THE MINISTRY OF EDUCATION OF THE REPUBLIC OF AZERBAIJAN

Approved by the decree № ___
of the Ministry of Education
of the Republic of Azerbaijan,
dated ___ ___ 2020.

EDUCATIONAL PROGRAM ON

BACHELOR'S DEGREE LEVEL (BASIC HIGHER EDUCATION)

Program code and title: 050629 – Mechatronics and Robotics Engineering

Baku – 2020

EDUCATIONAL PROGRAM FOR THE BACHELOR'S DEGREE LEVEL 0N THE SPECIALTY 050629 – MECHATRONICS AND ROBOTICS ENGINEERING

1. General Provisions

1.1. The Educational Program for the bachelor's degree level on the specialty 050629 – Mechatronics and Robotics Engineering (hereinafter referred to as the Educational Program) has been developed in accordance with the Law of the Republic of Azerbaijan "On Education," relevant decrees of the Cabinet of Ministers of the Republic of Azerbaijan, as well as the "Classification of Specialties (Programs) for the Basic Level of Bachelor's Degree of Higher Education."

1.2. Objectives of the Educational Program are as follows:

To define the graduate's competencies, scope of the specialty, teaching and learning methods of the subject, assessment methods, learning outcomes, as well as the infrastructure and human resource requirements necessary for the implementation of the training process; and to outline opportunities for students regarding internships, employment, and further education;

-To inform students and employers about knowledge, skills, and learning outcomes acquired by graduates;

-To inform experts involved in evaluating the compliance of staff training on the Educational Program.

1.3. The Educational Program is mandatory for all higher education institutions operating in the Republic of Azerbaijan, regardless of their subordination, ownership type, or organizational-legal form, that provide basic bachelor's level education in this specialty.

1.4. Under a 5-day workweek, the total weekly workload of a student, including classroom and extracurricular hours, is 45 hours (excluding specialized higher education institutions). The number of classroom hours should not exceed 50% of the total weekly workload. Depending on the specifics of the specialty, the weekly workload may be adjusted.

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2. Graduate’s Competencies

2.1. At the end of the Educational Program, graduates must acquire the following general competencies:

- Oral and written communication skills in Azerbaijani related to their specialty;

- Communication skills in at least one foreign language relevant to their specialty;
- Systematic and comprehensive knowledge of the historical, legal, political, cultural, and ideological foundations of Azerbaijani statehood, its current place and role in the modern world, and the ability to forecast the prospective development of the national state.
- Ability to identify the threats and challenges facing our national statehood;
- Ability to use information technologies in the workplace;
- Ability to work in a team and achieve a collaborative approach to problem-solving;
- Ability to adapt to new conditions, take initiative, and demonstrate the will to succeed;
- Ability to identify and select additional information resources to solve problems;
- Skills in analyzing, synthesizing, and applying relevant information for professional purposes;
- Ability to plan and organize professional activities, improve existing skills and pursue further education, manage time effectively, and complete tasks on time;
- Ability to act with social and environmental responsibility, civic awareness, and ethical conduct, and to prioritize quality in activities;
- Ability to reassess situations and oneself, and engage in self-criticism to improve knowledge and skills;
- Ability to engage in corporate cooperation and communicate with professionals from other fields;
- Initiative and leadership skills; Organizational abilities;
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- Ability to establish connections with local and international organizations in the field of automated production management.

2.2. At the end of the Educational Program, graduates must have acquired the following professional competencies:

- Ability to use fundamental technical knowledge;

- Required knowledge in the fields of kinematics and dynamics of mechatronic systems, control systems, information measurement devices, technical vision systems, and programming languages;
- Ability to propose new ideas in the field of automation and control;
- Skills to utilize both local and international experience, scientific and technical achievements, modern information technologies, and software in the design, application, and operation of automatic and mechatronic systems;
- Ability to conduct diagnostics of automatic and mechatronic systems, improve their reliability, identify and eliminate existing malfunctions;
- Ability to analyze technological, structural, functional, and schematic principles of robot manipulators, robotic and mechatronic systems, understand their working principles, and organize their maintenance and reconfiguration.
- Ability to efficiently use databases of leading companies and enterprises that manufacture robot manipulators, mechatronic devices, and systems, and to design and reconfigure required systems based on this information;
- Ability to understand, analyze, and manage technological processes at enterprises where robot manipulators, robotic, and mechatronic systems are used;
- Ability to master safety regulations related to robot manipulators, robotic, and mechatronic systems and to make appropriate decisions;
- Ability to implement regulatory requirements regarding environmental protection and occupational safety;
- Ability to apply industrial robots in flexible automated production systems, robotic complexes, and automated lines;
- Knowledge and skills regarding the operating principles and structural features of sensors, controllers, actuators, and other devices used in the regulation and control of mechatronic systems;
- Ability to simulate electronic systems, develop prototypes of simple systems, and design and organize the production of mechatronic objects using 3D technologies;
- Ability to program sensors, controllers, actuators, and other devices involved in basic mechatronic systems, including microcontrollers, and to use relevant software;
- Ability to apply logical thinking and mathematical methods to process experimental results;
- Ability to understand the correlation between the structures of materials at the nano-, micro-, and macro-technical scales and the properties of the three main material classes — metals, polymers,

- and ceramics — and to apply set theory, matrices, transformations, optimization, and optimal control methods; Knowledge of the operational algorithms and development of robots and robotic systems, including understanding of neural networks, artificial neurons, significance of nonlinear converters, and the ability to apply fuzzy neural networks; Ability to understand and apply the fundamentals of programming, including core requirements, design, coding, debugging, and classification of data types; Ability to analyze the design aspects of mechanical and electronic systems and to design mechatronic systems. Ability to demonstrate knowledge related to the design and development of mechatronic devices, robot structure, comprehensive functioning of the robot, industrial application of robots, kinematic analysis, and planned trajectory; Ability to control electronic devices operating on direct and alternating current based on analog and digital signals; Ability to apply robotic devices in various fields such as aviation, underwater and space exploration, research centers of different profiles, and in industries such as space, medicine, oil extraction, food, light industry, and household use.

3. Structure of the Educational Program

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

Number of subjects	Subject name	AKTS credits
	General subjects	
1	History of Azerbaijan This course examines the emergence, formation, and development of modern statehood traditions in Azerbaijan. It analyzes and explores the political, ideological, economic, and cultural factors that have contributed to the establishment of modern Azerbaijani statehood. The course also provides a systematic analysis of the role and position of the Republic of Azerbaijan in the contemporary world.	3
2	Business and Academic Communication in the Azerbaijani Language This course focuses on developing students' skills in delivering presentations, public speaking, and writing in academic and professional contexts in the Azerbaijani language. Particular emphasis is placed on enhancing effective	4

	communication abilities relevant to both academic and business environments.	
3	**Business and Academic Communication in a Foreign Language** Within the scope of this course, particular attention is given to developing students' oral and written communication skills in a foreign language relevant to their field of study. The course emphasizes presentation skills, public speaking, academic and professional writing in the target foreign language. **Elective Courses** Elective courses are determined by the higher education institution. Depending	15
	on the specifics of the academic program, additional elective courses may be included. Philosophy Sociology The Constitution of the Republic of Azerbaijan and Fundamentals of Law	
4	Logic Ethics and Aesthetics Introduction to Multiculturalism Information Technologies (by Specialization) Information Management Fundamentals of Entrepreneurship and Introduction to Business Political Science	3
5		3
	Major Courses	120
6	Linear Algebra and Analytic Geometry This course provides knowledge on complex numbers, matrices and matrix operations, determinants, their properties and computation methods, vector spaces and their bases, systems of linear equations and their solution methods, linear transformations and quadratic forms. It also covers the Cartesian coordinate system in the plane and space, basic problems of analytic geometry, elements of vector algebra, equations of lines and planes, and second-degree algebraic curves and surfaces.	4
7	Mathematical Analysis This course covers the elements of set theory, the concept of the limit of a sequence, the limit and fundamental properties of single-variable functions, continuity of single-variable functions at a point and on a set, and uniform continuity	8

	on a set. It also includes differential and integral calculus of single-variable functions, numerical and functional series, Euclidean spaces of multiple dimensions, the limit, continuity, and uniform continuity of multivariable functions, as well as differential and integral calculus for functions of several variables.	
8	Applied Mathematics This course provides knowledge on ordinary differential equations and systems of differential equations, methods for constructing solutions of n-th order ordinary differential equations, and their applications in the mathematical modeling of various processes. It includes the classification of partial differential equations, formulation of Cauchy and boundary value problems for equations of mathematical physics, types of boundary conditions and their physical interpretation. The course also covers analytical and numerical methods for solving partial differential equations, optimization methods, optimization of dynamic and discrete systems, mathematical methods for reliability and diagnostics, optimal control problems and their numerical solutions, dynamic programming, and the Bellman principle.	4
9	Physics This course covers the fundamental principles of classical mechanics, including vector algebra, particle kinematics and dynamics, energy and acceleration, conservation laws, rotational dynamics, oscillatory motion, and gravitation. It also introduces the principles of thermodynamics and the kinetic theory of gases. The course further explores electrostatics, including conductors and insulators; direct current (DC) circuits; magnetic forces and fields; the magnetic effects of moving charges and electric currents; electromagnetic induction; Maxwell's equations; electromagnetic oscillations and waves. Additionally, it covers the basic laws and principles of optics and atomic physics, including geometric and physical optics.	5
10	Fundamentals of Mechatronics and Robotics This course introduces microelectronics and mechatronics, as well as the historical	6

	development of mechatronic and robotic systems (MRS). It covers the structure and main components of MRS, their fields of application, and the terminology used in the design and operation of mechatronic and robotic systems. Topics include the kinematics and dynamics of manipulators, control systems and their classifications, information and measurement devices used in robots, robotic vision systems, robot programming languages, artificial intelligence, and motion planning.	
11	Theoretical Mechanics This course provides an understanding of the development of design models for structural elements and the application of the laws and principles of mechanics for analyzing the mechanical behavior of structured material systems.	6
12	Fundamentals of Programming This course introduces the stages and methods of problem-solving using a computer, the general principles of algorithm design, and the concept of a programming system. It covers program structure, data types, operators and expressions, control structures, arrays, strings, pointers, files, subprograms, and the fundamentals of object-oriented programming. Students will gain an understanding of classes and objects, their properties, and methods.	7
13	Theory of Machines and Mechanisms This course focuses on the development of algorithms for analyzing the structural and kinematic schemes of basic types of mechanisms by solving problems and determining their kinematic and dynamic parameters. It covers the evaluation of functionality and potential technological applications of various types of mechanisms; the selection of criteria for assessing motion quality; the formulation of synthesis problems considering both necessary and desirable conditions; the development of algorithms and mathematical models for the synthesis of mechanisms used in special machines. The course also teaches the use of automated computational systems for the design and parameterization of mechanisms on a computer.	6
14	Data Structures and Algorithms This course focuses on fundamental data	7

	structures, including both static and dynamic structures such as arrays, stacks, queues, trees, and graphs. It covers the applications of trees and graphs, including balanced trees and heaps, as well as memory management and caching techniques. Key algorithmic topics include sorting, searching, string operations, and graph algorithms. The course also introduces fundamental algorithms from other domains such as computational geometry and operations research. Emphasis is placed on the design and development of algorithms, understanding their performance characteristics, and evaluating their potential efficiency in real-world applications.	
15	Database Systems This course introduces data modeling, normalization, and the relational model. It covers the design and implementation of databases, including query languages for creating both simple and complex queries. Students will learn conceptual modeling techniques, as well as hierarchical, network, and relational database models, and how to establish and manage connections with databases	7
16	Design of Mechatronic and Robotic Systems This course covers the general concepts and main stages of designing mechatronic and robotic systems. Topics include the selection of configuration schemes for manipulators, force analysis, and accuracy calculations. It also addresses the design of mobility modules of manipulators, selection of key structural parameters for modules, and transmission mechanisms in robots. The course explores the kinematics and dynamics of robots, the design of actuator mechanisms, selection of position sensors, and development of system block diagrams. Additionally, it includes the design of robotic technological complexes.	8
17	Electronics This course introduces the fundamental components and concepts of parametric electronic devices, including semiconductor diodes, bipolar and unipolar transistors, photoelements, light-emitting diodes (LEDs), optoelectronic switches, and their various circuit	6

	configurations, connection methods, parameters, analysis techniques, and core characteristics. Students will learn about amplifiers as primary electronic devices—their block diagrams, operating modes, amplification classes, and characteristics. The course covers amplifier circuits based on bipolar and unipolar transistors, types of amplifiers, negative feedback and its impact on amplifier performance indicators, multistage amplifiers, and methods for their analysis and calculation. It also addresses direct current (DC) amplifiers, methods to minimize offset drift, their parameters and characteristics, differential amplifier circuits, and their features. A key focus is placed on operational amplifiers—one of the core elements of modern analog electronics—including both linear and nonlinear circuits built on them. Additionally, the course covers electronic switches such as diode, thyristor, and transistor-based switches, including their control circuits and applications.	
18	Robot Control This course introduces the fundamental concepts, terminology, and applications in the field of robotics. It covers the structure of industrial robots and the functions of their subsystems, along with an overview of the capabilities of existing robot platforms. The course explores principles and characteristics of various control systems applied to industrial robots, including the design and implementation of these systems. Students will study different types of robot control, including program-based control, adaptive control, and intelligent control systems, along with their architectures. The course also addresses centralized and decomposed (modular) control architectures for robotic systems. Emphasis is placed on understanding current capabilities and future development prospects in robot control.	6
19	Modeling and Simulation of Dynamic Systems This course introduces the fundamental principles of simulation theory, including key concepts related to continuous, discrete-event, and agent-based system modeling. It emphasizes the core	6

	principles of system dynamics and provides insight into the development of stochastic models. Students will gain practical skills in modeling and simulating dynamic systems using the MATLAB/Simulink software environment. The course focuses on building, analyzing, and interpreting simulation models to understand complex system behavior and to support decision-making and design in engineering applications.	
20	Theory of Automatic Control This course provides students with a comprehensive understanding of the classification, principles, and significance of automatic control systems within modern engineering sciences. It focuses on fundamental control principles commonly applied in electrical and electronic devices, including regulation based on external disturbances, error signals, and combined control strategies. Students will study core control laws and regulators, linear dynamic elements such as inertialess, first- and second-order aperiodic links, oscillatory, conservative, integrating, and differentiating components, along with their time and frequency domain characteristics. Key concepts include transfer functions, impulse and step responses, Bode plots (amplitude-frequency and phase-frequency characteristics), and logarithmic amplitude-frequency characteristics. The course also develops skills in structural transformation of complex control systems and teaches methods for analyzing essential performance indicators such as accuracy, stability, transient response, stability margins, overshoot, and system robustness. Fundamental stability criteria and design techniques for feedback control systems are covered in depth.	6
21	Digital Signal and Image Processing This course covers the fundamentals and practical aspects of acquiring and processing digital images and signals. Key topics include image acquisition techniques, lighting methods, camera models and calibration, and stereoscopic imaging. It examines inter-pixel relationships and the principles of low-level image processing aimed at enhancing image quality. Students explore	7

	high-level machine vision systems and the use of region descriptors for feature extraction. The course focuses on the implementation of digital signal processing algorithms, development of specialized software modules, and integration into broader software systems. Further topics include methods for parametric representation of images, analysis of deterministic and stochastic signals, and parameter estimation techniques, particularly signal correlation and spectral analysis. Efficient computational algorithms for discrete Fourier transforms (DFT) and wavelet transforms are also taught.	
22	Sensors and Actuators This course provides students with an understanding of the fundamental concepts and structural components of cyber-physical systems, including sensors, controllers, and actuators, as well as the operating principles of essential mechatronic devices. It explores the concepts of the Internet of Things (IoT) and the Industrial Internet of Things (IIoT), along with the key stages of design and manufacturing for cyber-physical systems and their associated software. Students will gain practical skills in microcontroller programming and software utilization, electronic system simulation, and the use of tools and techniques for the rapid prototyping and deployment of basic cyber-physical systems. The course also includes training in the design and manufacturing of physical components using 3D technologies.	7
23	Computer Graphics This course aims to teach the fundamental principles and standards for creating design sketches, structural, technological, functional, and schematic electrical diagrams of various components and devices. It covers methods for representing geometric shapes, geometric spaces, and surfaces, as well as the design of automation and control system elements using modern computer-aided design (CAD) software such as AutoCAD and OrCAD. Students will gain skills in performing both two-dimensional (2D) and	5

	three-dimensional (3D) graphical tasks. The course also introduces the basics of computer graphics and its types, including raster, vector, and fractal (3D) graphics. Additionally, it covers multimedia tools and steganographic threat models related to data hiding within such media.	
24	Flexible Manufacturing Systems This course provides an understanding of the prerequisites for industrial robots, as well as knowledge of the classification of robotic systems and industrial robots. It introduces the structure and degrees of freedom of robots, the key technical characteristics of industrial robots, and the principles for designing and calculating gripper mechanisms. Students will learn the methodology for selecting the kinematic structure of a robot's mechanical system and understand the components of the actuating mechanical system. The course also covers flexible automated manufacturing systems, their architecture, robotic complexes, and flexible manufacturing systems (FMS), with a focus on the application of industrial robots in automated production lines. It includes the automation of assembly operations using industrial robots.	6
25	Civil Defense This course provides students with knowledge of the types of emergencies that may arise during peacetime and wartime, the organization of civil defense bodies, their main forces and responsibilities, as well as individual and collective protection measures against weapons of mass destruction. Students will gain skills in conducting rescue and other urgent operations, and in decontaminating people and equipment exposed to radioactive and chemical contamination. The course introduces the concept of civil defense, methods used by the state to protect civilians (non-combatants) from military attacks and natural disasters, and covers the principles of emergency operations, including prevention, mitigation,	3

	preparedness, response, emergency evacuation, and recovery.	
	University-Designated Courses These are courses individually determined by each higher education institution and are reflected in the curriculum of the respective academic program.	60
	Internship (Practical Training and Graduation Project)	30

Major Courses	General Courses	Specialized Courses (including Civil Defense) 120	Courses Defined by the Higher Education Institution 60	Internship and Graduation work	Total
050629 - Mechatronics and Robotics Engineering	30			30	240

4. Teaching and learning

4.1. The teaching and learning environment should be organized in such a way that students are able to achieve the learning outcomes set forth in the educational program.
These courses are offered by the higher education institution, taking into account the experience of the faculty, research infrastructure, and local and international employment opportunities. The courses designated by the higher education institution should be elective for students and should also facilitate their participation in foreign exchange programs.

4.2. Teaching and learning methods must be described in the relevant documents (for example, in the instructor's syllabus, etc.) and should be made publicly accessible (for example, on the university's website, program brochures, etc.).

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

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

- lectures, seminars, practical assignments;
- written assignments;

- oral presentations;
- surveys;
- open discussions;
- practice reports, fieldwork reports;
- assessment of skills based on observations in practice and laboratory;
- reports on project work;
- group work and self-assessment;
- -etc.

4.5. A balance between theoretical 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 students' independence and foster the concept of lifelong learning. By the end of the educational process, a student should be able to work independently in any direction and be capable of continuing their education throughout life.

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5. Assessment

5.1. Assessment should be organized in such a way that the achievement of the expected learning outcomes by students can be measured effectively. It should enable monitoring of progress, evaluation of the extent to which educational program outcomes are achieved, facilitate feedback with students, and help establish initial conditions for improving educational programs.

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

5.3. Assessment methods should be continuously reviewed and improved considering innovative teaching practices. Regular updating of assessment methods must 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 encourage active student participation in the learning process. Examples of assessment methods that can be used include:

- written assignments;
- tests on knowledge and skills, computer-based tests;

- ☐ oral presentations;
- ☒ surveys;
- ☐ open discussions;
- ☐ practice reports, fieldwork reports;
- ☐ assessment of skills based on observations in practice and laboratory;
- ☐ reports on project work;
- ☐ portfolio assessment;
- ☐ oral questioning (frontal questioning);
- ☐ group work and self-assessment;
- ☒ -etc.

Note: The listed methods may be selected and/or modified depending on the specifics of the course.

5.5. Methods used to assess learning achievements should be based on clearly defined criteria and allow for accurate and reliable determination of the level of knowledge, skills, and competencies acquired by the student during the education period. During the assessment of learning outcomes, teachers should adhere to 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 and assessors, including the assessment process. The higher education institution must establish procedures for the assessment process and appeals related to assessments.

5.7. Academic ethics occupies an important place in the education process. Students are taught to observe academic honesty and to understand the issue of plagiarism. They should be informed about intellectual property rights related to intellectual work.

6. The program and course learning outcomes

6.1. The determination of the learning outcomes of the educational program, as well as the learning outcomes of each course and the preparation of the syllabus for each course, is the responsibility of the higher education institution/academic staff.

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

6.3. To ensure that the content of the educational program responds to the changing needs of society and the labor market, the syllabi of courses should be regularly updated.

7. Infrastructure and Human Resources

7.1. Teaching, learning, and assessment process of the educational program requires the higher education institution to have the following infrastructure: appropriate classrooms, laboratories, computer rooms, etc., for conducting theoretical, practical, and laboratory classes in the courses specified in the curriculum, as well as a material and technical base equipped with modern equipment for carrying out scientific research. Students must have access to the institution's local network, the internet, information databases, electronic libraries, and search systems.

7.2. Professors and teaching staff of higher education institutions generally hold academic degrees. Individuals from other state or private institutions and/or other relevant organizations may also be involved in teaching.

8. Internship/Practice

8.1. Internship is important for applying theoretical knowledge in practice and strengthening professional skills.

8.2. Internships can be organized in private companies, state institutions, research laboratories, as well as universities, private local or international organizations and companies, etc.

8.3. Before the internship, a contract must be signed between the higher education institution and the company/institution where the internship will take place. At the same time, based on the student's individual request, permission may be granted for internship at another company/institution relevant to their specialty, including abroad. The contract should include conditions, students' rights and obligations, and other necessary details.

8.4. The evaluation of the internship is conducted by internship supervisors appointed by the university. The evaluation process involves specialists in the field and academic staff with scientific degrees. The assessment of the internship is based on the opinion provided by the organization where the internship takes place and on the internship report prepared by the student. This evaluation takes into account the student's attendance during the internship and their knowledge as demonstrated in the report.

9. Graduation Thesis/Final Project

9.1. The educational program is completed with a graduation thesis/final project.

9.2. If the educational program does not include a graduation thesis, its credits are added to the credits for the internship.

9.3. Evaluation of the graduation thesis: The defense of graduation theses is organized by a commission established in accordance with the "Regulation on the State Attestation of Bachelor Students of Higher Education Institutions of the Republic of Azerbaijan." The graduation thesis is evaluated by the members of the Attestation Commission (DAK) through voting.

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10. Employment and Lifelong Learning

10.1. Fields and professions where graduates of the educational program can work.

10.2. Graduates must be ready to work professionally in fields relevant to their specialty based on their fundamental and professional training, and to pursue master's education in their specialty. Regardless of the form of ownership and subordination, they can work in any production fields, organizations, departments, enterprises, associations, and various research centers—such as space, medicine, oil production, food and light industry production—in roles like technical department engineer, chief specialist (technologist, electrical engineer, mechanic), engineer of automated design systems, and others.

10.3. The higher education institution must conduct regular surveys regarding the employment of graduates of the educational program and publish information about job vacancies on its website.

10.4. Master's programs that bachelor's graduates can continue their education in:

-Graduates who have completed the main educational program of higher professional education based on the educational program in "Mechatronics and Robotics Engineering" have the right to continue their education at the master's level in relevant specialties.

10.5. The knowledge, skills, and approaches acquired during the education period are prerequisites for graduates to independently pursue lifelong learning.

Approved by:

Deputy Head of the Office of the Ministry of Education Chairman of the working group

of the Republic of Azerbaijan, Head of the Department of Higher, for the preparation of the State

Secondary and Specialized Education Education Programs

_____Yaqub Piriyev for technical and technological specialties,

Date: _____"17" July 2020 _____Prof.Mustafa Babanlı

Date:_____ "16" July 2020

Learning Outcomes for the Educational Program and Courses

The higher education institution must determine the expected learning outcomes for the Educational Program as a whole and for each individual course. At least six learning outcomes should be listed in the tables below (separately for the Educational Program and for each course).

Program Learning Outcomes (PLO)
PLO 1: Ability to structure data, perform algorithmization, and work with algorithmic languages.
PLO 2: Ability to design databases and information systems.
PLO 3: Ability to design mechatronics and robotics systems.
PLO 4: Ability to understand key concepts, terminology, and purposes in robotics; define the structure of an industrial robot and the functions of its subsystems.
PLO 5: Ability to identify objects, define models, structures, and parameters for dynamic system modeling and simulation.
PLO 6: Ability to model and control flexible manufacturing systems.

Course Learning Outcomes (CLO)
CLO 1: Applies algorithms and high-level algorithmic languages to solve various types of problems.

CLO 2: Designs projects by using database models, creating conceptual schemas, tables, relationships between them, and queries.
CLO 3: Implements design of mechatronics and robotics using principles of operation, structural organization methods, and technical and software tools.
CLO 4: Manages industrial robots and existing robot parks; understands principles and features of various control systems for industrial robots; implements development prospects of robots.
CLO 5: Performs identification of dynamic object characteristics using MATLAB/Simulink simulation.
CLO 6: Models and studies flexible manufacturing systems using Petri nets, including their control.

Matrix of Courses and Learning Outcomes of the Educational Program

The higher education institution must determine how it supports the achievement of the learning outcomes of the educational program for the

specialty, using the table below:

Program Learning Outcomes

Course Name	PTN 1	PTN 2	PTN 3	PTN 4	PTN 5	PTN 6
Business and Academic Communication in Azerbaijani	□		□			
Modern History of Azerbaijani Statehood						
Business and Academic Communication in a Foreign Language	□					
Linear Algebra and Analytic Geometry		X				
Mathematical Analysis				X		
Applied Mathematics		X		X		
Physics	X			X		
Fundamentals of Mechatron	X		X	X	X	X

ics and Robotics						
Theoretical Mechanics				X		X
Fundamentals of Programming		X	X	X	X	X
Theory of Machines and Mechanisms			X		X	
Data Structures and Algorithms	X	X				
Database Systems	X	X	X			
Design of Mechatronics and Robotics Systems	X	X	X			
Electronics				X	X	X
Robot Controlling	X			X	X	X
Modeling and Simulation of Dynamic Systems	X				X	X
Automatic Control Theory					X	
Digital Signal and Image Processing				X		X
Sensors and Actuators				X	X	X
Computer Design	X	X	X			
Agile	X			X	X	X

Manufactu ring Systems						
Civil Defense						