



# EDUCATIONAL PROGRAM

**6B06 - Information and Communication Technologies**  
(Code and classification of the field of education)

**6B061 - Information and communication technologies**  
(Code and classification of the direction of training)

**0610**

(Code in the International Standard Classification of Education)

**B057 - Information technology**  
(Code and classification of the educational program group)

**6B06106 - SMART systems and programming**  
(Code and name of the educational program)

**Bachelor**  
(Level of preparation)

**Semey**

## **Educational program**

**6B06 – Information and Communication technologies**  
(Code and classification of the field of education)

**6B061 - Information and Communication technologies**  
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(Code and name of the educational program)

**bachelor**  
(Level of preparation)

# PREFACE

## Developed

The educational program 6B06106 - SMART systems and programming in the direction of preparation 6B061 - Information and Communication technologies on the basis of the State Compulsory Standards of Higher and Postgraduate Education approved by the Order of the Ministry of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No 2 (as amended by the order) was developed by the Academic Committee dated 20.02.2023 No 66).

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Member of the AC	Tleboldy Ulpa	Student of the VT-101 group
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## Reviewed

at the meeting of the Commission on Academic Quality of the Faculty of Engineering and Technology  
Protocol No. 3 January 15, 2024

at the meeting of the Commission on Academic Quality of the Higher School of Artificial Intelligence and Construction  
Recommended for approval by the Academic Council of the University  
Protocol No. 1, "6" June 2024

## Approved

at a meeting of the University Academic Council by protocol No. 6/1 of January 19, 2024.

at a meeting of the University Academic Council by protocol No. 11 of June 28, 2024.

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# 1.Introduction

## 1.1.General data

Training under the educational program "6B06106 - SMART systems and programming" is carried out at the Department of "IT technologies" of the Graduate School Artificial Intelligence and Construction of the NAO "Shakarim University" in Semey. The developers are both teachers of the department who have extensive professional experience in the scientific and pedagogical field, and interested stakeholders. The educational program has been developed taking into account the needs of the regional labor market.

The educational program regulates the following aspects:

1. Objectives: the main goals and objectives of the educational program are determined.
2. Expected results: the knowledge, skills, skills and competencies that graduates are expected to have after successful completion of the program are determined.
3. Content: Describes the content of the educational process, including topics, modules, educational materials and resources.
4. Conditions and technologies of implementation: the methods and approaches that will be used for the implementation of the educational process are determined, including lectures, practical classes, project work, the use of modern information technologies and other resources.
5. Assessment of the quality of graduate training: criteria and methods for assessing the level of graduate training are determined, including exams, control papers, project assignments and other forms of assessment.
6. Characteristics of the program and areas of professional activity of the graduate: the main directions, spheres and objects of professional activity of the graduate are described.
7. Learning outcomes and acquired competencies: specify the specific skills, knowledge and competencies that students will receive at the end of the program.
8. Policy of evaluation of learning outcomes: the principles and approaches to the evaluation of educational achievements of students are determined.
9. Organization of the educational process: the structure of the program, the schedule of classes, resources and support that ensure the quality of training of students are described.
10. Modules of the educational program: the components of the modules that are included in the program and determine the educational units and their content are described.
11. Methodological materials: manuals, manuals, recommendations and other materials necessary for the implementation of educational technologies and methods are provided.

The educational program is the main document defining the main aspects of teaching and training students in this area of education.

The educational program allows graduates to acquire the following skills:

1. Programming: Graduates gain programming skills in various languages, such as HTML, CSS, JavaScript, Python, Java, Swift and others. They will learn how to create and maintain websites, mobile applications and smart systems.
2. Web development: Graduates will master the development of websites, including creating user interfaces, working with databases, using frameworks and tools for developing web applications.
3. Mobile Application Development: Graduates will learn how to create mobile applications for various platforms, such as iOS and Android. They will master the skills of developing user interfaces, working with mobile devices and using specialized tools and frameworks.
4. Working with Smart Systems: Graduates will gain knowledge about smart technologies and smart systems, such as smart home, Internet of Things (IoT), automation and device management. They will learn how to develop applications and integrate various devices and technologies to create smart systems.
5. Teamwork: Graduates develop teamwork, collaboration and communication skills. They will learn how to interact effectively with other developers, designers and information technology specialists.
6. Application Design and Architecture: Graduates will learn about the principles of application design and architecture, including best practices, design patterns and principles for the development of scalable and reliable systems.
7. Problem Solving and Analytical Thinking: Graduates develop skills in analyzing, finding solutions and solving problems related to software development. They will learn how to effectively and systematically approach the solution of technical problems.

8. Testing and Debugging: Graduates will master the skills of testing and debugging software to ensure its quality and reliability.

9. Relevance and updating of skills: Graduates will learn to follow the latest trends and new technologies in the field of web programming, mobile applications and smart systems in order to update and update their skills.

When implementing the educational program, it is planned to use artificial intelligence tools in the educational process, thereby developing digital competencies among students in a rapidly changing technological environment.

The educational program provides for the education of a student with special educational needs in the conditions of a higher educational institution, as well as his socialization and integration into society.

#### 1.2.Completion criteria

The main criterion for the completion of bachelor`s degree programs is the development of at least 240 academic credits for the entire period of study, including all types of student`s educational activities.

1.3.Typical study duration: 3 years

## 2.PASSPORT OF THE EDUCATIONAL PROGRAM

2.1.EP purpose	Training of highly qualified specialists in the field of software development for web and mobile applications, smart technologies capable of effectively applying their knowledge and skills to create innovative and functional solutions that meet modern requirements of the information industry
<b>2.2.Map of the training profile within the educational program</b>	
Code and classification of the field of education	6B06 - Information and Communication technologies
Code and classification of the direction of training	6B061 - Information and Communication technologies
Code in the International Standard Classification of Education	0610
Code and classification of the educational program group	B057 - Information technology
Code and name of the educational program	6B06106 - SMART systems and programming
2.3.Distinctive features of the OP (double degree/joint, OVPO-partner, Double major, innovative)	An innovative Educational program
<b>2.4.Qualification characteristics of the graduate</b>	
Degree awarded / qualification	Bachelor`s degree in Information and Communication Technologies in the educational program 6B06106 - SMART systems and Programming
Name of professional standard	<ol style="list-style-type: none"> <li>1 Information safety;</li> <li>2 Testing new applications (including computer games);</li> <li>3 System analysis in information and communication technologies;</li> <li>4 Graphic and multimedia design development;</li> <li>5 Development of technical documentation;</li> <li>6 Software Maintenance;</li> <li>7 Software maintenance;</li> <li>8 Software Testing;</li> <li>9 System and network administration;</li> <li>10 Development of data processing and storage systems;</li> <li>11 Development of IoT systems;</li> <li>12 Software Architects;</li> <li>13 Ensuring the security of the infrastructure and FROM;</li> <li>14 Database administration;</li> <li>15 Software developers and specialists in testing WEB and additional applications;</li> <li>16 Software;</li> <li>17 Database developers and administrators;</li> <li>18 Testing Web and multimedia applications;</li> <li>19 Software Testing;</li> <li>20 Business analysis in information and communication technologies;</li> <li>21 Management and design of computer hardware and embedded systems.</li> </ol>
Atlas of new professions	Areas related to smart systems and programming are included in the Atlas of New Professions.
Regional standard	It is not provided.
Name of the profession / list of positions of a	Web developer; mobile developer; Smart system

specialist	development specialist; Full-stack developer; UI/UX designer; software architect; Software tester; DevOps engineer; Game development specialist; Project manager; interface designer; database administrator
OQF qualification level (industry qualification framework)	6
Area of professional activity	Website and application development, mobile application development, interface design and user experience, databases and data storage, adaptive and responsive design, testing and debugging, integration and deployment, security, project management: Planning, organizing and coordinating the development of web projects, mobile applications and smart systems.
Object of professional activity	<ol style="list-style-type: none"> <li>1. Educational institutions: Universities, colleges and schools that offer courses and programs on web programming and mobile application development.</li> <li>2. Online stores and e-commerce: Companies that sell goods and services online need to develop and support websites and platforms for e-commerce.</li> <li>3. Media and Entertainment: Media companies, publishers, game studios and entertainment platforms need to develop websites, mobile applications and smart systems to provide content and interactive services.</li> <li>4. Banks and Financial Institutions: Financial institutions develop web and mobile applications for online banking, electronic payments, financial management and other financial services.</li> <li>5. Consulting and IT services: Companies providing consulting services in the field of information technology and software development are looking for specialists with web programming and mobile development skills.</li> <li>6. Web studios and agencies: Companies specializing in the development of websites, web applications and interfaces.</li> <li>7. IT companies: Technology companies providing various services in the field of information technology, including the development of web applications and mobile applications.</li> <li>8. Enterprise IT departments: Large organizations and enterprises with their own IT departments that develop and support web applications, mobile applications and smart systems for internal use or interaction with customers.</li> <li>9. Freelancers and independent developers: Independent specialists working on a self-employed basis, fulfilling orders for the development of web products, mobile applications and smart systems from different clients.</li> </ol>
Types of professional activity	<ul style="list-style-type: none"> <li>-Software development</li> <li>-System administration and network infrastructure</li> <li>-Information security and cybersecurity</li> <li>-Data analytics and machine learning</li> <li>-Project and product management</li> <li>-Design and user experience</li> <li>-Consulting and business development</li> </ul>



	<ul style="list-style-type: none"> <li>-IT service and support</li> <li>-Teaching and education</li> <li>-Internet marketing and digital advertising</li> </ul>
<p><b>2.5. Graduate Model</b></p>	<p>1. Knowledge and understanding:</p> <ul style="list-style-type: none"> <li>-Fundamentals of web technologies, including HTML, CSS and JavaScript.</li> <li>-Knowledge of various frameworks and libraries for web development, such as React, Angular or Vue.js</li> <li>-Understanding the principles of mobile application development for various platforms, such as Android and iOS.</li> <li>-Knowledge of programming languages for mobile development, for example, Java, Kotlin, Swift or Objective-C.</li> <li>-Understanding the architecture and the main components of smart systems.</li> </ul> <p>2. Development skills:</p> <ul style="list-style-type: none"> <li>-Web development: the ability to create dynamic web pages, interactive elements, work with databases and APIs.</li> <li>-Mobile development: the ability to develop a user interface, work with the hardware capabilities of devices and integrate network services.</li> <li>-Development of smart systems: the ability to create applications that can control and interact with various devices and sensors.</li> </ul> <p>3. Testing and debugging skills:</p> <ul style="list-style-type: none"> <li>-Testing of web and mobile applications, including functional testing and user interface testing.</li> <li>-Debugging and correcting errors in the code.</li> <li>-Ability to use tools for automated testing and quality control.</li> </ul> <p>4. Teamwork and communication skills:</p> <ul style="list-style-type: none"> <li>-Ability to work in a team of developers and other specialists.</li> <li>-The ability to communicate effectively and transmit information.</li> <li>-Collaborative programming and the use of version control systems such as Git.</li> </ul> <p>5. Analytical and problem-oriented skills:</p> <ul style="list-style-type: none"> <li>-Ability to analyze customer requirements and transform them into application functionality.</li> <li>-Problem solving, identification and correction of errors in the code.</li> <li>-Ability to design effective and optimized solutions.</li> </ul>

## 3. Modules and content of the educational program

### Brief description of the module content

#### Module disciplines

### Module 1. Fundamentals of social and humanitarian knowledge

#### Brief description of the module content

This module reveals such aspects as: socio-cultural, economic-legal, environmental knowledge, communication skills, the use of information technology taking into account modern trends in the development of society.

#### Module disciplines

Foreign language

Kazakh(Russian) language (1)

Bases of economics, law and ecological knowledge

Physical Culture

Foreign language

History of Kazakhstan

Kazakh(Russian) language (2)

The module of socio-political knowledge (sociology, political science, cultural studies, psychology)

Physical Culture

Physical Culture

World of Abai

Information and communication technology

Physical Culture

Philosophy

### Module 2. Application development for mobile devices

#### Brief description of the module content

This module reveals such aspects as: socio-cultural, economic-legal, environmental knowledge, communication skills, the use of information technology taking into account modern trends in the development of society.

#### Module disciplines

Basics of programming in Kotlin

Mobile Application Development (Android)

Cross-platform mobile development

Mobile UI/UX design

Game development on Unity

Development of mobile applications for the Internet of Things (IoT)

Own mobile development

### Module 3. Algorithms, mathematics and data analysis

#### Brief description of the module content

The module is aimed at studying fundamental concepts in mathematics, data analysis, algorithms and data structures, which are the basis for developing effective software solutions and gaining skills for building predictive models.

#### Module disciplines

Algorithms and data structures

Mathematics

Business Analytics

Signal analysis and processing

Optimization Methods

Statistical Data Analysis

### Module 4. Software development: from the basics of programming to advanced concepts in various

## **development environments**

### **Brief description of the module content**

This module is aimed at developing the basic knowledge and skills necessary for a successful start in the programming profession. The module is aimed at developing practical skills and knowledge in object-oriented programming in Python. Learning C# and Java languages will form the knowledge and skills necessary to develop simple and complex projects. The module's disciplines will allow you to develop skills in creating Windows applications based on Visual C#. During the training, students will gain skills in creating graphical interfaces, interacting with databases in application development using various technologies.

### **Module disciplines**

Introduction to the profession

Production practice 1

Educational practice

Python object-oriented programming

Advanced programming in C#

Basics of Java programming

Production practice 2

Creating Windows applications based on Visual C#

Development of multithreaded and parallel applications

Interface and user interaction

Advanced programming in Java, JSP and JOBS

Software quality testing and assurance

## **Module 5. Network and smart technologies, operating systems: security and administration**

### **Brief description of the module content**

The main purpose of the module is to study the basics and principles of network technologies and smart devices. To understand the architecture, operation and administration of operating systems, as well as to master the methods of ensuring the security of systems and networks.

### **Module disciplines**

Administration of web servers and hosting

Computer networks

Applied information theory

Computer network security

Cloud technologies

Basics of operating systems

Network operating systems

Internet technologies

## **Module 6. Development of WEB applications and Internet technologies**

### **Brief description of the module content**

The main purpose of the module is to study the main advanced technologies and frameworks for WEB development. Students will gain skills in creating interactive and dynamic websites that interact with server databases. The disciplines will allow you to master the client and server development of web applications, as well as learn how to ensure the security of web applications

### **Module disciplines**

Basics of WEB development

Advanced WEB technologies

Programming in PHP

Multilevel WEB applications and Internet technologies

Development and deployment of WEB applications

Development using Vue.js

JavaScript Frontend development using

Cloud technologies and web applications

## **Module 7. Database development and management**

### **Brief description of the module content**

This module is designed to study the theoretical and practical aspects of creating, optimizing and administering databases, and acquiring skills in working with the MySQL database management system. Students also get acquainted with the principles of developing client-server applications based on the use of databases, with concepts and methods of working with extended NoSQL databases.

### **Module disciplines**

MySQL Database Management Systems

Client-server applications using databases

Extended NoSQL databases

## **Module 8. Visualization, graphics and interface design**

### **Brief description of the module content**

The module is aimed at developing skills in creating scientific graphics using the Python programming language and its libraries, skills in working with computer graphics and creating visual effects in the Blender program. The disciplines of the module are aimed at studying the methods and technologies used for processing and analyzing images using computers.

### **Module disciplines**

Scientific graphics in Python

Blender computer graphics and visual effects

Big Data Visualization

Computer vision and image processing

Optimization and modeling of smart systems

## **Module 9. Software development process management and design**

### **Brief description of the module content**

This module is aimed at developing software development skills in flexible methodologies, including Scrum, Kanban and others. Studying the disciplines of the module will help you acquire skills in creating IT projects, study the technologies and methods used by computers to automatically improve and optimize their algorithms and functions based on large amounts of data and feedback

### **Module disciplines**

Project development in an Agile environment

Project management

Managing the software development process

Designing Web Application design

Research project

Machine learning

Designing WEB applications

Pre-graduate practice

Production practice 3

## **Final examination**

### **Brief description of the module content**

Writing and defending a thesis or preparing and passing a comprehensive exam.

### **Module disciplines**

Comprehensive exam

Graduation project

#### 4. Summary table on the scope of the educational program «6B06106 - SMART systems and programming»

Name of discipline	Cycle/ Component	Term	Number of credits	Total hours	Lec	SPL	LC	IWST	IWS	Knowledge control form
<b>Module 1. Fundamentals of social and humanitarian knowledge</b>										
Foreign language	GER/CC	1	5	150		45		35	70	Examination
Kazakh(Russian) language (1)	GER/CC	1	5	150		45		35	70	Examination
Bases of economics, law and ecological knowledge	GER/US	1	5	150	15	30		35	70	Examination
Physical Culture	GER/CC	1	2	60		60				Examination
Foreign language	GER/CC	2	5	150		45		35	70	Examination
History of Kazakhstan	GER/CC	2	5	150	30	15		35	70	Qualification examination
Kazakh(Russian) language (2)	GER/CC	2	5	150		45		35	70	Examination
The module of socio-political knowledge (sociology, political science, cultural studies, psychology)	GER/CC	2	8	240	30	45		55	110	Examination
Physical Culture	GER/CC	2	2	60		60				Examination
Physical Culture	GER/CC	3	2	60		60				Examination
World of Abai	BS/US	3	3	90	15	15		20	40	Examination
Information and communication technology	GER/CC	4	5	150	15	15	15	35	70	Examination
Physical Culture	GER/CC	4	2	60		60				Examination
Philosophy	GER/CC	5	5	150	15	30		35	70	Examination
<b>Module 2. Application development for mobile devices</b>										
Basics of programming in Kotlin	AS/US	2	5	150	15	30		35	70	Examination
Mobile Application Development (Android)	AS/US	3	5	150	15	15	15	35	70	Examination
Cross-platform mobile development	AS/US	4	5	150	15	30		35	70	Examination
Mobile UI/UX design	AS/CCh	5	5	150	15	30		35	70	Examination
Game development on Unity	AS/US	5	5	150	15	30		35	70	Examination
Development of mobile applications for the Internet of Things (IoT)	AS/CCh	5	5	150	15	30		35	70	Examination
Own mobile development	AS/CCh	5	5	150	15	30		35	70	Examination
<b>Module 3. Algorithms, mathematics and data analysis</b>										
Algorithms and data structures	BS/US	1	5	150	15	15	15	35	70	Examination
Mathematics	BS/US	1	5	150	15	30		35	70	Examination

Business Analytics	BS/US	5	5	150	15	30		35	70	Examination
Signal analysis and processing	AS/CCh	5	5	150	15	30		35	70	Examination
Optimization Methods	AS/CCh	5	5	150	15	30		35	70	Examination
Statistical Data Analysis	AS/CCh	5	5	150	15	30		35	70	Examination
<b>Module 4. Software development: from the basics of programming to advanced concepts in various development environments</b>										
Introduction to the profession	BS/US	1	3	90		30		20	40	Examination
Production practice 1	BS/US	2	3	90						Total mark on practice
Educational practice	BS/US	2	2	60						Total mark on practice
Python object-oriented programming	AS/US	3	8	240	15	30	30	55	110	Examination
Advanced programming in C#	AS/CCh	3	5	150	15	30		35	70	Examination
Basics of Java programming	BS/CCh	4	5	150	15	30		35	70	Examination
Production practice 2	BS/US	4	7	210						Total mark on practice
Creating Windows applications based on Visual C#	BS/CCh	4	5	150	15	30		35	70	Examination
Development of multithreaded and parallel applications	AS/CCh	4	5	150	15	30		35	70	Examination
Interface and user interaction	BS/CCh	5	5	150	15	30		35	70	Examination
Advanced programming in Java, JSP and JOBS	AS/CCh	5	5	150	15	30		35	70	Examination
Software quality testing and assurance	AS/CCh	5	5	150	15	30		35	70	Examination
<b>Module 5. Network and smart technologies, operating systems: security and administration</b>										
Administration of web servers and hosting	BS/CCh	1	5	150	15	30		35	70	Examination
Computer networks	BS/CCh	1	5	150	15	30		35	70	Examination
Applied information theory	BS/CCh	1	5	150	15	30		35	70	Examination
Computer network security	BS/US	3	5	150	15	30		35	70	Examination
Cloud technologies	BS/CCh	3	5	150	15	30		35	70	Examination
Basics of operating systems	BS/CCh	3	5	150	15	30		35	70	Examination
Network operating systems	BS/CCh	3	5	150	15	30		35	70	Examination
Internet technologies	BS/CCh	4	5	150	15	30		35	70	Examination
<b>Module 6. Development of WEB applications and Internet technologies</b>										
Basics of WEB development	AS/US	1	5	150	15	30		35	70	Examination
Advanced WEB technologies	AS/US	2	5	150	15	30		35	70	Examination
Programming in PHP	AS/CCh	3	5	150	15	30		35	70	Examination
Multilevel WEB applications and Internet technologies	BS/CCh	4	5	150	15	30		35	70	Examination
Development and deployment of WEB applications	BS/CCh	4	5	150	15	30		35	70	Examination
Development using Vue.js	AS/CCh	4	5	150	15	30		35	70	Examination
JavaScript Frontend development using	AS/CCh	4	5	150	15	30		35	70	Examination

Cloud technologies and web applications	BS/CCh	5	5	150	15	30		35	70	Examination
<b>Module 7. Database development and management</b>										
MySQL Database Management Systems	BS/US	2	5	150	15	30		35	70	Examination
Client-server applications using databases	AS/CCh	3	5	150	15	30		35	70	Examination
Extended NoSQL databases	AS/US	4	5	150	15	15	15	35	70	Examination
<b>Module 8. Visualization, graphics and interface design</b>										
Scientific graphics in Python	BS/CCh	4	5	150	15	30		35	70	Examination
Blender computer graphics and visual effects	AS/US	4	5	150	15	30		35	70	Examination
Big Data Visualization	AS/CCh	5	5	150	15	30		35	70	Examination
Computer vision and image processing	AS/CCh	5	5	150	15	30		35	70	Examination
Optimization and modeling of smart systems	AS/CCh	5	5	150	15	30		35	70	Examination
<b>Module 9. Software development process management and design</b>										
Project development in an Agile environment	AS/CCh	3	5	150	15	30		35	70	Examination
Project management	AS/CCh	3	5	150	15	30		35	70	Examination
Managing the software development process	AS/CCh	3	5	150	15	30		35	70	Examination
Designing Web Application design	BS/CCh	5	5	150	15	30		35	70	Examination
Research project	AS/US	5	5	150	15	30		35	70	Examination
Machine learning	AS/CCh	5	5	150	15	30		35	70	Examination
Designing WEB applications	AS/US	5	5	150	15	30		35	70	Examination
Pre-graduate practice	AS/CCh	6	15	450						Total mark on practice
Production practice 3	AS/CCh	6	15	450						Total mark on practice
<b>Final examination</b>										
Comprehensive exam		6	8	240						
Graduation project		6	8	240						

**NON -PROFIT LIMITED COMPANY «SHAKARIM UNIVERSITY OF SEMEY»**

**EDUCATIONAL PROGRAM DEVELOPMENT PLAN**  
**6B06106 - "SMART systems and programming"**

2024-2027

Semey 2024



## Content

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## 1. Passport of the Development Plan of the Bachelor's degree program 6B06106 - SMART systems and programming

1	The basis for the development	Development program of the Non -Profit Limited Company «Shakarim University of Semey» for 2023-2029 School work plan
2	Terms of implementation	2024-2027
3	Expected results of implementation	Training of specialists who are competitive in the labor market, have high personal characteristics and broad fundamental and applied knowledge in the field of information and communication technologies. The program is aimed at the formation of qualified specialists equipped with the competencies necessary for successful competition in the labor market. It also aims to develop students' personal qualities, such as creativity, sociability, analytical thinking and the ability to work in a team. Within the framework of the program, students will receive a wide range of fundamental and applied knowledge, including programming, architecture of computer systems, databases, algorithms, data structures, development of web applications, mobile applications and applications for smart systems. They will be ready for successful work in the field of information and communication technologies, having confidence in their skills and abilities, as well as understanding the current requirements and trends of the industry.

## 2. Analytical justification of the educational program

### 2.1 Information about the educational program

The educational program has been developed in accordance with the National Qualifications Framework and Professional Standards, according to the Dublin Descriptors and the Euro-Educational Program of the European Qualifications Framework. The typical period of mastering the bachelor's degree program is 3 years.

The main criterion for the completion of the educational process is the development of at least 240 credits, with the award of a bachelor's degree in information and communication technologies under the educational program "6B06106 - SMART systems and programming".

The uniqueness of the program lies in the opportunity for students to participate in scientific programs, startup projects, to realize their creative possibilities through scientific research, creative projects, sports and educational programs, as well as to continue further studies in master's and doctoral studies.

### 2.2 Information about students

Academic year	2024-2025 academic year	2025-2026 academic year	2026-2027 academic year
The basis of training			
Grant	30	30	30
Contract	25	25	25
Total	55	55	55

### **2.3 Internal and external conditions for the development of the educational program**

The academic policy of the IT Technologies, which implements the educational program "6B06106 - SMART systems and Programming", is aimed at using innovative teaching technologies based on the best practice of teaching modern general education, basic and profile disciplines, on the quality of teaching using modern learning strategies, modern teaching methods in higher education. Students and teaching staff of the IT Technologies have unlimited access to information and educational resources and electronic library systems necessary to perform independent educational and research work. Electronic information resources: full access to databases – Scopus, ScienceDirect, the Electronic Library System "Polpred", Cyberleninka, the Presidential Library named after B.N. Yeltsin, as well as limited access to some electronic databases.

The educational and laboratory classrooms of the IT Technologies are equipped with modern equipment, comply with the current sanitary standards, the requirements of the anti-educational program of the fire-free educational program, the qualification requirements for the activities of educational organizations. These classrooms are used both for conducting classes in the disciplines of the EDUCATIONAL PROGRAM "6B06106 - SMART systems and programming", and for independent work of students, completing term papers and theses/projects. THE EDUCATIONAL PROGRAM "6B06106 - SMART systems and programming" is sufficiently provided with basic methodological materials on the disciplines taught.

The classrooms of the IT Technologies are connected to a WI-FI network for online conferences, lectures, seminars with the participation of leading scientists of Kazakhstan, near and far abroad.

The Portal of educational resources of the Shakarim Semey University operates ([http://ais.semgu.kz /](http://ais.semgu.kz/)), which contains lectures, videos, hyperlinks, tasks for self-examination, presentations on topics, textbooks and other educational and methodological content on the studied disciplines of the EDUCATIONAL PROGRAM, the content of which the teaching staff uses in the classroom, and to which students have round-the-clock access. The most common innovative methods developed by teaching staff of departments for lecturing, conducting practical and laboratory classes, protection and pre-defense of graduation papers include: video lectures, slide presentations, working with an interactive whiteboard, using various programs and applications.

The Department of IT Technologies has modern computer classes and classrooms equipped with interactive whiteboards with multimedia projectors.

To implement the above-mentioned purpose of the educational program, the department has the appropriate material and technical resources. 14 classrooms are involved: 2 lecture halls, equipped with LSD projectors and interactive whiteboards, 6

computer classes with a LAN connection and unlimited Internet, 5 specialized laboratories. Thus, to date, the classroom fund of the department is sufficient for the successful implementation of the educational PROGRAM plan.

To attract students to research activities, there is a specialized laboratory (700 aud), which allows consolidating efforts to carry out scientific research. The financial resources of the EDUCATIONAL PROGRAM are provided by the university budget, as well as research and international projects. Information resources are at the disposal of the EDUCATIONAL PROGRAM and are represented by the library (including electronic publications), access to the Internet for all students and teaching staff, access to the local network of the university. There are open WI-FI zones. The personnel of the EDUCATIONAL PROGRAM is fully staffed, according to the EDUCATIONAL PROGRAM development plan. The provision of educational programs with educational and methodological complexes of disciplines is 100%. The work on mobility has been well done: Cooperation between Kazakh Universities has been expanded (Caspian University, Kozybayev SKU, Gumilev ENU, VKTU named after Serikbayeva, Innovative Eurasian University in Pavlodar, Toraighyrov University, Astana IT University also as a result of working on the project, it was possible to conclude memoranda and cooperation agreements with leading EU universities.

In 2016, a cooperation agreement was signed between the Technical and Humanitarian Academy in Bielsko-Biala (Poland). In 2017, an agreement was signed with Sofia Technical University (Bulgaria). In 2018, a cooperation agreement was signed between Taras Shevchenko National University of Kyiv (Ukraine).

According to the system of double-degree education, a joint educational program is currently working with Kyungdong University, Jionsang National University, South Korea.

During the development of the EDUCATIONAL PROGRAM, employers took part in its discussion: V.A. Zenkovich, head of the technical department of the Institution "Kazakh Center for Network Information; Daurembekova U.E., Head of the Department of Information Technology, Communications and Information Security, Semey Engineering Joint Stock Company, who represented the interests of specialists in the IT field.

According to the Educational program, contracts for practical training were signed with KSU "Center for Scientific and Practical Education and Tourism", LLP "B-APPS", LLP Kazpoligraf, LLP Kondiz distribution, JSC "Semey Engineering", LLP "IMAS GROUP", IE "Title Agency".

## 2.4 Information about teaching staff implementing the educational program

The teaching staff of the IT Technologies, which provides the implementation of the educational program "6B06106 - SMART systems and programming" is:

<b>№</b>	<b>Indicators</b>	<b>Units of measurement</b>	<b>2024-2025 academic year</b>	<b>2025-2026 academic year</b>	<b>2026-2027 academic year</b>
1	The share of teaching staff with a degree in the educational program	%	37	38	39
2	Including the share of teaching staff with a degree in the OOD cycle	%	39	40	40

The Department of IT Technologies carries out the educational process at three levels of study: bachelor's degree, Master's degree and PhD doctorate. The formation of scientific and pedagogical personnel at the department is carried out by training through a master's degree, PhD doctoral studies, advanced training of the teaching staff.

Teachers of the educational program undergo advanced training in leading universities of Kazakhstan (according to the FPC plan) and training seminars held by the Ministry of Education and Science of the Republic of Kazakhstan, universities and other organizations. Teachers' training is confirmed by certificates and certificates. Teaching staff of the University undergo scientific internships in universities of far and near abroad, in universities and research institutes of the Republic of Kazakhstan. The qualified staff of teachers is able to provide a high-quality educational process, meets the qualification requirements, the level and specifics of the educational program.

A number of teachers, such as Zolotov A.D., Kozhakhmetova D.O. have a practical educational program to work at enterprises: associate Professor Zolotov A.D. - automation engineer of the Fedorovsky Gormolzavod of the Kostanay region, Kozhakhmetova D.O. in the Instrumentation of the Milling and Feed Mill, Madiev T.B. works as a programmer of the Center for Information and Communication technology at Shakarim University. For the achievements achieved at the University, PhD, Associate Professor Zolotov A.D. was awarded the Shakarim medal, the diploma of the Minister of Education of the Republic of Kazakhstan Ye. Sagadieva.

Senior teachers Bekbaeva R.S., Ospanov E.A., Myasoedov D.V., Kurushbaeva D.T. were awarded diplomas and letters of thanks from the akim of Semey. The teaching staff of the educational program "6B06106 - SMART systems and programming" participates in competitions for grant funding, program-targeted financing of projects, which are administered by the Ministry of

Education and Science of the Republic of Kazakhstan, development institutes. The scientific direction of the department is connected with research in the field of solving scientific and practical problems in various areas of automation and IT.

The teaching staff of the department has a high scientific and methodological publication activity. The results of the scientific activity of teachers are reflected in scientific publications with an impact factor. Scientists of the Department of Automation, Information Technology and Urban Planning have the Hirsch index (h-index) in the Webofsciences and Scopus databases.

## **2.5 Characteristics of educational program achievements**

The achievements of the educational program include the training of target specialists, scientific and pedagogical personnel. The involvement of students in research is more than 65%. An important indicator of the relevance and relevance of educational programs, their compliance with modern trends in education is the academic mobility of students and teaching staff. In the direction of academic mobility development, students undergo scientific internships in foreign research centers: University of Ecology and Management in Warsaw between Shakarim State University of Semey, Transilvania University of Brasov Romania between Shakarim State University of Semey, Jan Amos Komenski State School of Higher Education in Leszno Poland between Shakarim State University of Semey, Pamukkale University between Shakarim State University of Semey, Technological educational Institute (TEI) of Crete between Shakarim State University of Semey , Democritus University of Thrace between Shakarim State University of Semey. The university implements international projects in the field of education and science, such as: Development of 2-cycle Innovative curriculum in Microelectronic Engineering, where teachers of the educational program take part.

### **3. The main objectives of the educational program development plan**

In accordance with the Strategic Development Plan of the University for the effective implementation of the educational program "6B06106 - SMART systems and programming" of the educational program, the following tasks are assigned:

- Providing high-quality training of competitive specialists
- Development and implementation of scientific projects
- Development of human resources
- Strengthening the material and technical base

• Development of international cooperation The expected final results assume: participation in funded grant projects, the publication activity of teaching staff in rating publications with a non-zero impact factor, the development and operation of joint educational programs with foreign universities, the introduction of research results into the educational process, the involvement of students in research, academic mobility of students and teaching staff.

### **4. Risk analysis of the educational program**

Identification and risk assessment of the educational program "6B06106 - SMART systems and programming" is carried out in accordance with the Strategic Development Plan of the University until 2026. The mechanism for monitoring possible risks of the educational program "6B06106 - SMART systems and programming" is the educational program surveys and questionnaires of students with satisfaction with the organization of the educational process, the quality of teaching, material and technical base. in order to assess the quality of the implemented educational program, meetings are held with specialists, graduates of previous years, students. questionnaires of employers who evaluate the quality of training of specialists are systematically monitored. The results of the survey and monitoring of the risks of the educational program are analyzed and used in the future when updating educational programs.

The successful implementation of the educational program can be influenced by various types of risks and as a result, preventive measures of the educational program have been developed measures to reduce them:



<b>№</b>	<b>Name of risks</b>	<b>Measures to eliminate</b>
1	Decrease in the number of students enrolled in the educational program	Development of a comprehensive career guidance plan for undergraduate students of the University. Attracting a contingent of students on a fee-and-contract basis
2	Insufficient level of knowledge of the language for the introduction of multilingualism	Strengthening the language training of students and teaching staff by mandatory attendance of foreign language courses established both at the university and beyond
3	Decrease in the level of employment	Attracting employers, Alumni Fair
4	Insufficient development of external and internal academic mobility of students and teaching staff	To intensify work with foreign universities for the exchange of students and teaching staff on academic mobility
5	The risk of reducing the settling of the teaching staff according to the educational program	Increasing the degree of settling down by defending doctoral dissertations
6	An improving digital material and technical base can lead to a rapid aging of the existing base	To plan the annual release of scientific and educational literature in the state language by scientists and teaching staff

## 5. Action plan for the development of the educational program


№	Criteria	Expected results	Unit of measurement	2024-2025	2025-2026	2026-2027
<b>Direction 1. Educational and methodological support</b>						
1.1	Updating the educational program based on professional standards, taking into account the recommendations of employers	Conducting an examination of the Educational program "6B06106 - SMART systems and programming" in order to increase the practice orientation and development of professional competencies of graduates	fact	+	+	+
1.2	Monitoring and updating catalogs of elective disciplines in accordance with the development of key and professional competencies, and the demands of the labor market	Improving the quality of the content of educational programs by including elective courses aimed at developing key and professional competencies of graduates in accordance with the demands of the labor market.	fact	+	+	+
1.3	The introduction of modern learning technologies into the educational process that contribute to the development of cognitive activity and the communicative ability of students	Improving the quality of teaching academic disciplines, taking into account the novelty and variety of forms of work that contribute to the development of cognitive activity.	fact	+	+	+
1.3.1	Implementation of mass open online courses (MOOCs) in the educational process according to the educational program 6B06106 - SMART systems and programming	The introduction of disciplines into the educational process is to improve the quality of teaching academic disciplines, taking into account the novelty and variety of forms of work that contribute to the development of cognitive activity.	unit	-	1	1

<b>1.4</b>	Involvement of social partners and employers in the development and examination of the implementation of educational programs	Improving the quality of educational programs implemented, taking into account market demands and recommendations from employers	unit	<b>1</b>	<b>1</b>	<b>1</b>
<b>1.5</b>	Development and implementation of elective courses in English	The introduction of disciplines in English into the educational process	unit	-	<b>1</b>	-
<b>1.6</b>	Conducting seminars and round tables on the application of innovative technologies in the educational process	The introduction of innovative technologies in the educational process	unit	-	<b>1</b>	<b>1</b>
<b>1.7</b>	Publication of educational, methodical and scientific literature on the implemented OP	Improvement of educational and methodological support in the disciplines of the implemented educational programs	unit	<b>1</b>	<b>1</b>	<b>1</b>
<b>1.8</b>	Conclusion of agreements with foreign and domestic partner universities in order to develop academic exchange of students of all levels and teaching staff	Creation of a database of foreign and domestic partner universities for the development of academic exchange of students of all levels and teaching staff	unit	<b>1</b>	-	<b>1</b>
<b>1.9</b>	Inviting students from partner universities to study for a semester, short-term internships, internships, etc.	Development of international recognition of educational programs, implementation of academic mobility programs for students	people	-	<b>1</b>	-
<b>1.10</b>	Participation of teaching staff and students in international academic exchange programs	Development of international cooperation with foreign universities implementing educational programs in the field of OP "6B06106 - SMART systems and programming"	people	-	<b>1</b>	-

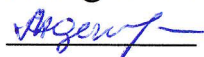
<b>1.11</b>	Development of outgoing academic mobility of teaching staff and students in the direction of OP 6B06106 - SMART systems and programming	Improving the educational program based on the experience of implementing such programs in leading foreign universities	people	<b>1</b>	-	-
<b>Direction 2. Teaching staff</b>						
<b>2.1</b>	Professional development and training of scientific and pedagogical personnel for the implementation of educational programs once every 5 years	The share of teaching staff who have completed advanced training at the national and international levels is at least 20%	people	<b>1</b>	<b>1</b>	<b>1</b>
<b>2.2</b>	Advanced training, retraining, internships of teaching staff at the international level	Completion of at least 2 teachers of the advanced training program, retraining, internships of teaching staff at the international level	people	-	<b>1</b>	-
<b>2.3</b>	Promotion of publications of the works of the Faculty in international publications indexed by the Web of Science and Scopus databases	An increase in the share of teaching staff who have published the results of scientific research in publications indexed by the Web of Science and Scopus databases – at least 30% of the total number of teaching staff	%	<b>30</b>	<b>30</b>	<b>30</b>
<b>2.4</b>	Involvement of practical specialists in teaching and scientific activities	Participation of practitioners in the implementation of educational programs (at least 20% of specialists)	%	<b>20</b>	<b>20</b>	<b>20</b>
<b>Direction 3. Internationalization of educational programs</b>						
<b>3.1</b>	Conclusion of agreements on international cooperation with foreign universities	Implementation of joint projects, preparation of scientific publications with foreign partners, creation of bases for scientific internships of students	unit	<b>1</b>	<b>1</b>	-

<b>3.2</b>	Attracting foreign students to study under the educational program 6B06106 - SMART systems and programming	Increasing the number of foreign students	people	<b>1</b>	<b>1</b>	<b>-</b>
<b>3.3</b>	Organization of joint scientific and practical events with international partners	Improving the effectiveness of scientific and methodological activities of teaching staff, exchange of experience with foreign partners	unit	<b>1</b>	<b>1</b>	<b>-</b>
<b>3.4</b>	Inviting foreign experts to give lectures and consultations on master's projects and dissertations	Improving the content component of educational programs based on the introduction of the experience of foreign specialists in the implementation of educational programs	unit	<b>1</b>	<b>1</b>	<b>1</b>
<b>3.5</b>	Expansion of cooperation with leading foreign scientific and educational organizations in order to attract the most qualified foreign specialists to the implementation of educational programs	Formation of key and professional competencies in accordance with the practice of leading universities	people	<b>1</b>	<b>1</b>	<b>1</b>
<b>Direction 4. Logistics and digitalization</b>						
<b>4.1</b>	Step-by-step equipment of classrooms with technical training tools (projectors, panels, interactive and multimedia whiteboards, multifunction devices, webcam, projector screen, etc.)	Equipping classrooms assigned to the department with technical training tools (projectors, panels, interactive and multimedia whiteboards, multifunction devices, webcam, projector screen, etc.)	unit	<b>1</b>	<b>1</b>	<b>1</b>
<b>4.2</b>	Automation of the educational process (testing, session management, student body movement, dean's office, department, teaching staff workload, schedule, library, syllabuses)	Information management based on automation of the educational process (testing, session management, student body movement, dean's office, department, teaching staff workload, schedule, library, syllabuses)	fact	<b>+</b>	<b>+</b>	<b>+</b>

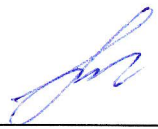
4.3	Replenishment of the full-text database of research results of teaching staff and students, teaching staff (articles, monographs, etc.)	An increase in the number of results of scientific works of scientists, research of teaching staff and students, teaching staff (articles, monographs, etc.)	unit	2	3	2
4.4	Expansion of the fund of scientific and educational literature, including on electronic media for ongoing educational programs	Ensuring the implementation of educational programs based on modern educational and information resources, including on electronic media	%	10	10	10
4.5	Monitoring the content and improvement of the faculty's website	The formation of the faculty's website on various aspects of the implementation of educational programs.	%	20	20	20

Head of the Department  Bekbayeva R.S.

**REVIEWED**

at the meeting of the Commission on Academic Quality  
Graduate School Artificial Intelligence and Construction  
Minutes of the meeting № 1 «06» 06. 2024  
Chairman CAQ  Adylkanova A.Zh.

**AGREED**

Dean  Kozhahmetova D.O.  
«06» 06. 2024