

MINISTRY OF EDUCATION OF THE REPUBLIC OF AZERBAIJAN

APPROVED

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of the Republic of Azerbaijan

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BACHELOR'S DEGREE EDUCATIONAL PROGRAM
(Basic Higher Education Level)

Specialty Code and Title:
050604 –Device Engineering

MINISTRY OF EDUCATION OF THE REPUBLIC OF AZERBAIJAN

BACHELOR'S DEGREE EDUCATIONAL PROGRAM

Specialty: 050604 – Device Engineering

1. General Provisions

1.1. The Bachelor's Level Educational Program for the specialty **050604 – Device Engineering** (hereinafter referred to as "the Program") has been developed in accordance with the Law of the Republic of Azerbaijan *On Education*, relevant resolutions of the Cabinet of Ministers of the Republic of Azerbaijan, and the **Classification of Specialties (Programs) for the Basic Bachelor's Level of Higher Education**.

1.2. The primary objectives of the Program are to:

- Define the competencies of graduates in the specialty, the framework of the specialty, teaching and learning methodologies, assessment methods, expected learning outcomes, and infrastructure and personnel requirements necessary for quality education and training;
- Provide students and employers with comprehensive information regarding the knowledge, skills, and academic achievements of graduates;
- Guide experts involved in evaluating the alignment of educational outcomes with the Program's objectives;
- Develop highly competitive engineers capable of designing, developing, installing, operating, and maintaining devices and systems for measurement, control, automation, and management.

1.3. This Program is mandatory for all higher education institutions operating within the Republic of Azerbaijan that offer basic undergraduate training in this specialty, regardless of their institutional affiliation, type of ownership, or legal-organizational status.

1.4. Under a five-day academic work schedule, the total weekly workload (including classroom and independent learning) shall not exceed 45 hours, excluding special-purpose higher education institutions. Weekly classroom instruction should not exceed 50% of the total workload. Depending on the specifics of the specialty, the weekly load may vary accordingly.

2. Graduate Competencies

2.1. Upon successful completion of the Program, graduates will be expected to demonstrate the following **general competencies**:

- Proficiency in oral and written communication in the Azerbaijani language within the professional domain;
- Ability to communicate effectively in at least one foreign language in the context of their professional field;

- Comprehensive understanding of the historical, legal, political, cultural, and ideological foundations of Azerbaijani statehood and its modern global positioning; ability to anticipate future national development;
- Awareness of and ability to analyze challenges and threats to the national state;
- Proficiency in utilizing information and communication technologies in professional activities;
- Capacity to collaborate effectively in team settings and contribute to collective problem-solving;
- Adaptability, initiative, and a strong drive for achievement;
- Skills in identifying and utilizing appropriate information sources for problem-solving;
- Ability to analyze, synthesize, and apply relevant data for professional purposes;
- Skills in planning, organizing, and managing professional tasks, as well as a commitment to lifelong learning, self-improvement, and time management;
- Commitment to civic responsibility, environmental and social sustainability, ethical behavior, and quality in professional practice;
- Ability to self-reflect, engage in constructive self-criticism, and reassess knowledge and skills for continuous improvement;
- Demonstration of high technical competence, alongside strong communication and management skills within the engineering profession;
- Capacity to assume leadership roles in multidisciplinary teams and to contribute ethically and responsibly to society.

2.2. In addition, graduates will be expected to acquire the following **professional competencies**:

- Application of general engineering knowledge in the design, construction, and production of devices, systems, and complexes; proficiency in mathematical modeling and analytical methods relevant to engineering tasks;
- Ability to apply concepts from linear algebra and analytical geometry to solve engineering problems;
- Understanding of the fundamentals of mathematical statistics and probability theory, and the ability to use mathematical modeling tools in professional contexts;
- In-depth knowledge of physical laws and principles, including their applications in evolving technologies, materials, devices, and measurement techniques, and the ability to apply these in engineering practice;
- Familiarity with chemical systems and processes, including chemical reactions, types of inorganic substances, atomic-molecular theory, and substance identification methods, with the ability to utilize this knowledge in relevant engineering activities;
- Competence in the field of computer systems, including hardware and software; ability to describe general computer architecture and peripheral devices, analyze operating system structures, understand process and resource management, algorithms, and software organization; and apply theoretical and practical IT knowledge in professional engineering practice.
- Be able to solve geometric problems by applying knowledge in engineering graphics and design, including the use of planar drawings, projection principles, construction of spatial geometric objects, assessment of their geometric properties, and graphical solutions for spatial problems. The graduate should be capable of transforming views to represent the shape, size, and spatial orientation of an object and apply appropriate methods in the preparation of design drawings.

- Possess comprehensive knowledge of the fundamental laws of electrical engineering, including techniques for analyzing and reporting on electrical and magnetic circuits. This includes understanding the operating principles, properties, and characteristics of electronic components used in electrical systems and devices, and the ability to construct and interpret various types of electrical diagrams and assess the technical parameters of electrical and electronic equipment in professional practice.
- Demonstrate knowledge of engineering mechanics, including the structure and motion laws of fundamental elements and mechanisms, types and operational principles of transmission mechanisms, and the fundamentals of mechanical design. The graduate should understand various mechanical joints, principles of strength analysis, and the classification and functional roles of bearings (rolling and sliding), and be able to apply this knowledge to practical engineering tasks.
- Understand the structure, functions, and applications of electronic devices—particularly semiconductor components—and schematic solutions within analog and digital electronics. This includes the ability to analyze the core technical and operational features of contemporary electronic systems, grasp trends in microelectronics, interpret circuit diagrams, and apply schematic design solutions for analog, discrete, and microelectronic systems in practice.
- Be proficient in utilizing computer-aided design tools (e.g., AutoCAD and similar software) to produce technical documentation. This includes creating 2D and 3D geometric models, applying standardized drawing principles, and generating views, sections, and notations in accordance with technical drawing conventions and standards.
- Be capable of conducting metrological analyses during the development and operation of devices and systems, including the evaluation of measurement uncertainty and risk, use of metrological tools, standards, and certification systems. Graduates should be able to apply the principles of standardization and quality control, integrate systems of non-destructive testing and diagnostics in materials and industrial processes, and manage installation, maintenance, and software solutions for quality assurance in engineering practice.
- Oversee the implementation of requirements related to equipment certification, licensing, attestation, and accreditation in compliance with the national system for state control of goods and services. The graduate should also be able to supervise testing and operation procedures, perform technical inspections in device manufacturing, and manage product quality throughout the production lifecycle.
- Demonstrate in-depth understanding of the structure and kinematics of mechanical systems within devices, including mechanism synthesis and optimization techniques. The graduate should possess knowledge of device components and construction fundamentals, mechanical and physical properties of engineering materials, and perform strength and performance calculations. Additionally, they should be capable of applying principles of material science, including the structure and behavior of metals and alloys, the influence of composition and structure on properties, classification based on technological features, and modern techniques for material processing and surface treatment. They should also be able to select and utilize standard technological equipment and tools effectively in engineering operations.
- Demonstrate knowledge of both classical and modern measurement methods and tools, including electrical measurement schemes, analog and digital measuring devices, and be capable of applying these measurement technologies effectively in various areas of production and operational settings.

- Be proficient in selecting and utilizing appropriate resources, contemporary methodologies, devices, and equipment for conducting experimental research and performing accurate measurements.
- Apply engineering principles related to the structure, classification, characteristics, implementation, and sustainable operation of devices and device complexes—such as actuators, coordinating elements, and control mechanisms—in the development and functioning of modern measurement, monitoring, and control systems across diverse technical fields. Graduates should be capable of contributing to the creation of advanced techniques and technologies, as well as solving complex scientific and technical problems.
- Utilize fundamental and advanced principles of automatic control in the manufacturing of devices. This includes a solid understanding of digital logic, digital computing technologies, microprocessor systems and their applications in device production, memory devices, programmable logic integrated circuits (PLCs), microprocessors and microcontrollers, system architectures and instruction sets, input-output systems, and peripheral devices. Graduates should also be capable of applying these technologies in measurement, industrial control, and testing systems.
- Possess knowledge of device manufacturing technologies, including the design of technological processes for the assembly and preparation of devices, the selection of appropriate technological aids, and the automation and mechanization of production processes. They should understand the classification and features of flexible manufacturing systems, their technological basis, application areas, and control structures applicable to various industrial domains.
- Understand the principles underlying the development of modern technologies and metrological assessment methods. They should be able to work with a variety of devices, devices, and systems used in the certification of products, as well as in the testing and quality control of materials and equipment. This includes the ability to analyze functional block diagrams, structural and technical specifications, and operational principles of information-measuring systems and complexes—electronic, optoelectronic, analytical, and others—in process control and management.
- Plan and conduct experimental studies and project-based research, analyze data critically, process results purposefully, and present findings in a clear and structured manner.
- Be able to work in various professional environments, including production enterprises, public and private organizations, departments, industrial associations, and related institutions, regardless of ownership status or administrative affiliation, in accordance with their qualification level and area of specialization.
- Work in different educational institutions (excluding research and academic positions in higher education institutions) in compliance with national standards and regulations.
- Apply modern information and communication technologies in their professional work while adhering to established information security protocols.
- Pursue professional activities aligned with their fundamental and specialized academic training, including the ability to continue their studies at the master's level in their respective field.
- Contribute to the development of design, construction, and technological documentation in line with current national and international standards, based on their professional competencies.
- Engage in professional tasks such as designing, programming, assembling, calibrating, and operating electronic, measuring, control, and diagnostic devices and systems. This includes systems for facility protection, quality assurance, diagnostics, and monitoring across

multiple sectors such as medicine, aviation, aerospace, energy, oil and gas, petrochemical, food industries, defense, environmental satellite monitoring, meteorology, hydroacoustics, and medical informatics.

3. Structure of the Educational Program

3.1. The Educational Program is structured to comprise a total of **240 ECTS credits** over a period of **4 academic years**. The credit distribution is organized in accordance with the European Credit Transfer and Accumulation System (ECTS), ensuring alignment with international standards. The structure includes general education subjects, core subjects within the specialty, and elective components.

Table 1.

No.	Course Title	ECTS Credits
General Subjects		
1	History of Azerbaijan This course explores the origin, formation, and evolution of the modern Azerbaijani state. It analyzes the political, ideological, economic, and cultural factors that have shaped the country's statehood traditions. The role and significance of Azerbaijan in the contemporary international system are examined in a systematic and analytical manner.	5
2	Business and Academic Communication in Azerbaijani Language This course aims to develop students' skills in public speaking, presentation delivery, and academic and business writing in the Azerbaijani language. Emphasis is placed on professional oral and written communication techniques relevant to various academic and workplace contexts.	4
3	Business and Academic Communication in a Foreign Language The course focuses on developing communicative competence in a foreign language relevant to the student's field of study. It includes training in delivering academic presentations, public speaking, business correspondence, and both written and verbal academic discourse in a foreign language.	15
<i>Elective subjects are determined by the higher education institution. Depending on the specific nature of the specialty, additions or modifications to the list of elective courses may be made.</i>		
4	Philosophy	3
	Sociology	
	Constitution of the Republic of Azerbaijan and the Basics of Law	
	Logic	
	Ethics and Aesthetics	
5	Introduction to Multiculturalism	3
	Information Management	
	Information Technologies (by Specialty)	
	Fundamentals of Entrepreneurship and Introduction to Business	
	Political Science	
Core Specialty Subjects		

7	<p>Linear Algebra and Analytical Geometry</p> <p>This subject provides comprehensive knowledge of complex numbers, matrices and determinants, linear spaces and their bases, systems of linear algebraic equations and methods for their solution, linear transformations and quadratic forms. It also covers the Cartesian coordinate system in two- and three-dimensional space, fundamental problems in analytical geometry, elements of vector algebra, equations of lines and planes, and second-order algebraic curves and surfaces.</p>	4
8	<p>Mathematical Analysis</p> <p>This subject introduces the elements of manifold theory, the concept of sequence limits, the limit and fundamental properties of univariate functions, continuity at a point and over a set, uniformly continuous univariate functions, and the differential and integral calculus of univariate functions. It also covers numerical and functional sequences, multidimensional Euclidean space, as well as the limit, continuity, uniform continuity, and the differential and integral calculus of multivariate functions.</p>	8
9	<p>Applied Mathematics</p> <p>This subject is designed to equip students with the knowledge and skills necessary to apply the following: calculation of geometric characteristics of planar and spatial objects (such as surface area, volume, projection elements, surface lines, and curvature), use of numerical methods in geometric computations, numerical solution methods for linear and nonlinear equations and systems, mathematical techniques for optimization, reliability analysis, and diagnostics of dynamic and discrete systems. It also includes methods for solving ordinary differential equations, applications of differential equations in the mathematical modeling of natural processes, classification of special types of differential equations, formulation of Cauchy and boundary value problems in mathematical physics, fundamentals of complex analysis, rules of probability calculation, and the characteristics of discrete and random variables.</p>	4
10	<p>Fundamentals of Physics</p> <p>Offers a foundational understanding of classical mechanics, thermodynamics, electrodynamics, optics, quantum theory, atomic and nuclear physics, and special relativity.</p>	5
11	<p>Applied Physics</p> <p>Focuses on the practical application of physical laws in modern technologies, materials science, measurement techniques, and devices relevant to device engineering.</p>	7
12	<p>Chemistry</p> <p>Provides fundamental knowledge of chemical systems and processes, substance reactivity, types of inorganic substances, the atomic-molecular theory, and techniques for determining and identifying chemical compounds.</p>	6
13	<p>Fundamentals of Hardware and Software of Computer Systems</p> <p>Explores computer architecture and components in information-measuring systems, various operating system structures, algorithms, file systems, and key concepts in process and resource management, with emphasis on both theoretical understanding and practical applications</p>	7
14	<p>Engineering Graphics and Design</p>	4

	Focuses on solving geometric problems through planar and spatial drawings, projection techniques, graphical construction of spatial objects, and transforming lines to represent object shape, size, and spatial orientation. Includes practical methods for producing design drawings.	
15	Electrical Engineering Covers the fundamental laws of electrical engineering, circuit analysis methods (both electrical and magnetic), the behavior of linear and nonlinear circuits, and characteristics and performance of semiconductor devices. Students learn to analyze and interpret various circuit configurations and device parameters.	7
16	Mechanical Engineering This subject encompasses the fundamental elements of mechanisms and the types of kinematic pairs they form, the principal types of mechanisms and their laws of motion, as well as the causes of motion irregularities. It also covers the main types of transmission mechanisms, their operational principles, motion laws, schematic representations, and design fundamentals. Additionally, the course includes the study of connection types and purposes for device components, the fundamentals of strength analysis, various types of rolling and sliding bearings, their functions, and the basic principles guiding their selection.	6
17	Electronics and Circuit Engineering This subject covers the various types of electronic devices, their operating principles, and functional capabilities. It includes the structure, working mechanisms, and application areas of semiconductor devices. The course also explores schematic solutions in the fields of analog and discrete electronics, analyzes the key technical and operational characteristics of modern electronic systems, and examines current trends and future development directions in microelectronics.	6
18	Computer-Based Device Engineering Develops practical skills in technical drawing using CAD tools (e.g., AutoCAD), including 2D and 3D modeling, construction of views and sections, and application of drawing standards in engineering environments.	5
19	Quality Control and Metrology This subject covers metrological assurance and measurement risk analysis during the preparation and operation of devices and systems. It includes an overview of metrological devices, measurement and management practices, key standards and certification systems, and their application in measurement and quality control. The course addresses fundamental metrological and standardization principles in quality assurance, strategies for enhancing operational reliability, and the prevention of technological and environmental hazards. It also encompasses non-destructive testing and diagnostic systems used for materials, products, and industrial technological processes, including their software, installation, operation, and maintenance, with a focus on quality control across production and operational settings.	7
20	Measurement Technologies Introduces classical and modern measurement methods, devices, and error analysis. Covers electrical, magnetic, and optical parameter measurement,	6

	analytical devices, and the use of analog/digital tools in production and operational contexts.	
21	<p>Industrial Devices</p> <p>Focuses on various industrial devices—temperature, displacement, level, flow, and pressure sensors—and their types, construction, functional characteristics, application areas, and integration into production and operational processes. Also covers execution mechanisms and principles of industrial measurement and control systems.</p>	6
22	<p>Materials Science</p> <p>Provides an understanding of the structure, composition, and mechanical, chemical, and physical properties of materials. Emphasis is placed on materials testing methods, chemical-thermal treatment techniques, and the technological processes involved in producing components from industrial materials.</p>	6
23	<p>Microprocessors and Microcontrollers</p> <p>Explores digital electronics, microprocessor architecture, interface systems, memory structures, programmable logic devices, and microcontroller-based device control systems, including circuit design and real-world applications.</p>	6
24	<p>Fundamentals of Device Technologies</p> <p>This subject teaches the theoretical foundations of production process accuracy, ensuring the precision of device components, and methods for achieving high-quality surface finishes. It covers the technological principles of device structures, the information support required for production, and the core principles of designing technological processes. The course includes automation of production in device manufacturing and technologies for producing various components such as elastic elements, optical parts and coatings, plastic and rubber parts, and metalloceramic materials. It also addresses the equipment used in these processes. Additionally, students gain knowledge on the production of electronic equipment components, printed circuit boards (PCBs), their structural and technological features, as well as the processes of preparing originals and photo templates, manufacturing microcircuits, microlithography, integrated circuits, and magnetic elements. The classification of magnetic conductors and the fundamentals of designing technological assembly processes are also explored, along with other related technological topics</p>	5
25	<p>Automated Design Systems of Devices</p> <p>This subject covers key topics related to system analysis of the design process, including the integration of design with artificial intelligence and the general characteristics of automated design systems. It explores the generalized algorithm of automated design and various types of support systems such as technical, mathematical, software, informational, linguistic, methodological, and organizational. The course provides instruction on geometric modeling and machine graphics, as well as the use of advanced automated design systems such as CATIA V5, Pro/ENGINEER, and UNIGRAPHICS NX; mid-range systems like SolidWorks, AutoCAD Inventor, Solid Edge, and KOMPAS; and entry-level systems such as AutoCAD LT, T-Flex CAD 2D, and CADMECH. Additional topics include the creation of electronic models, structural and layout design of devices, analysis and synthesis of design decisions, automated design systems for production, device life cycle management systems, CALS technologies and standards, and modern computer technologies. Students are also introduced to programming tools</p>	6

	such as VBA for AutoCAD, SQL, MySQL, and other software for graphical design and database development, as well as 3D modeling.	
26	Physical Foundations of Information Acquisition, Modern Sensors and Transducers This subject covers fundamental concepts related to information and signals, as well as the classification and characteristics of modern sensors and transducers. It addresses various types of errors that occur in sensors and transducers and explores methods for improving the accuracy of information acquisition. The course examines physical effects such as gas discharge, Faraday, Doppler, Hall, thermoresistance, thermoelectric, thermal radiation, piezoelectric effects, and the corresponding measurement methods for parameters such as pressure, voltage, displacement, temperature, electric and magnetic fields, optical and acoustic signals. Additionally, it covers the architecture, operational modes, and principles of sensors, including basic sensor types, signal processing algorithms, optical transmission systems, and techniques for integrating multifunctional and auxiliary sensors into electronic systems.	6
27	Civil Defense This subject addresses the management of emergency situations in the Republic of Azerbaijan, the nature and characteristics of such situations, and the primary methods and means of protection against them. It includes the assessment of conditions arising during emergencies, techniques for self-help and assisting others, as well as the development and implementation of civil defense plans within production processes.	3
Internship		
	Internship and Final Project	30

Note: The elective courses are determined by the higher education institution based on the expertise of its academic staff, the availability of research infrastructure, and alignment with both local and international labor market needs. These courses should be offered as electives to students and designed in a way that facilitates their participation in international exchange programs.

Table 2.

Specialization Code	General Subjects	Specialty Subjects (incl. Civil Defense)	Subjects Determined by the Institution	Internship & Graduation Project	Total ECTS
050604	30	120	60	30	240

4. Teaching and Learning

4.1. The teaching and learning environment must be organized in a manner that enables students to successfully achieve the learning outcomes outlined in the Educational Program. Institutions are

responsible for ensuring the availability of necessary physical, technological, and pedagogical resources that support effective learning.

4.2. Teaching and learning methods employed in each course should be clearly described in relevant academic documents such as **course syllabus**, and must be made publicly accessible—preferably through the university’s official website, departmental portals, or program brochures.

4.3. Instructional methods should undergo regular review and enhancement, reflecting international best practices and innovations in education. The ongoing development and refinement of teaching strategies must be integrated into the university’s **internal quality assurance system**.

4.4. A diverse range of instructional methods should be employed to ensure a **student-centered learning experience**. These approaches should actively engage students in both theoretical understanding and practical skill development. Examples of recommended methods include:

- Lectures, seminars, and practical/laboratory sessions
- Interactive presentations, discussions, and debates
- Independent learning, problem-solving tasks, and applied case studies
- Project-based learning and preparation of engineering reports
- Problem-based learning and research-focused modules
- Fieldwork and industrial site visits
- Role-playing and simulation exercises
- Group work, teamwork, and peer collaboration
- Comparative analysis assignments and expert-led workshops
- Video/audio conferencing, multimedia lectures
- Use of distance and blended learning platforms
- Technology-assisted learning and virtual laboratory simulations

4.5. A balanced relationship between theoretical knowledge and practical training is a core component of the educational process. This balance is achieved through the integration of diverse teaching formats:

- **Theoretical learning** is delivered via lectures—traditional, binary, and discussion-based—as well as academic seminars, problem-based learning sessions, debates, briefings, conferences, and verbal or demonstration-based explanations. Additionally, modern tools such as video/audio conferencing and comparative analysis methods are employed to enhance conceptual understanding.
- **Practical learning** is implemented through exercises, practicums, laboratory work, and workshop-based training sessions that emphasize application, experimentation, and the development of technical competencies.

4.6. The educational program is designed to foster students' autonomy and instill the principles of **lifelong learning**. Upon graduation, students are expected to:

- Operate independently across professional contexts;
- Continue their educational journey through advanced study or self-directed learning;

- Demonstrate adaptability and a commitment to continuous personal and professional development.

5. Student Assessment

5.1. Assessment is a critical component of the educational process, designed to:

- Accurately measure student achievement against the defined learning outcomes;
- Track academic progress and provide timely feedback;
- Identify areas for curriculum enhancement through dialogue with students.

5.2. Assessment methods must be clearly defined in all course-related documentation (e.g., course descriptions, syllabus) and should be made publicly accessible via the university's official platforms, such as the institutional website or program brochures.

5.3. Assessment methods should be regularly reviewed and updated to reflect the evolution of pedagogical approaches and innovations in teaching. Such revisions must be integrated into the institution's quality assurance system to maintain relevance and fairness.

5.4. A variety of assessment techniques should be utilized to support a **student-centered approach** and encourage **active engagement**. These may include:

- Written assignments and analytical essays;
- Tests and examinations, including computer-based formats;
- Oral presentations and defenses;
- Structured question-and-answer dialogues;
- Academic debates and theoretical discussions;
- Fieldwork and practical/laboratory reports;
- Evaluation of technical skills in simulated or real-life settings;
- Project reports and research documentation;
- Portfolio reviews;
- Group work, peer review, and self-assessment;
- Workshops and situational tasks.

5.5. Assessment methods must be based on **clearly defined, objective criteria**. They should ensure that the student's knowledge, skills, and competencies are evaluated **accurately and reliably**. All assessments must adhere to the principles of:

- **Transparency**
- **Fairness and impartiality**
- **Mutual respect**
- **Academic and professional integrity**

5.6. Students must be provided with opportunities to engage in constructive dialogue with faculty regarding all aspects of the assessment process. Institutions must establish formal procedures that allow students to appeal grades or request reassessment in accordance with academic policies.

5.7. Academic ethics are a cornerstone of the educational environment. The program emphasizes the importance of:

- **Academic integrity** and ethical behavior in all scholarly activities;
- Raising awareness of **plagiarism** and its consequences;
- Understanding and respecting **intellectual property rights** related to academic work;
- Promoting a culture of honesty, responsibility, and respect in both individual and collaborative learning.

6. Learning Outcomes of the Program and Each Subject

6.1. The responsibility for defining the learning outcomes of the educational program, as well as for preparing the syllabus of each subject, lies with the higher education institution and its academic staff.

6.2. Learning outcomes shall be determined by each higher education institution in accordance with the standardized format provided in **Appendix 1**. The corresponding **learning outcomes matrix** (Appendix 2) must clearly demonstrate the alignment between individual subjects and the overall program learning outcomes.

6.3. Subject syllabus should be reviewed and updated regularly to ensure that the educational program reflects both theoretical and practical content that meets the evolving demands of society and the labor market.

7. Infrastructure and Human Resources

7.1. To effectively deliver the teaching, learning, and assessment processes outlined in the Educational Program, the higher education institution must provide the necessary infrastructure, including:

- A well-equipped material and technical base featuring ICT-enabled classrooms and laboratories;
- Computer labs and workshops suitable for conducting practical classes, experiments, and scientific research aligned with the curriculum of the *Device Engineering* specialty;
- Student access to the institution's local network, internet resources, academic databases, electronic libraries, and information retrieval systems.

7.2. The teaching staff should predominantly hold academic qualifications such as scientific degrees or titles. Additionally, qualified professionals from state bodies, private enterprises, or other relevant organizations may be engaged to enrich the educational process.

8. Internship

8.1. The internship component is essential for bridging theoretical knowledge with practical application, thereby enhancing students' professional competencies.

8.2. Internships may be arranged in diverse settings including private companies, state enterprises, research laboratories, universities, national academies (e.g., ANAS), and local or international organizations.

8.3. Prior to commencement, a formal agreement must be signed between the higher education institution and the host organization. Students may also apply individually to undertake internships at alternate organizations, including those abroad, provided these align with their specialty. The contract should explicitly specify the rights, responsibilities, and conditions governing the internship.

8.4. Internship performance is assessed by supervisors appointed by the university, comprising subject matter experts, professors, and academic staff holding scientific qualifications. Evaluation is based on feedback from the host organization, the student's internship report, attendance, and demonstration of knowledge and skills during the internship period.

9. Graduation Thesis

9.1. The educational program culminates in the preparation and defense of a graduation thesis.

9.2. In cases where the graduation thesis is not included within the educational program, its credit allocation shall be transferred to the internship component.

9.3. The defense of the graduation thesis is conducted by a commission established according to the **Regulations on State Attestation of Students of Higher Education Institutions of the Republic of Azerbaijan at the Bachelor's Degree**. The thesis evaluation is performed through a vote by the members of the respective State Attestation Commission (DAC).

10. Employment and Lifelong Learning

10.1. Graduates of the Bachelor's program in specialty 050604 – *Device Engineering* acquire comprehensive knowledge in measurement information technologies and device engineering. They become highly qualified specialists capable of contributing to various sectors, including but not limited to:

- Medical, aviation, and space industries;
- Fuel and energy complexes, including oil and gas, petrochemical, and food production industries;
- Aviation equipment manufacturing and operational sectors (including equipment and ground control systems for unmanned aerial vehicles);
- Light and heavy industrial enterprises, military-industrial facilities;
- Environmental satellite monitoring, ecological and meteorological systems;

- Medical and hydro acoustic information-measuring and management systems;
- Complex testing for facility protection, quality control, diagnostics, and security systems;
- Analog and digital electronics, metrology, photonics;
- Industrial electrical systems and motors;
- Digital systems and microcontrollers;
- Hydraulics and pneumatics;
- Biomedical engineering design and development.

Graduates may assume professional roles such as biomedical engineers, quality control and diagnostics engineers, electrical and electronic device engineers, metrological control and standardization specialists, device technology experts, import/export control officers for devices and systems, automation and calibration engineers, operation and control engineers, and other related positions. They may also find employment opportunities in various state and private sector departments utilizing information systems, as well as in technical educational institutions.

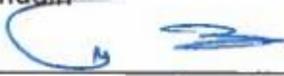
10.2. Higher education institutions are responsible for conducting regular graduate employment surveys and for maintaining up-to-date vacancy announcements accessible on their official websites to facilitate graduate employment.

10.3. Graduates of the Device Engineering Bachelor's program (code 050604) are eligible to pursue advanced studies in relevant Master's degree programs.

10.4. The knowledge, skills, and competencies developed throughout the educational program form a solid foundation enabling graduates to engage in **lifelong learning** independently and proactively throughout their professional careers.

Razılaşıdırılmışdır:

Azərbaycan Respublikasının Təhsil
Nazirliyinin Aparat rəhbərinin müavini,
Elm, ali və orta ixtisas təhsil şöbəsinin
müdiri

 Yaqub Piriye

"17" 07 2020-ci il

Texniki və texnoloji ixtisaslar qrupu
üzrə Dövlət Təhsil Proqramlarını
hazırlayan işçi qrupun sədri, prof.

 Mustafa Babanlı

"16" 07 2020-ci il



Educational Program and Learning Outcomes by Subject

Higher education institutions are required to clearly define the Educational Program and specify the expected learning outcomes for each subject. The following tables must include at least six learning outcomes separately for the overall Educational Program and for each subject.

Learning Outcomes of the Educational Program (LOEP)
<p>LOEP 1: The graduate is a specialist with higher education possessing comprehensive knowledge in the humanities relevant to a technical engineer. This includes knowledge of the history of Azerbaijan, proficiency in business and academic communication in Azerbaijani, mastery of basic skills in at least one foreign language, and familiarity with philosophical thinking, sociology, law, ethics, aesthetics, and multiculturalism. The graduate is able to collect and analyze information about the cultural characteristics and traditions of diverse social groups to develop personal knowledge and foster effective intercultural interaction. Demonstrating respect for Azerbaijan’s historical heritage and sociocultural traditions, the graduate can constructively engage with individuals from diverse backgrounds, considering their sociocultural specificities, to successfully resolve professional and social issues. The graduate selects appropriate relationship-building styles and employs verbal and non-verbal communication strategies in business conversations conducted in the state language and foreign languages. They proficiently use information and communication technologies to obtain information necessary for addressing standard communication challenges in both the state and foreign languages. Furthermore, the graduate conducts business correspondence in written and electronic formats, respecting stylistic and socio-cultural norms of official and informal communication in the state and foreign languages, and demonstrates the ability to translate professional texts between a foreign language and the state language.</p>
<p>LOEP 2: The graduate possesses fundamental knowledge in mathematics, physics, and chemistry and is capable of applying this knowledge to the study of other engineering subjects. They can utilize mathematical, natural science, and general professional knowledge to model engineering problems relevant to device engineering, formulating, interpreting, and analyzing such problems effectively.</p>
<p>LOEP 3: The graduate is competent in designing various systems, components, and assemblies at schematic and element levels. They understand the physical principles underpinning devices and quality control systems and are able to develop functional and structural schematics. They can prepare technical documentation—including software programs, technical specifications, and testing protocols—conduct project calculations, use computer-aided design tools, and perform technical-economic justifications for engineering structures. Additionally, they apply relevant engineering methods, tools, and research-based knowledge for measuring, controlling, and managing device systems and demonstrate commitment to continuous professional development.</p>
<p>LOEP S 4: The graduate can develop specialized programs and their modules, design and analyze devices and systems, and optimize their performance to solve various technical challenges. They can compile detailed research descriptions, prepare data for reports, reviews, and other technical documentation, and work with theoretical models to predict system behaviors. The graduate effectively utilizes appropriate resources, methods, and tools—</p>

including forecasting, modeling, modern devices, and engineering IT applications—in complex engineering tasks, adhering to professional standards and requirements.

LOEP 5: Ensures the necessary conditions for the maintenance, approval, and efficient use of equipment during testing and operation. Supervises and controls compliance with requirements for maintaining equipment suitability and safety of operational processes. Regulates and manages testing and operation of facilities according to the principles of certification, licensing, attestation, accreditation, harmonization, and inspection within the framework of the state goods and services control system.

LOEP 6: Prepares and manages design and technological documentation and workflows, including the provision of relevant technical documentation, materials, and equipment. Analyzes the status of scientific and technical problems, formulates technical tasks, and conducts literature and patent research. Understands the purpose and design of devices and quality control systems, determines their physical principles and systemic as well as schematic-technical structures, develops functional and structural schemes, and identifies optimal solutions in product development considering quality, cost, implementation timeline, competitiveness, and lifecycle. Implements technical control during device production and manages quality assurance.

LOEP 7: Understands the importance and effectiveness of team cooperation strategies to achieve set objectives and is capable of identifying and fulfilling their role within a team. Demonstrates awareness and sensitivity to the diverse behavioral characteristics of various groups of collaborators and stakeholders and integrates this understanding into professional interactions. Evaluates personal performance, plans subsequent activities to achieve desired outcomes, fosters team development, and actively engages in knowledge sharing, information exchange, and presentation of team results.

Learning Outcomes for the Subject (LOS)

LOS 1: Demonstrates logical thinking and applies mathematical rules and laws effectively. Utilizes existing mathematical methods and models for data processing and applies these models in production and technological processes, automation, measurement, and control systems. Employs foundational methods for the development of experimental results and conducts both analytical and numerical solutions of fundamental equations in applied physics. Possesses knowledge of mechanics, statistics, dynamics of solids, liquids, gases, electricity, magnetism, oscillations, waves, quantum physics, statistical physics, thermodynamics, basic chemical systems, substance reactivity, types of inorganic substances, atomic-molecular theory, and methods for substance identification and chemical analysis.

LOS 2: Graduates should be able to: Visually represent samples in space and interpret technical and design graphical documentation related to equipment; Understand and apply the principles of drafting technical schemes and engineering drawings; Work with and interpret technical graphs; Utilize application software packages for preparing engineering drawings, specifications, and explanatory notes; Comprehend fundamental concepts of applied mechanics, including the kinematics of particles and rigid bodies, as well as the static and dynamic characteristics of mechanical systems; Apply the equations and theorems of dynamics to solve mechanical problems; Analyze the stress-strain state of materials and understand the fundamentals of strength theory, including methods for determining the resistance of elements to deformation;

Understand the structural and kinematic principles of device mechanisms, the synthesis and optimization methods for mechanisms, and the fundamentals of mechanical design; Evaluate

the mechanical properties of construction materials, including strength, hardness, and dimensional accuracy of mechanism components; Demonstrate knowledge of the structure and properties of metals and alloys, and understand the influence of temperature on their behavior during deformation; Identify and utilize various types of construction and electrotechnical materials; Understand and apply various methods for forming and surface treating mechanical parts; Use standard technological equipment and tools effectively; Apply knowledge of the crystal structure of materials, ideal and real metal structures, and cooling curves of pure metals; Enhance the strength of metals and alloys through structural modification; Understand alloy theory, including the relationship between alloy structure, chemical composition, and properties; Classify alloys based on their technological characteristics; Apply methods for producing alloys and processing them through cold and hot working technologies.

LOS 3: Acquires fundamentals of electrical engineering, including basic principles of electric and magnetic circuits. Possesses comprehensive knowledge of electrical engineering concepts, including electrical circuits—both linear and nonlinear—and methods for the analysis and reporting of magnetic circuits. Demonstrates understanding of electromagnetic devices and electric machines, their applications in automation, measurement, and control systems. Acquainted with the development trends in electronics and microelectronics, including schematic solutions in analog and discrete electronics, and their practical uses in device manufacturing. Understands the principles of construction and operation of logical and computational equipment, analog-computing devices, and the logical foundations and element base of digital computing systems. Possesses knowledge of microprocessor technology and its potential applications in device manufacturing. Has foundational knowledge in measurement science, including the basic concepts of measurement, characteristics and structural schemes of measuring equipment, different types of measurements, measurement methods, sources of errors, and techniques for error reduction. Is proficient in handling measurement signals, measurement circuits, converters, devices, systems, measurement-computing complexes, and display devices for measurement results.

LOS 4: Demonstrates a comprehensive understanding of information theory and is capable of working with the general characteristics of information collection, transmission, processing, and storage processes. Applies functional and computational problem-solving models, algorithmic programming, high-level programming languages, and software development technologies to address specialty-related problems using computer systems. Possesses detailed knowledge of memory devices, programmable logic integrated circuits, microprocessor architectures and command systems, input-output organization, and peripheral devices. Effectively applies microprocessors and microcontrollers within measurement techniques and control systems. Understands the fundamentals of computer graphics and CAD systems, with proficiency in using graphic editors and software packages for the design of electronic circuits on computers. Applies foundational principles of modern automatic control in device engineering, including control and testing, based on comprehensive knowledge of measurement technologies, metrological support, industrial devices, and industrial management.

LOS 5: Is able to accurately select and apply measurement methods, devices, and measurement standards, including the calibration of measuring devices and assessment of error sources. Demonstrates proficiency in choosing and applying appropriate control methods and tools aimed at quality improvement. Understands and implements safety principles essential for life protection in practical activities related to metrology, diagnostics, and testing. Recognizes ecological safety concerns in the design and operation of production facilities and applies methods of quantitative and qualitative analysis of particularly hazardous and anthropogenic factors in industrial environments. Has foundational knowledge of the scientific and

organizational principles underlying the prevention and mitigation of accidents and natural disasters. Possesses an understanding of the fundamentals of devices manufacturing technology, including the development and mechanization of technological processes for device preparation, assembly, and technological support. Demonstrates knowledge of the classification, characteristics, and application areas of flexible production systems based on the design and manufacturing processes of devices, as well as the structure and operation of flexible control systems across various fields.

LOS 6: Understands the biosphere and its evolutionary directions, as well as the interactions between organisms and their surrounding systems. Applies ecological principles in the development of environmentally sustainable technologies that minimize destructive impacts. Demonstrates expertise in metrological certification, testing, and control of equipment and purpose-built products. Is proficient in using diverse devices, information-measuring systems, and complexes, understanding their operating principles, functional block diagrams, and constructive and technical characteristics. Applies knowledge of electronic, optoelectronic, and analytical devices in process control and management.

Matrix of Subject Learning Outcomes and the Educational Program

The higher education institution should use the following table to determine how the specialization supports the achievement of the Educational Program's learning outcomes.

Block Name	Subject Name	Educational Program Learning Outcomes (EPLOs)						
		EPLOs 1	EPLOs 2	EPLOs 3	EPLOs 4	EPLOs 5	EPLOs 6	EPLOs 7
Humanities Subjects	History of Azerbaijan	X						
	Business and academic communication in Azerbaijani	X						
	Foreign language	X						
	Civil Defense	X						X
Professional training subjects of the specialty	Analytical geometry and linear algebra		X					
	Mathematical analysis		X					
	Applied mathematics		X					
	Fundamentals of physics		X					
	Applied physics		X					
	Chemistry		X				X	
	Fundamentals of hardware and software of computer systems				X			
	Engineering graphics and design					X		
	Electrical engineering			X				
	Engineering mechanics							
	Electronics and circuit engineering			X				
	Computer-based design				X			
	Quality control and metrology					X		
	Measurement technologies					X		
	Industrial devices					X		X
	Materials science						X	
	Microprocessors and microcontrollers				X			X
	Device technologies						X	X
	Automated design systems of devices			X	X			X
	Physical methods of information acquisition, basics, modern sensors and transducers			X	X	X		