AZERBAIJAN REPUBLIC MINISTRY OF EDUCATION

Decision of the Ministry of Education of the Republic of Azerbaijan dated 2018

BACHELOR'S LEVEL (MAIN (BASIC) HIGHER MEDICAL EDUCATION)

EDUCATION PROGRAM

ON THE SPECIALITY

Code and name of the specialty (program): 050616 - "Information Technologies"

BAKU   2020

**BACHELOR'S LEVEL EDUCATION PROGRAM ON THE SPECIALTY
050616 - "INFORMATION TECHNOLOGIES"**

1. General provisions

1.1. The Bachelor's level basic education program 050616 – Information Technologies specialty (hereinafter referred to as the Education Program) has been developed in accordance with the Law of the Republic of Azerbaijan "On Education", relevant decisions of the Cabinet of Ministers of the Republic of Azerbaijan, as well as the "Classification of specialties (programs) at the bachelor's basic level of higher education".

1.2. The objectives of the Education Program are as follows:
   - Determines the competencies of the graduate in the specialty, the framework of the specialty, teaching and earning methods in subjects, assessment methods, training results, requirements for infrastructure and personnel potential for personnel training, opportunities for students to undergo internships, get a job and increase their education;
   - Inform students and employers about the knowledge and skills acquired by graduates, as well as training results;
   - Inform experts involved in this process during the assessment of the compliance of personnel training under the Education Program with this program.

1.3. The Educational Program is mandatory for all higher education institutions operating in the Republic of Azerbaijan and providing basic bachelor's training in the given specialty, regardless of their subordination, type of ownership and organizational-legal form.

1.4. The total weekly classroom and extracurricular workload of a student in a 5 (five) day work regime is 45 hours (except for special purpose higher education institutions). The volume of weekly classroom hours should not exceed 50% of the total weekly workload. The volume of weekly workload changed depending on the nature of the specialty.

2. Graduate competencies

2.1. At the end of the Educational Program, the graduate must acquire the following general competencies:
- oral and written communication skills in the Azerbaijani language in his/her specialty;
- communication skills in at least one foreign language in his/her specialty;
- systematic and comprehensive knowledge of the historical, legal, political, cultural, ideological foundations of Azerbaijani statehood and its place and role in the modern world, the ability to predict the prospective development of our national state;
- skills to identify threats and challenges faced by our national state;
- ability to use information technologies in the workplace;
- ability to work in a team, achieve a common approach to problem solving;
- ability to adapt to new conditions, take initiative and the will to succeed;
- ability to identify and select additional information resources for solving problems;
- skills to analyze, summarize and apply relevant information for professional purposes;
- ability to plan and organize professional activities, improve future education and existing skills, manage time and complete tasks on time;
- the ability to prioritize social and environmental responsibility in their activities, as well as civic awareness and an ethical approach, as well as quality;
- ability to reassess the situation and oneself and to self-criticize in order to develop knowledge and skills.

2.2. At the end of the Educational Program, the graduate must acquire the following professional competencies:
- ability to apply ICT capabilities in all areas, taking advantage of relevant

sciences, language knowledge, and knowledge in the field of information technologies (IT);

- ability to present the role of information, information technologies and information security in modern society, as well as their importance for meeting the objective needs of the individual, society and the state in this area;
- ability to develop and apply system, application and special-purpose software tools, information and communication technologies to solve professional problems;
- ability to identify, select and apply the necessary information, information technologies and computing resources to solve professional problems;
- ability to analyze problems and apply the necessary software-based tools to support the IT system;
- ability to understand the needs of users in order to develop, test, install and maintain ICT-based solutions that meet the technical requirements of users;
- ability to apply programming languages and software development systems to solve professional problems;
- ability to develop and apply tools based on computer graphics, multimedia and virtual reality technologies;
- ability to develop, test, integrate and manage databases, user interfaces, basic modules of information systems;
- ability to install, use, configure, service modern software, hardware and software and technical means, organize and conduct control checks of their performance and effectiveness;
- ability to analyze, summarize and apply relevant information for professional purposes;
- the ability to make effective decisions in the field of information technology management by applying software and technical systems;
- the ability to select, study and summarize scientific and technical literature, regulatory and methodological documents in order to solve professional problems;

- the ability to determine the compliance of information technologies in the organization (administration, enterprise) with the requirements of existing standards, apply regulatory legal acts, regulatory and methodological documents regulating activities in this field and maintain working technical documentation;
- the ability to prepare initial data for the design of information systems, to conduct feasibility studies of appropriate project solutions;
- the ability to use the necessary mathematical methods to solve professional problems;
- the ability to apply modern (including mathematical) methods for modeling in the analysis and evaluation of information technologies and systems.
- the ability to apply modern (including mathematical) methods for modeling.

3. Structure of the Educational Program

3.1. The Educational Program shall consist of 240 (4 years) ECTS credits. The credits shall be distributed as follows:

Subject Num	Subject Name	AKTS credit
	General Subjects	30
1.	**History of Azerbaijan** This subject studies the emergence, formation and development of modern statehood traditions of Azerbaijan, the role of political, ideological, economic and cultural factors in the formation of modern Azerbaijani statehood is analyzed and researched. The place and role of the Azerbaijani state in the modern world systematically analyzed.	5
2.	**Business and Academic Communication in Azerbaijani** Within the framework of this subject, special attention should be paid to instilling in students the skills of presentation, public speaking, and academic and business writing in Azerbaijani.	4
3.	**Business and academic communication in a foreign language** Within the framework of this subject, special attention should be paid to instilling in students the skills of making presentations in one of the foreign languages in their specialty, public speaking, academic and business writing, and oral and written skills.	15
4.	**Elective subjects** (Elective subjects are determined by the higher education institution. Depending on the specifics of the specialty, additions may be made to elective subjects.)	6
5.	Philosophy	
	Sociology	
	Constitution of the Republic of Azerbaijan and the foundations of law	o
	Logic	o
	Ethics and aesthetics	
	Introduction to multiculturalism	
	Information Technology (Specialization)	
	Information Management	o
	Entrepreneurship Fundamentals and Introduction to Business	
	Political Science	
	Major Subjects	120

3.	**Linear Algebra and Analytical Geometry** This subject teaches knowledge about complex numbers, matrices and determinants, linear space and its basis, linear algebraic equations and methods for solving them, linear transformations and quadratic forms, the Cartesian coordinate system in the plane and space, simple problems of analytical geometry, elements of vector algebra, equations of a straight line and a plane, and bilinear algebraic lines and surfaces.	3
7.	**Mathematical analysis** This subject teaches 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 on a set, regularly continuous univariate functions on a set, differential and integral calculus of a univariate function, numerical and functional sequences, multidimensional Euclidean space, limit, continuity and regular continuity of a multivariate function, differential and integral calculus of a multivariate function. General information is provided about ordinary differential equations and systems of equations of one order, and ordinary differential equations of n-order.	7
8.	**Differential equations** One-order ordinary differential equations and systems of equations, methods for constructing solutions of n-order ordinary differential equations, investigation of the existence, uniqueness and stability of solutions of Cauchy and boundary value problems for these equations, application of differential equations to mathematical modeling of various processes in natural science, classification of special differential equations, formulation and correctness of Cauchy and boundary value problems for equations of mathematical physics.	3
9.	**Discrete mathematics** This subject studies the basic elements and concepts of information theory, mathematical logic, graph theory, algorithm theory, set theory, including the theory of fuzzy sets and relations, combinatorics, and the principles of their application in computer engineering. Within the framework of the subject, Boolean algebra, relations, fuzzy relations, linguistic variables, predicate calculus, information coding, calculation of its quantity, units of measurement, number systems are studied	3
10.	**Probability theory and mathematical statistic** This subject covers events and actions on them, various definitions of probability and its calculation rules, application of absolute probability and Bayes' formulas, laws of distribution of discrete and random quantities and their numerical characteristics, the main essence of the law of large numbers and central limit theorems, basic elements of mathematical statistics, statistical determination of the choice of distribution parameters,	3
11.	**Physics** This subject teaches classical mechanics, including vector algebra, particle kinematics and dynamics, energy and momentum, conservation laws, rotational dynamics, oscillatory motion, gravity, thermodynamics and the kinetic theory of gases, electrostatics, including conductors and insulators; DC circuits; magnetic forces and fields; magnetic effects of moving charges and currents; electromagnetic induction; Maxwell's equations; electromagnetic oscillations and waves, and geometric and physical optics.	5
		8

12.	**Fundamentals of information technology** The fundamentals of information technology (IT), including various types of computer hardware and networking, are introduced. 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 fundamentals of information technology for human-computer interaction, data management, programming, networking, web systems and technologies, as well as information security and management. Working with some of the most important	
13.	**The basics of programming** It teaches the stages and methods of solving problems on a computer; general principles of building algorithms; the concept of a programming system; the structure of a program; data types, operators and operations, control structures, arrays, strings, pointers, files, how to create and use subroutines, the object-oriented programming model, the concept of classes and objects, their properties and methods.	6
14.	**Modern programming languages** Modern programming languages, their development, advantages and disadvantages; Teaches how to apply modern programming methods in creating information systems; how to determine data structures and simpler ways to solve complex problems when designing algorithms in the process of solving problems; how to use libraries of standard programs included in the programming language; how to apply modern programming languages when solving problems; modular programming methods; how to develop and implement applications for various platforms (Apple, mobile, etc.), the Internet.	6
15.	**Computer architecture** This subject explains the representation of numbers and symbols in a computer, describes the computer's I/O system and interconnection structures, the CPU design, and explains the working principles of internal and external, virtual memory systems, and peripheral devices. This subject explains the representation of numbers and symbols in a computer, describes the computer's I/O system and interconnection structures, the CPU design, and explains the working principles of internal and external, virtual memory systems, and peripheral devices.	8
16.	**Data structure and algorithms** Special attention is paid to basic data structures, static and dynamic data structures, queues, stacks, trees and graphs, applications of trees and graphs, top-balanced trees, heaps, memory management, hashing techniques, hearing, searching, string operations, and graph algorithms. Several 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.	7
17.	**Database systems** Data modeling; normalization; relational model; database construction; query language; simple and complex queries; conceptual modeling, hierarchical, network, and relational models teach how to create relationships with databases.	7

18.	**Operating systems** This course provides a convenient and efficient interface between user programs and computer hardware. It teaches students the basic principles of building modern operating systems, the architecture of Windows, Unix, Linux, Mac OS and mobile operating systems, the basic functions of operating systems, utilities, antivirus packages, various network protocols, hardware and software tools used in building modern computer networks.	6
19.	**Multimedia technologies** It teaches computer graphics, color schemes, their types, raster, vector and fractal graphics, 3D graphics, their characteristics, widely used graphic editors, their working principles, and multimedia tools.	6
20.	**Information security** Information security and its basic properties; threats and dangers to information resources; channels of information leakage; cryptosystems; encryption methods; steganography; methods of hiding information; network security; security attacks; digital signature technology; teaches how to use security measures to protect computers and information from cyberattacks and prevent unauthorized use.	6
21.	**Human-computer interface** Human-computer interface includes interactive aspects of computer operating systems, hand tools, heavy machinery operator controls, and process control.	7
22.	**Computer networks** Introduction to computer networks, network requirements and layered architecture, ISO reference model, data encoding/structuring, error detection and correction, Ethernet and FDDI. Network layer and WAN, IP and routing, cell switching and ATM, bridges, internet - global internet. End-to-end protocols, UDP, TCP and RPC. Includes information on application layer, security, domain name system (DNS) and WWW protocols. This course covers the equipment required to connect digital devices together to provide data transmission over a network, bus architecture, ports, network cards, cables, routers, switches, ensuring network reliability. It covers issues of optimizing network performance.	8
23.	**Artificial Intelligence** This subject covers the main research areas in artificial intelligence theory; advantages and disadvantages of knowledge representation models; working principles of artificial intelligence systems; formulation methods and techniques for solving intellectual problems; principles and application methods for implementing image recognition systems; problems of developing and implementing natural language interfaces; issues such as building natural language recognition systems and text synthesis.	6
24.	**Web systems and technologies** Describes technologies used for communication over the Internet; applies commonly used search methods for searching the Internet; creates and manipulates modern image formats; creates the appearance of web pages using script programming.	7
25.	**IT project management**	5

	Describes project management and its key elements; establishes a work breakdown structure with appropriate organizational and cost control structures; develops an execution plan for the project Describes project management and its key elements; establishes a work	I	;
26	**Civil defense** In this subject, students will learn about civil defense, the methods of protecting a state's citizens (generally non-combatants) from military attacks and natural disasters, the principles of emergency operations, and prevention, mitigation, preparedness, response, or emergency evacuation and recovery measures.	3	
	❖ Subjects determined by the higher education institution *The subjects listed here are determined individually by each higher education institution and are reflected in the curriculum of that specialty*	60	
	Experience	30	

Schedule 2

4. Teaching and learning

Speciality	General subjects	Specialization subjects (including Civil Defense)*	Subjects determined by ATM	Experience	Total
060616 –İnformation Technologies	30	120	60	30	240

can be changed up to 20% as:

4.1. The teaching and learning environment should be organized so that students can achieve the learning outcomes intended in the educational program.

4.2. Teaching and learning methods should be described in relevant documents (e.g.,teacher syllabus, etc.) and made publicly available (e.g., on the university website, program brochures, etc.).

4.3. Teaching and learning methods should be continuously reviewed and improved, taking into account innovative educational practices. Regular improvement of teaching and learning methods should be part of the university's quality assurance system.

4.4. Different teaching methods should be used in the learning process. These methods should promote a student-centered approach and the active role of students in the learning process. Examples of teaching and learning methods that can be used include:

- lectures, seminars, practical assignments;
- presentations and discussions, debates;

- independent work/research (e.g., work with practical examples);
  - projects;
- problem-based learning;
- fieldwork;
- role-playing games;
- reports;
- group assessment;
- expert method;
- video and audio conferencing technologies;
- video and audio lectures;
- distance learning;
- simulations;
- etc.

❖ These subjects are offered by the higher education institution, taking into account the experience of the teaching staff, research infrastructure, local and international job opportunities. The subjects determined by the higher education institution should be elective for students, as well as create conditions for students to participate in foreign exchange programs.

4.5. A balance between theory and practical training should be maintained in education. The main focus should be on strengthening practical skills in accordance with the changing needs of the labor market.

4.6. The educational program should support the independence of students and develop the concept of lifelong learning. At the end of the educational process, the student should be able to work independently in any direction and continue his education throughout his life.

5. Assessment

5.1. Assessment should be organized in such a way that it is possible to effectively measure the achievement of expected learning outcomes by students. This should help to monitor progress, assess the extent to which the outcomes of educational programs have been achieved, as well as to create conditions for an exchange of views with students and to form the prerequisites for improving educational programs.

5.2. Assessment methods should be described in relevant documents (e.g., in the subject program, syllabus, etc.) and should be publicly available (e.g., on the university website, in program brochures, etc.).

5.3. Assessment methods should be continuously reviewed and improved, taking into account innovative teaching practices. Regular updating of assessment methods should be part of the quality assurance system of the higher education institution.

5.4. Different assessment methods should be used in the teaching process. These methods should promote a student-centered approach and the active role of students in the learning process. Examples of assessment methods that can be used:
- written assignments;
- oral presentations;
- surveys;
- open discussions;
- practice reports, fieldwork reports;
- assessment of skills based on observations in practice, in the laboratory;
- reports on project work;
- group and self-assessment;
- etc.

5.5. The methods used in the assessment of learning achievements should be based on clearly defined criteria and should allow for a correct and reliable determination of the level of knowledge, skills and abilities acquired by the student during the course of education. When assessing learning outcomes, teachers should be guided by the principles of transparency, impartiality, mutual respect and humanism.

5.6. Students should be given the opportunity to discuss all aspects of their education with teachers/assessors, including the assessment process. The higher education institution should establish assessment processes or appeal procedures related to grades.

5.7. Academic ethics play an important role in the educational process. Students are taught to observe academic integrity and understand the problem of plagiarism. They should be informed about intellectual property rights of intellectual work.

6. Learning outcomes of the program and each subject

6.1. The higher education institution/academic staff is responsible for determining the learning outcomes of the educational program, as well as for developing the syllabus for each subject.

6.2. Learning outcomes are determined by each high education institution in accordance with the form in Appendix 1. The learning outcomes matrix (Appendix 2) should reflect the relationship between subjects and learning outcomes.

6.3. The syllabus of subjects should be regularly updated in order for the Education Program to provide theoretical and practical content that meets the changing needs of society and the labor market.

7. Infrastructure and human resources

7.1. The teaching, learning and assessment process of the Education Program requires that the higher education institution has the following infrastructure: it must have a material and technical base that includes appropriate cabinets, laboratories, computer classes, etc. for conducting classes on the subjects provided for in the curriculum, conducting practical and laboratory classes, as well as modern equipment for carrying out scientific and research work. Students must be provided with access to the local network of the higher education institution, the Internet, information databases, electronic libraries,

and search systems.

7.2. The teaching staff of higher education institutions, as a rule, has scientific degrees. Persons from other state or private institutions and/or other relevant organizations may also be involved in teaching.

8. Experience

8.1. Internship is important in terms of applying the student's theoretica knowledge in practice, as well as strengthening professional skills.

8.2. Internship can be organized in a private company, state enterprise, research laboratory (as well as a university, private local or international organizations and companies, etc.).

8.3. Before the internship, an agreement must be signed between the higher education institution and the company/enterprise where the internship will be organized. At the same time, upon the individual application of the student, he is allowed to undergo an internship in another company/enterprise corresponding to his specialty, including abroad. The agreement reflects the conditions, rights and obligations of students and other necessary details.

8.4. Evaluation of the internship: the student must write a report on the results of the internship project carried out at a production enterprise or company during the internship and defend it before a commission consisting of the academic staff of the higher education institution and representatives of the internship site. The results of the implementation of the internship program are evaluated in the manner determined by the educational institution.

9. Employment and lifelong learning

9.1. Areas and professions in which graduates of the Educational Program can work: Graduates studying in the specialty "Information Technologies" operate in the

fields of information processes of modern information technologies, information resources, information systems, databases of scientific and technical information, knowledge bases, information products and services, and can work in relevant state and non-state organizations, companies and departments.

9.2. The AII educational institution must conduct regular surveys on the employment of graduates of the Educational Program, as well as place information on vacant positions on its website.

9.3. Graduates of the Bachelor's program have the right to continue their education at the master's level in relevant fields.

9.4. The knowledge, skills and approaches acquired during education are prerequisites for graduates to engage in independent lifelong learning.

Agreed by

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Republic of Azerbaijan,
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_____Y.Piriyev
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Appendix 1

Learning outcomes for the Curriculum and subjects. The higher education institution must define the expected learning outcomes for the Curriculum and each subject. The tables below must list at least 6 (six) learning outcomes (for the Curriculum and each subject separately).

General learning outcomes of the **educational program** (PLO)
PLO 1 Skills in supporting users of the IT system
PLO 2 Skills in secure database and information management
PLO 3 Skills in digital media and virtual reality technologies
PLO 4 Skills in organizing network and computer interactions
PLO 5 Skills in programming and developing application programs
PLO 6 Skills in servers, memory management and virtualization
Learning outcomes **for the subject** (SLO)
SLO 1 Implements troubleshooting strategies to solve problems identified in IT systems.
SLO 2 Designs a database project scheme, Prepares database queries
SLO 3 Apply methods and tools to ensure the security of IT systems.
SLO 4 Describes models, protocols and components of computer networks.
SLO 5 Demonstrates methods for writing original code for software.
SLO 6 Designs IT infrastructure at the enterprise level.

Matrix of learning outcomes of subjects and the Educational Program
	The higher education institution should use the following table to determine how the specialty supports the achievement of the Educational Program learning outcomes.

Subjects	Learning outcomes of the program					
	5 1—CL	PTN2	PTN3	PTN4	PTN5	PTN6
Business and academic communication in the	X					
History of Azerbaijan						
Business and academic communication in a	X					
Linear algebra and analytical geometry		X				
Mathematical analysis						
Discrete mathematics		X				
Differential equations		X				
Probability theory and mathematical statistics		X		X		
Physics	X			X		
Fundamentals of information technologies	X	X		X		
Fundamentals of programming	X	X	X			
Computer architecture	X			X	X	
Computer networks	X			X		X
Operating systems	X	X		X	X	X
Data structure and algorithms	X	X				
Database systems	X	X			X	X
Information security	X	X	X	X		
Computer graphics and multimedia	X		X			
Web systems and technologies	X	X	X	X		X
Human-computer interfaces	X		X		X	
Artificial intelligence	X	X			X	
IT project management	X	X	X	X	X	X