call functions in C, pass parameters to functions, declare arrays, search arrays, declare pointers, the relationship between pointers and arrays, declare strings, assigning values to strings, functions for working with strings, creating an object in C language, addressing its limits, allocating space for creating a dynamic object, deleting the space allocated for a dynamic object, writing data to files and reading data from files with Read and write functions, working with virtual machines, virtual start, save and stop machines, install Linux systems as virtual, change system settings of virtual machines, get a dump file of programs that have crashed, read processor registers by virtual executor, write physical memory speed to disk file, analyze physical memory speed, cp , cat, more and diff commands in C language, execute programs with the gdb analysis program and stop execution at the required address, design simple client programs for popular server programs, respond to signals received from other processes and the kernel, to get a dump file of programs where errors occur, to determine the crossing points between two different computers in the network with the tracetr command, to obtain the source codes of the kernel of the operating system, to configure, compile and execute them, to learn the basic functions of the operating systems, utilities, antivirus packages, in the construction of modern computer networks the various network protocols, hardware and software tools used.</p>	8
17	<p>Computer networks Introduction to computer networks, network requirements and layered architecture, ISO reference model, data encoding/structuring, error detection and correction, Ethernet and FDDL Network layer and WAN, IP and routing, cell switching and ATM, bridges, internet - global internet. End-to-end protocols, UDP, TCP and RPC. It includes information about application layer, security, domain name system (DNS), and WWW protocols. This course covers the hardware, bus architecture, ports, network cards, cables, routers, switches, network reliability required to interconnect digital devices to ensure data transmission over a network. It covers network performance optimization issues.</p>	8
18	<p>Computer architecture This subject explains the description of numbers and symbols in the</p>	8

	<p>computer, describes the computer's i/o system and interaction structures, the cpu project, explains the working principles of internal and external virtual memory systems, peripheral devices. The purpose of the computer architecture subject is to deeply study the modern methods and technologies of the internal and external devices of the computer. Students studying computer architecture must be able to disassemble a personal computer, clean all its internal devices, etc. Also, how to connect the peripherals connected to the computer, configure them and download the necessary drivers. It is to print any document using a printer, read it using a scanner and enter it into the computer, etc. After completing the subject, the student should be able to distinguish the components of the computer and their differences. The student must be able to independently detect and troubleshoot computer hardware or software issues. It must connect many hardware peripheral devices to the computer and identify them by their ports. The student should be able to take necessary measures to increase or decrease technical indicators. The student should also be able to distinguish between internal devices by the number of beeps.</p>	
19	<p>Theory of cycles The subject teaches the architecture of microprocessors and multi core processors; computer command system; number systems; memory organization and management; interruptions; input/output devices, features of early computers. Development dynamics of computers. Generations of computers. Operating systems. BIOSes and memory development. General information about boxes and ports. Computer memory devices, Carry number systems. General information about CPU and processors. Logic gardens. Boolean algebra. The main methods of conjugation used in history. Basic elements of a computer. Graphical representations of garden working cycles. Information about browsers. IP addresses. Cache memory. Means of communication. Types of network. Information about servers. Information about network architectures.</p>	7
20	<p>Basics of electronics This subject examines current and voltage; voltage and current sources; ohm's law; power and energy; parallel and series circuits; Kirchhoff voltage and current law; Thevenin's and Norton's theorems; capacitors and inductors; Laplace and Fourier transforms; important issues in operating system design and implementation. The main purpose of electrical engineering and electronics is to study the structure of devices, their characteristics, chemical properties, the composition of the main compounds that replace metals, etc. It aims to convey the theoretical and practical issues of electrical engineering and electronics to students in a wider way.</p>	6
21	<p>Digital systems It teaches the methodology for analyzing the operation of data transmission and reception systems, to know the main directions of telecommunication development, the basic concepts of telecommunications, the ability to find the main characteristics of the SPPI of data transmission and reception systems, the ability to</p>	7

	calculate the main characteristics of digital ciphers, the parameters of their subsystems, and the ability to design structural schemes . Ensuring the scientific-methodical training of the future specialist, formation of relevant knowledge, skills and habits in the implementation of teaching in students, familiarization with the accumulated experience in teaching the subject of computer architecture, formation of logical thinking ability, goals and tasks of the subject of digital systems as a science, scientific- formation of ideas about research methods, their relationship with other sciences; Forming ideas about the forms of organization of digital systems training; Forming ideas about digital systems training tools; Forming ideas about the goals and tasks of digital systems theory training for students studying digital systems; Controlling and investigating the level of performance of practical tasks.	
22	Security of computer systems It teaches Information security and its main properties; dangers and threats to information resources; channels of information leakage; cryptosystems; encryption methods; steganography; information hiding methods; network security; security attacks; digital signature technology; how to use security measures to protect computers and information from cyberattacks and prevent unauthorized use.	8
23	Computer graphics Computer graphics, color schemes, their types, raster, vector and fractal graphics, 3D graphics, their features, widely used graphic editors, their working principles, multimedia tools, computer graphics applications; Types of graphics and their creation; Issues solved with the help of graphics. Information about information and computer technologies; What is used in the application of graphics; Importance and role of computer graphics application; Work with graphic editors on the computer; Modern graphic programs and their fields of application.	5
24	Computer modeling To select and analyze existing problems in various fields of activity, conduct computer experiments and determine the degree of conformity of the model to the original; select, build and analyze mathematical and computer models in various fields of activity; to implement individual stages of computer simulation using basic programming systems; choosing a program for building a computer model; work with selected software tools.	7
25	Civil defense In this subject, students will learn about civil defense, the methods of protecting a nation's citizens (usually non-combatants) from military attacks and natural disasters, the principles of emergency operations and prevention, mitigation, preparedness, response, or emergency evacuation and recovery.	3
	Subjects determined by the institution of higher education <i>The subjects here are determined individually by each higher education institution and are reflected in the curriculum of that specialty</i>	60

26	<p>Application of information technologies in the specialty of computer engineering</p> <p>Provision and processing of information. Information technologies. Premise and content of information. Information processes and its automation. Aspects of the approach to the study of information. Information systems. Structure and main object of information systems. Hardware and software part of the information system. Classification of information systems according to various characteristics. Main components of information systems. Their schemes of action. Development trends of information systems. Digital computing systems. Principles of computer construction. The concept of command. Architecture and structure of computers. It teaches the logical structure of computers. Information technology (IT) basics, including various types of computer equipment and network technology, are presented. Various data representation schemes such as binary number systems are covered. This course provides a broad introduction to the tools and applications students need to become successful professionals in the IT environment. Students will explore the core information technologies of human-computer interaction, data management, programming, networking, web systems and technologies, as well as information assurance and security. Working experience with some important elements of the IT field is gained through various laboratory exercises.</p>	3
27	<p>Information management</p> <p>This subject covers the basics of using information systems in management, the company's information infrastructure, the analysis of the development of electronic systems of customer relationship management, information systems and management, the system of enterprise models, the principles of the structure and creation of the system of interaction of enterprises with customers, the realization of the company's strategy using information technologies, Information Management of systems services: functions, processes, measurements, Information systems service effectiveness measurement, Information systems operation and development cost estimation, Information technology services and business, overview cost of ownership, Information technology development projects and organizational restructuring, Complex information systems standard methods of application, network provision of the system aimed at customer management</p>	3
28	<p>Basics of information security</p> <p>First of all, this subject introduces the student to the specialty of information security. The course teaches the subject, scope, basic principles and concepts, and goals of information security. The knowledge and skills that an information security specialist should know and their connections with other subjects and specialties are taught. Lectures clearly describe the areas covered by information security for students, and practical exercises show the possibilities of using the acquired knowledge in work activities, forming the</p>	3

	thinking characteristic of an information security specialist.	
29	<p>Instrumental and applied programs</p> <p>About system software, Basic software, operating systems, operating systems and network operating systems, Functions of utilities, Maintenance of utilities, Antivirus software, Utilities, Symptoms of computer viruses, Instrumental software, Programming languages and systems, Integrated programming environment , Software complexes, Applied software, Types of applied programs, About and groups of general-purpose programs, Steps of solving problems on a computer. Setting the issue. Case analysis and research. Creating a solution algorithm. Algorithm description in programming language. Testing and debugging. Obtaining and analyzing results. The main properties of the algorithm - determinism, massiveness, consequentiality and discreteness. Algorithm description methods - verbal description (natural language), algorithmic language description (program), graphic description (block diagram). Conventional symbols used in block diagram illustration. Algorithm structure types) – linear, branching and cyclic (recursive) algorithms. Simple and complex branching algorithms. Simple and complex cyclic algorithms. It teaches how to describe an algorithm with pseudocode.</p>	5
	<p>Mathematical logic</p> <p>The subject of logic helps a person to objectively assess opportunities, make quick and correct decisions, express ideas clearly, convince the interlocutor using correct arguments, and stay away from uncertain situations. This subject evaluates the ability to think logically, measures the ability to perceive and apply logical patterns, and allows you to learn how rich the knowledge base is in various fields.</p>	5
30	<p>Basics of cybersecurity.</p> <p>Within this subject, the conceptual model, role and importance of cyber security, as well as its difference from information security, as well as their mutual relations, are taught. Various cyber attack vectors and subjects, widespread vulnerabilities, threats and risks in the field of cyber security, the characteristics of each stage of the cyber attack chain and ways to take necessary measures against them, the role and characteristics of technical and organizational measures in the field of cyber security are taught.</p>	5
31	<p>Object-oriented programming</p> <p>The main goal of object-oriented programming (OOP) is to provide a way to organize and structure code in a more modular and reusable way. OOP is based on the concept of objects, which are instances of classes that encapsulate data and functionality. The main objectives of OOP can be summarized as follows:</p> <p>Encapsulation: Encapsulation is the process of grouping related data and functions into a single unit (object) and hiding the internal details from the outside world. This allows better control over the application's data and functionality and helps prevent unexpected changes.</p> <p>Inheritance: Inheritance is a mechanism that allows a class to inherit</p>	3

	<p>properties and behaviors from its parent class. It allows you to create new classes based on existing ones and facilitates code reuse, reducing duplication and maintenance efforts.</p> <p>Polymorphism: Polymorphism is the ability of an object to take many forms depending on the context. It allows the same interface to be used for different data types or classes, allowing more flexibility in programming and improving code readability.</p> <p>Abstraction: Abstraction is the process of simplifying complex systems by focusing on essential features and ignoring non-essential ones. This allows a more manageable system to be created by breaking it down into smaller, more manageable parts.</p> <p>Modularity: Modularity is the ability to break a complex system into smaller, more manageable parts or modules. This enables the generation of reusable code, increasing development efficiency and reducing maintenance efforts.</p> <p>Overall, the main goal of OOP is to create software that is modular, reusable, and easy to maintain, while allowing for greater flexibility, extensibility, and extensibility.</p>	
32	<p>Engineering graphics</p> <p>In modern engineering practice, drawing drawings by the classical method - by hand - is losing its relevance. Automated design systems based on the capabilities of modern information technologies have already found wide application in project work. The application of this system allows drawing-graphic work to be performed with greater speed and quality, editing, reproduction, more flexible transmission in electronic form, and repeated use when necessary. The purpose of the engineering graphics course is to train students specializing in construction, engineering, architecture, technology and industry in the application of 2D and 3D graphics.</p> <p>This subject provides students with the ability to read, prepare and master plans, sections and traditional construction and engineering drawings. Also, students gain experience in developing and solving 2D and 3D graphics using various tools, such as AutoCAD, SolidWorks, or CATIA.</p>	
33	<p>Basics of cryptography.</p> <p>In this course, students learn a brief history of the creation and development of traditional cryptography, its relevance, application areas and current problems, as well as how cryptography provides information security principles together with modern cryptosystems and encryption methods. The course reviews advanced cryptographic algorithms, along with block, stream, and public-key cryptographic algorithms, with practical applications of these algorithms.</p>	5
34	<p>Mobile programming</p> <p>Concept of mobile programming. SDK setup. Algorithm concepts, Application design features, Mobile programming advantages, XML XML files. Layout and basic assembly tags, Activity lifecycle, Design and appearance examples of games,</p>	

	Timing and scoring concepts. Intervention in ready-made mobile applications with Java programming. Methods of changing design layout with Java, Variables, Assigning buttons and tags, Parcelabel interface, Object concept, Implicit intent concept, Drawing from camera, Creating a file, Writing, reading and deleting XML files, Over existing XML files case management, SQL lite and databases. Concept of Canvas, Web service connection and HTTP.	
35	<p>Theory of artificial intelligence</p> <p>The purpose of this subject is to teach the students of artificial intelligence and expert systems the basics, possibilities and application prospects, artificial intelligence and its development stages. Definition of artificial intelligence. Definition of difficult formalized problems and related examples. Complex systems. The goals of artificial intelligence. Areas of application of difficult formalization issues. Development stages of artificial intelligence. Natural intelligence and its main characteristics. Sensory, motor, logic and thinking. The main problems of artificial intelligence. Exact and fuzzy sets. Definition of fuzzy set. Fuzzy discrete and continuous sets. Types of membership functions. Fuzzy numbers and intervals. Fuzzification and defuzzification. Linguistic variables. Operations on fuzzy numbers. Fuzzy relationships. Fuzzy logic inference algorithms. Basic concepts of artificial intelligence and expert systems. Search and planning strategies. Determination and structure of intellectual agent. Problem solving agents. Planning agent. Knowledge engineering. Organization and acquisition of knowledge. Methods of acquiring knowledge. Field of knowledge. Theoretical aspects of knowledge acquisition. Practical methods of knowledge acquisition. Knowledge description models and extraction mechanism. Data and knowledge. Logical model of knowledge description. Production model of knowledge description. Semantic model of knowledge description. Framework model of knowledge description. Straight and reverse subtraction algorithm. Extraction mechanism. It teaches facification methods.</p>	
36	<p>Modern programming languages</p> <p>Modern programming languages, their development, advantages and disadvantages; to apply modern programming methods in the creation of information systems; to determine data structures and simpler ways of solving a complex problem when designing algorithms in the process of solving problems; to use the libraries of standard programs included in the programming language; to apply modern programming language when solving problems; modular programming methods; teaches the development and implementation of applications for various platforms (Apple, mobile, etc.), Internet are taught.</p>	13
37	<p>Operations Research</p> <p>Operations Research, which includes many technical and scientific approaches, generally aims to solve the scientific approach to the best organization and use of systems in which limited resources are shared.</p> <p>The most important benefit of Operations Research is finding the</p>	4

	<p>best possible decisions for an entire organization. For example, it solves the following problems and similar ones. Operations Research taught in Computer Engineering is applied to companies to create maximum profit / minimum cost. The identified solution is required to provide minimum cost or maximum profit for the company. This is why operations research is so important for companies.</p>	
38	<p>Robotics As a field related to technology, it studies robots, their design, construction, management methods, and computer systems created for information processing. The field of robotics is becoming more and more popular all over the world. The desire and idea to produce automatic machines goes back a long time. Leonardo Da Vinci made sketches and plans for the robot construction. Humans have always been fascinated by creating machines that can perform tasks or interact with them. With robotics lessons, children develop comprehensively. At the same time, their logical approach, teamwork and communication skills also develop. Children's imaginations are vast, and if they are used properly, they can build a wonderful future.</p>	4
39	<p>System programming The subject of system programming, depending on its content, covers a wide range of problems, from the management of computer equipment to the management of computer software. In essence, in addition to playing the role of a bridge between equipment and user applications, correct and safe execution of user program requests, providing user programs with the required computer resources, ensuring the possibility of synchronization and mutual information exchange between them, including the possibility of joint use of resources are considered topics related to problems of system programming.</p>	3
40	<p>Simulation of systems It teaches Formation of ideas about the subject of systems simulation as a science, its goals and objectives, scientific research methods, and its relationship with other sciences; Forming ideas about the forms of organization of systems simulation systems training; Forming ideas about the tools of systems simulation training; Forming ideas about the principles of systems simulation training, training methods; Forming ideas about the goals and tasks of systems simulation training for undergraduate students; Implementation of practical tasks used in the training of systems simulation course for undergraduate students</p>	3
41	<p>Data science The purpose of this subject is to provide the student with the necessary knowledge of Python, statistics, linear algebra, probability theory, simple linear and n-dimensional linear and logistic regression, decision tree and basic knowledge of building neural networks; to prepare them as professional specialists in the field of management in the future by imparting skills to solve issues such as data collection, data processing, data visualization, machine</p>	5

	learning, clustering, classification, social network analysis, forecasting.	
42	<p>Multimedia technologies</p> <p>The main goal of this subject is that students learn what multimedia technologies are, which use several types of information at the same time, their programs and how to use them. They should be able to use it for education, entertainment, etc. in electronic publishing houses, from the preparation of telecommunications on-demand programs to the selection of necessary credits in multimedia conferences. It teaches computer graphics, color schemes, their types, raster, vector and fractal graphics, 3D graphics, their features, widely used graphic editors, their working principles, multimedia tools.</p>	5
43	<p>Network Security</p> <p>Within this subject, deeper knowledge about networks is taught in order to understand the security issues of networks. Students should know concepts such as RADIUS, TACACS+, Kerberos, SSO, LDAP, etc. and acquire knowledge about different network equipments (IDS, IPS). They learn auditing and logging of networks. They learn the mechanisms of sniffing in networks, the adjustments needed to ensure security in networks. They understand and use security protocols available on the network. They learn about next-generation firewalls, as well as SIEM, SOAR, UEBA.</p>	4
44	<p>Cryptographic protocols</p> <p>Cryptography protocols, methods of their use, rules of use in security protection. Computer viruses, history of their creation, types and methods of combating them. Passwords, ensuring security by using them, security of network and operating systems, security policy. Information security standards, rules for their use, security management methods are to be taught to students.</p>	
45	<p>Intelligent technologies</p> <p>This subject teaches Natural intellectual system - Man and his main mission, Philosophical-associative essence of Man, Main mission of Man, Nanotechnology: searches and perspectives on "human technology", Artificial intelligence: origin, development, purpose, tasks, Intellectual system: nature and classification, Intellectual The role of artificial intelligence in the development of systems, Artificial intelligence is the basis of new information technology, Informatics and artificial intelligence, Presentation of knowledge, Semantic networks, Frame models (languages), Logical models of knowledge and logical inference systems, Modeling of creative processes, Dialogue systems with artificial intelligence, Intelligent information-search systems, Intelligent application software packages, Calculation-logic systems, Expert systems, Internal intellectualization of EHM, High-performance EHMs, Internally intellectualized system based on a functional approach, EHMs focused on symbol transformations (processing), Structure of intelligent systems and design, Knowledge base (KB) design, Knowledge base structure and its interaction with other components</p>	4

	of intellectual systems, Knowledge presentation and modeling, Intelligent systems design stages, Subject area and knowledge acquisition methods analysis, Possibilities of using intellectual systems in the study of supply and demand , Technology of building expert systems.	
45	<p>Cloud security</p> <p>This subject teaches what cloud technologies are, their benefits, and differences from traditional services. Students acquire the necessary knowledge and skills for cloud services security models, risk analysis, their prevention, approach to security from different angles, and building a security strategy.</p>	
47	<p>Applied programming</p> <p>Computer software, Software, System software, Application software, Application programs, General-purpose TPP, Method-oriented TPP, Problem-oriented TPP, Global networks TPP, Local and global for the organization of the calculation process, General-purpose TPP, Text processors, Graphic software packages , Basic concepts and types of computer graphics, Formats of graphic files, Table processors, VBIS: MS ACCESS database management system elements, Methodological TPP, Mathematical software packages, MATHCAD system, Matlab system programming, teaches Matlab system operators are taught</p>	4
48	<p>Management systems</p> <p>This subject teaches Classification of ALS, Effectiveness of ALS, Stages of Design, Testing, Structure of ALS, Provisions of ALS, Technical Support of ALS, Processors, Operating Modes of the Processor, Operating Modes by Number of Programs, Operating Modes by Data Exchange, ALS , users of ALS, linguistic support of ALS, identification by ALS, general scheme of identification, determination of transfer functions based on assignment curves, determination of object type (structural identification), parametric identification of object, automation of analysis, stability analysis, Raus stability criterion algorithm, Hurvis stability criterion algorithm, Mikhailov stability criterion algorithm, Nyquist stability criterion algorithm, Quality analysis, Determination of quality indicators according to the transition process, Quality research by the frequency method, Quality research according to the distribution of roots, Quality research according to integral indicators, Synthesis automation, Parametric synthesis of regulation systems, Synthesis of single-circuit regulation systems, Synthesis of combined ATS, Automation of constructive and technological design.</p>	4
49	<p>Microprocessors</p> <p>This subject teaches general information about microprocessors, Classification of microprocessors, The role of the microprocessor in the development of technical systems, The interaction of the microprocessor with RES devices, The structure of microprocessor control systems, The structure of the microprocessor controller, The structure of the communication device with the control object, Microprocessor control devices, Color TV control system,</p>	6

	Electricity transmission control system, TECHNICAL MEANS OF MICROPROCESSOR SYSTEMS, architecture of microprocessor systems, generalized architecture of systems with MP, trunk-module architecture of systems, algorithm of operation of MP, organization of the information processing process in microprocessor systems, structural scheme of the organization of information processing, organization of buses in the information processing system , Principles of memory organization and information transfer in microprocessor systems, Stack memory in MP, Memory organization, DEVICES FOR IMPLEMENTING TYPICAL FUNCTIONS IN MICROPROCESSOR, Typical functions of microprocessor systems, Frequency measurement device, Channel switching device, Circuit and algorithm for performing number function, MP software solution of the time interval generator, execution of calculation operations, information output to the digital indicator, programming of time delays, generation of control signals.	
50	Internet technologies Information technology (IT) basics, including various types of computer equipment and network technology, are presented. Various data representation schemes such as binary number systems are covered. This course provides a broad introduction to the tools and applications students need to become successful professionals in the IT environment. Students will explore the core information technologies of human-computer interaction, data management, programming, networking, web systems and technologies, as well as information assurance and security. Working experience with some important elements of the IT field is gained through various laboratory exercises.	6
51	Web programming In this course, students will learn the basics of Web programming for developing websites on the Internet. Main sections to be considered: HTML registration Web page and cascading style sheets (CSS), programming the client part of the site in JavaScript, programming the server part of the site in JS, using the MySQL database management system, building sites on the basis of Content Management System (CMS).	5
52	Fuzzy logic and decision making History of the origin and development of fuzzy mathematics, applications of fuzzy mathematics in Japan, Europe and America, applications of fuzzy mathematics in Azerbaijan, fuzzy logic. Brief historical information, mathematical apparatus of fuzzy set theory and fuzzy logic, examples of solving problems in fuzzy mathematics, mathematical models and algorithms of fuzzy inference system, creation of fuzzy logical inference systems in MATLAB and FuzzyTech software packages, Fuzzy -comparison of fuzzy sets, Operations on fuzzy sets, Distance between fuzzy sets, Fuzzy index, Definition of fuzzy quantities, Triangular fuzzy numbers, Trapezoidal fuzzy numbers, Triangular fuzzy numbers performing mathematical operations on, performing mathematical operations on trapezoidal fuzzy numbers, determining fuzzy	5

	quantities, numbers and intervals, performing mathematical operations on fuzzy numbers and intervals, fuzzy relations and their definition, binary fuzzy relationships. Characteristics of binary fuzzy relations, Comparison of fuzzy relations and operations on them, Composition of binary fuzzy relations, Fuzzy judgment and operations on them are taught	
53	<p>Basics of "soft-computing".</p> <p>"Efficiency of software based on soft computing technologies, evaluation of sw's reliability, application of soft computer methods in the evaluation of sw's reliability models, conceptual model, Fuzzy truth and falsehood, to increase the reliability of pt with the application of soft-computing methods formulas, Fuzzy predicates, Existence level of fuzzy predicates, Fuzzy variable. Fuzzy linguistic variable, Fuzzy linguistic expressions, logical operations on fuzzy expressions, definition of fuzzy logic formula, definition of fuzzy close formulas, definition of fuzzy true and fuzzy false formulas, definition of fuzzy predicates to determine the existence of fuzzy predicates, to establish fuzzy linguistic variables, to perform logical operations on fuzzy expressions, to calculate the degree of equivalence of fuzzy formulas, the essence of fuzzy logical deduction, stages of fuzzy logical deduction and their determination, To apply the features of the application of fuzzy logic inference algorithms to the solution of specific problems of fuzzy logic inference algorithms.</p>	5
	Internship	30