



# EDUCATIONAL PROGRAM

**6B05 - Natural Sciences, Mathematics and Statistics**  
(Code and classification of the field of education)

**6B051 - Biological and related sciences**  
(Code and classification of the direction of training)

**0510**  
(Code in the International Standard Classification of Education)

**B050 - Biological and related sciences**  
(Code and classification of the educational program group)

**6B05102 - Biotechnology**  
(Code and name of the educational program)

**Bachelor**  
(Level of preparation)

**Semey**

## **Educational program**

**6B05 -- Natural Sciences, Mathematics and Statistics**  
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**bachelor**  
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# PREFACE

## Developed

The educational program 6B05102 - Biotechnology in the direction of preparation 6B051 - Biological and related sciences 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).

Members of the Academic Committee	Full name	Academic degree, academic title, position
Head of the Academic Committee	Nurymkhan Gulnur	Dean of the Research School of Food Engineering
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Member of the AC	Kakimova Zhainagul	Head of the Department of « Biotechnology», Candidate of Engineering Sciences
Member of the AC	Mirasheva Gulmira	Associate professor of the Department of « Biotechnology», Candidate of Engineering Sciences
Member of the AC	Sailaubayev Askar	Director of LLP «Vostok-Milk Corporation»
Member of the AC	Kalieva Zulfiya	Technologist LLP «Aser»
Member of the AC	Muratbek Alibi	«6B05102 - Biotechnology» EP, student of group BT-201
Member of the AC	Bauezova Aizhana	«6B05102 - Biotechnology» EP, student of group BT-302

## Reviewing

Full name of the reviewer	Position, place of work
Sembayeva Shynar	Technologist of LLP «Vostok-Milk Corporation»
Sapinova Shynar	Technologist of PF «Kalikanuly»

## Reviewed

At a meeting of the Commission on Academic Quality of the Faculty of Engineering and Technology  
Protocol № 3 15 January 2024

At a meeting of the Academic Quality Commission of the Research School of Food Engineering  
Recommended for approval by the Academic Council of the University  
Protocol № 1 «06» 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.

# Content

1. Introduction
2. PASSPORT OF THE EDUCATIONAL PROGRAM:
  - 2.1. EP purpose;
  - 2.2. Map of the training profile within the educational program:
    - Code and classification of the field of education;
    - Code and classification of the direction of training;
    - Code in the International Standard Classification of Education;
    - Code and classification of the educational program group;
    - Code and name of the educational program;
  - 2.3. Distinctive features of the OP (double degree/joint, OVPO-partner, Double major, innovative);
  - 2.4. Qualification characteristics of the graduate:
    - Degree awarded / qualification;
    - Name of professional standard;
    - Atlas of new professions;
    - Regional standard;
    - Name of the profession / list of positions of a specialist;
    - OQF qualification level (industry qualification framework);
    - Area of professional activity;
    - Object of professional activity;
    - Types of professional activity;
  - 2.5. Graduate Model.
3. Modules and content of the educational program
4. Summary table on the scope of the educational program 6B05102 - Biotechnology»

# 1.Introduction

## 1.1.General data

The educational program 6B05102 "Biotechnology", implemented by the Shakarim University of Semey, Research School of Food Engineering, Department of "Biotechnology " for the group of educational programs 6B050 "Biological and related sciences" - was developed taking into account the needs of the regional labor market.

The educational program regulates the objectives, expected results, content, conditions and technologies for the implementation of the educational process, assessment of the quality of graduate training in this area of training and contains characteristics of the program and directions of the graduate's professional activities, learning outcomes and acquired competencies, organization of the educational process, -pechivuyu quality training students.

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 the educational process for the preparation of bachelors is the mastering by students of at least 205 credits of theoretical training, as well as at least 27 credits of practical training, 8 credits of final certification.

A total of 240 credits.

1.3.Typical study duration: 4 years.

## 2.PASSPORT OF THE EDUCATIONAL PROGRAM

<b>2.1.EP purpose</b>	Preparation of competitive specialists in the labor market for the implementation of biotechnological processes with biological objects of microbial, plant, animal origin for the purpose of its use in food and processing production
<b>2.2.Map of the training profile within the educational program</b>	
Code and classification of the field of education	6B05 - Natural Sciences, Mathematics and Statistics
Code and classification of the direction of training	6B051 - Biological and related sciences
Code in the International Standard Classification of Education	0510
Code and classification of the educational program group	B050 - Biological and related sciences
Code and name of the educational program	6B05102 - Biotechnology
<b>2.3.Distinctive features of the OP (double degree/joint, OVPO-partner, Double major, innovative)</b>	absent
<b>2.4.Qualification characteristics of the graduate</b>	
Degree awarded / qualification	Bachelor of Natural Science on the educational program 6B05102 Biotechnology
Name of professional standard	"Production of dairy products" "Yeast production" "Cheese production"
Atlas of new professions	absent
Regional standard	absent
Name of the profession / list of positions of a specialist	- the engineer-technologist (technologist); - quality engineer; - engineer - laboratory assistant; - production Preparation Engineer; - laboratory assistant in production laboratories; - laboratory assistant in research, design, technology, design or-ganizations; - technician-technologist; - technician-laboratory assistant
OQF qualification level (industry qualification framework)	6
Area of professional activity	Processing industry, agriculture
Object of professional activity	- Manufacturing enterprises and laboratories of the food and processing, microbial industry; - Agricultural enterprises; - Breeding stations; - Environmental services and organizations; - Sanitary-epidemiological station; - Laboratories for quality control and product safety.
Types of professional activity	Settlement and design; Organizational and managerial; Production and technology. Service and operational Breeding
<b>2.5.Graduate Model</b>	Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technology, taking into account modern

trends in the development of society;  
Analyze and critically comprehend socially and professionally significant experience, communicate effectively in an intercultural environment in oral and written form, including in a foreign language;  
Apply the fundamental laws of physics, elements of linear algebra, differential and integral calculus in mathematical problems of physics and mathematical methods for describing the physical processes occurring in nature, including in the body of living beings;  
Apply the basic stoichiometric laws of chemistry in solving computational problems, patterns of different types of reactions, calculate the energy characteristics of chemical processes and the number of components of solutions of a given concentration;  
To analyze the main processes and phenomena occurring in animate and inanimate nature and determine the principles of the structural and functional organization of biological objects, possible ways of biosynthesis of key ingredients and target products to select optimal conditions for the biotechnological process;  
Explain morphophysiological, biochemical, molecular genetic features of the functioning of biological objects in the field, laboratory and industrial conditions and perform qualitative and quantitative analyses using physico-chemical and microbiological methods in the cultivation of individual cells of microorganisms;  
Use microorganisms, plants or animals as objects for scientific research and practical purposes applied in various fields of biotechnology;  
Carry out the technological process of biotechnological production and processing of industrial waste in accordance with the requirements of the international standard for environmental management;  
Design enterprises of biotechnological production in accordance with the requirements of SNR and others regulations using of elements of CAD, engineering graphics and ways to ensure economic efficiency of production;  
Determine the order of organization, planning and carrying out research work using modern research, educational and information technologies, and is able to select methods of analysis depending on the object and the task;  
Use information resources to search and store information, work with spreadsheets, organize data, work with databases.

### 3. Modules and content of the educational program

#### 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. language training

##### Brief description of the module content

Argues and clearly constructs oral and written speech, correctly (logically) forms the results of thinking in written and oral form, including in a foreign language

##### Module disciplines

English for Academic purposes

Professionally-oriented foreign

Work with professional – oriented text

#### Module 3. Natural Sciences

##### Brief description of the module content

Uses the basic laws of natural science disciplines in professional activities

##### Module disciplines

Mathematics

Physics

Chemistry

#### Module 4. Biotechnology of living systems

##### Brief description of the module content

Understands the phenomena occurring in living systems and applies biotechnology objects in biotechnological processes

##### Module disciplines

Introduction to the profession

Microbiology and biotechnology in the meat and milk industries

Food Microbiology

Food Microbiology and sanitary hygiene

Training practice

General and molecular genetics

Objects of biotechnology



Physiology of nutrition  
Plant physiology  
Bioengineering  
Biochemistry  
Cell biotechnology  
Plant cell culture  
Fundamentals of biotechnology  
Fundamentals of Biotechnology of microorganisms  
Commodity Basics  
Production practice I  
Modern methods of creation of industrial strains of microorganisms  
Animal biotechnology  
Plant biotechnology  
Phytohormones in biotechnology

## **Module 5. Organization of biotechnological production**

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

Organizes biotechnological production and manages production processes

### **Module disciplines**

Safety of food products  
Industrial biotechnology  
Fundamentals of biotechnological production  
Food Biotechnology  
Industrial biotechnology  
Expertise of food products  
Microbiological control of biotechnological productions  
Microorganisms of fermentative productions  
Functional starter cultures in food industry  
Biotechnology fermentation production  
Biotechnology of dairy production and processing of secondary raw materials  
Biotechnology for the production of national dairy products  
Cost management  
Biotechnology of industrial waste processing  
Biotechnology of phototrophic microorganisms  
Yeast and micromycetes in industrial biotechnology  
Use of enzyme preparations in food production  
Probiotic biotechnology  
Selection of industrial strains of microorganisms  
Ecological biotechnology

## **Module 6. Design of enterprises of biotechnological production**

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

Performs complex engineering projects for biotechnological production facilities

### **Module disciplines**

Engineering Graphics  
Computer graphics  
Descriptive geometry and drawing  
Biotechnology equipment

Processes and devices of food manufactures  
Technological equipment of enterprises of meat and dairy industry  
Production practice II  
Organization and planning of production  
Standardization, certification and technical measurements  
Economics of enterprise  
Biotechnological waste recycling food production  
Design of fermentation enterprises  
Designing of the enterprises of meat and milk industry  
CAD Designing of the enterprises biotechnological production  
Modern problems of biosafety in food and industrial production  
Modern technologies of use of biologically active substances in bioindustry  
Prediploma practice  
Production practice III

## **Module 7. Research and protection of intellectual property**

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

Demonstrates the ability to prepare and conduct scientific research using knowledge of fundamental and applied disciplines and protection of intellectual property

### **Module disciplines**

Microbiological bases of biotechnological production  
Scientific basis of food production  
Modern directions the development of food biotechnology  
Intellectual property in quality management  
Medical and veterinary biotechnology  
Methods of food analysis  
Patent engineering  
The methodology of research work  
Research work on the specialty  
Fundamentals of scientific research

### **Final examination**

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

Writing and defending a graduation project or preparing and passing a comprehensive exam.

#### **Module disciplines**

Diploma project  
Comprehensive exam

**4. Summary table on the scope of the educational program  
«6B05102 - Biotechnology»**

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				Differentiated attestation
Foreign language	GER/CC	2	5	150		45		35	70	Examination
History of Kazakhstan	GER/CC	2	5	150	15	30		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				Differentiated attestation
Physical Culture	GER/CC	3	2	60		60				Differentiated attestation
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				Differentiated attestation
Philosophy	GER/CC	5	5	150	15	30		35	70	Examination
<b>Module 2. language training</b>										
English for Academic purposes	BS/CCh	3	3	90		30		20	40	Examination
Professionally-oriented foreign	BS/CCh	3	3	90		30		20	40	Examination
Work with professional – oriented text	BS/CCh	3	3	90		30		20	40	Examination
<b>Module 3. Natural Sciences</b>										
Mathematics	BS/US	1	5	150	15	30		35	70	Examination
Physics	BS/US	1	3	90	15	15		20	40	Examination
Chemistry	BS/US	3	5	150	15	15	15	35	70	Examination
<b>Module 4. Biotechnology of living systems</b>										
Introduction to the profession	BS/US	1	3	90	15	15		20	40	Examination
Microbiology and biotechnology in the meat and milk industries	BS/CCh	2	5	150	15		30	35	70	Examination
Food Microbiology	BS/CCh	2	5	150	15		30	35	70	Examination

Food Microbiology and sanitary hygiene	BS/CCh	2	5	150	15		30	35	70	Examination
Training practice	BS/US	2	2	60						Total mark on practice
General and molecular genetics	BS/CCh	3	5	150	15		30	35	70	Examination
Objects of biotechnology	BS/US	3	5	150	15		30	35	70	Examination
Physiology of nutrition	BS/CCh	3	5	150	15		30	35	70	Examination
Plant physiology	BS/CCh	3	5	150	15		30	35	70	Examination
Bioengineering	BS/CCh	4	5	150	15	30		35	70	Examination
Biochemistry	BS/US	4	5	150	15	15	15	35	70	Examination
Cell biotechnology	BS/CCh	4	5	150	15	30		35	70	Examination
Plant cell culture	BS/CCh	4	5	150	15	30		35	70	Examination
Fundamentals of biotechnology	BS/US	4	5	150	15		30	35	70	Examination
Fundamentals of Biotechnology of microorganisms	BS/CCh	4	5	150	15	15	15	35	70	Examination
Commodity Basics	BS/CCh	4	5	150	15	15	15	35	70	Examination
Production practice I	BS/US	4	5	150						Total mark on practice
Modern methods of creation of industrial strains of microorganisms	BS/CCh	4	5	150	15	15	15	35	70	Examination
Animal biotechnology	BS/CCh	5	5	150	15	30		35	70	Examination
Plant biotechnology	BS/CCh	5	5	150	15	30		35	70	Examination
Phytohormones in biotechnology	BS/CCh	5	5	150	15	30		35	70	Examination
<b>Module 5. Organization of biotechnological production</b>										
Safety of food products	AS/CCh	5	5	150	15		30	35	70	Examination
Industrial biotechnology	AS/CCh	5	5	150	15	30		35	70	Examination
Fundamentals of biotechnological production	AS/CCh	5	5	150	15	30		35	70	Examination
Food Biotechnology	AS/CCh	5	5	150	15		30	35	70	Examination
Industrial biotechnology	AS/CCh	5	5	150	15	30		35	70	Examination
Expertise of food products	AS/CCh	5	5	150	15		30	35	70	Examination
Microbiological control of biotechnological productions	BS/CCh	6	5	150	15	15	15	35	70	Examination
Microorganisms of fermentative productions	BS/CCh	6	5	150	15	15	15	35	70	Examination
Functional starter cultures in food industry	BS/CCh	6	5	150	15	15	15	35	70	Examination
Biotechnology fermentation production	AS/CCh	6	5	150	15	15	15	35	70	Examination and term work/Project
Biotechnology of dairy production and processing of secondary raw materials	AS/CCh	6	5	150	15	15	15	35	70	Examination and term work/Project
Biotechnology for the production of national dairy products	AS/CCh	6	5	150	15	15	15	35	70	Examination and term work/Project
Cost management	BS/CCh	7	3	90	15	15		20	40	Examination

Biotechnology of industrial waste processing	AS/CCh	7	6	180	30	30		40	80	Examination
Biotechnology of phototrophic microorganisms	AS/CCh	7	6	180	15	30	15	40	80	Examination
Yeast and micromycetes in industrial biotechnology	AS/CCh	7	6	180	15	30	15	40	80	Examination
Use of enzyme preparations in food production	AS/CCh	7	6	180	15	30	15	40	80	Examination
Probiotic biotechnology	AS/CCh	7	6	180	30	30		40	80	Examination
Selection of industrial strains of microorganisms	AS/CCh	7	6	180	30	30		40	80	Examination
Ecological biotechnology	AS/US	7	6	180	30	30		40	80	Examination
<b>Module 6. Design of enterprises of biotechnological production</b>										
Engineering Graphics	BS/CCh	3	5	150	15	30		35	70	Examination
Computer graphics	BS/CCh	3	5	150	15	30		35	70	Examination
Descriptive geometry and drawing	BS/CCh	3	5	150	15	30		35	70	Examination
Biotechnology equipment	BS/CCh	5	5	150	15	30		35	70	Examination
Processes and devices of food manufactures	BS/CCh	5	5	150	15	30		35	70	Examination
Technological equipment of enterprises of meat and dairy industry	BS/CCh	5	5	150	15	30		35	70	Examination
Production practice II	BS/US	6	5	150						Total mark on practice
Organization and planning of production	BS/CCh	7	3	90	15	15		20	40	Examination
Standardization, certification and technical measurements	BS/US	7	5	150	15	30		35	70	Examination
Economics of enterprise	BS/CCh	7	3	90	15	15		20	40	Examination
Biotechnological waste recycling food production	AS/CCh	7	5	150	15	30		35	70	Examination
Design of fermentation enterprises	AS/CCh	7	6	180	30	30		40	80	Examination and term work/Project
Designing of the enterprises of meat and milk industry	AS/CCh	7	6	180	30	30		40	80	Examination and term work/Project
CAD Designing of the enterprises biotechnological production	AS/CCh	7	6	180	30	30		40	80	Examination and term work/Project
Modern problems of biosafety in food and industrial production	AS/CCh	7	5	150	15	30		35	70	Examination
Modern technologies of use of biologically active substances in bioindustry	AS/CCh	7	5	150	15	30		35	70	Examination
Prediploma practice	AS/CCh	8	15	450						Total mark on practice
Production practice III	AS/CCh	8	15	450						Total mark on practice
<b>Module 7. Research and protection of intellectual property</b>										
Microbiological bases of biotechnological production	BS/CCh	5	5	150	15		30	35	70	Examination
Scientific basis of food production	BS/CCh	5	5	150	15		30	35	70	Examination
Modern directions the development of food biotechnology	BS/CCh	5	5	150	15		30	35	70	Examination
Intellectual property in quality management	BS/CCh	6	5	150	15	30		35	70	Examination

Medical and veterinary biotechnology	BS/CCh	6	5	150	15	30		35	70	Examination
Methods of food analysis	BS/US	6	5	150	15	15	15	35	70	Examination
Patent engineering	BS/CCh	6	5	150	15	30		35	70	Examination
The methodology of research work	AS/CCh	6	5	150	15		30	35	70	Examination
Research work on the specialty	AS/CCh	6	5	150	15		30	35	70	Examination
Fundamentals of scientific research	AS/CCh	6	5	150	15		30	35	70	Examination
<b>Final examination</b>										
Diploma project		8	8	240						
Comprehensive exam		8	8	240						

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

**EDUCATIONAL PROGRAM DEVELOPMENT PLAN**

**6B05102 - «Biotechnology»**  
2024-2028

**Semey 2024**

## Content

№	Name of sections	Pages
1.	Passport of the educational program development plan	3
2.	Analytical justification of the educational program	4
2.1	Information about the educational program	4
2.2	Information about students	4
2.3	Internal and external conditions for the development of educational programs	5
2.4	Information about teaching staff implementing the educational program	6
2.5	Characteristics of educational program achievement	7
3	Main objectives of the educational program development plan	7
4	Risk analysis of the educational program	8
5	Action plan for the development of the educational program	9



**1. Passport of the Development Plan of the Bachelor's EP 6B05102 - «Biotechnology»**

1	Basis for development	Development program of the NJSC Shakarim University of Semey for 2023-2029. Action plan for the implementation of the University Development Program for 2023-2029 Faculty work plan
2	Implementation deadlines	2024-2028
3	Expected results of implementation	Training of specialists competitive in the labor market to carry out biotechnological processes with biological objects of microbial, plant, animal origin for the purpose of its use in food and processing production

## 2. Analytical justification for the EP

### 2.1 Information about the educational program

The educational program is developed in accordance with the National Qualifications Framework and Occupational Standards, in accordance with the Dublin Descriptors and the European Qualifications Framework. The typical period for completing a bachelor's degree program is 4 years.

The main criterion for the completion of the educational process is the completion of at least 240 credits, with the award of a Bachelor of Science degree in the educational program 6B05102 “Biotechnology”.

The educational program 6B05102- “Biotechnology” was developed taking into account the needs of the regional labor market.

➤ License to conduct educational activities KZ38LAA00018432 dated June 25, 2020, application order № 274 dated June 25, 2020 (bachelor’s degree);

➤ State compulsory standard of higher and postgraduate education dated July 20, 2022.

The uniqueness of the program lies in the opportunity for students to participate in scientific programs, start-up projects, realize their creative potential through scientific research, creative projects, sports events, as well as continue further education in master's and doctoral programs.

### 2.2 Information about students

Academic year	2024-2025 academic year	2025-2026 academic year	2026-2027 academic year	2027-2028 academic year
Basics of training				
Grant	42	43	44	45
Contract	19	18	19	20
Total	60	61	62	65

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

For the development and implementation of the educational program 6B05102- «Biotechnology», the department has created favorable and optimal conditions such as:

- highly qualified teaching staff;
  - high material and technical equipment of the EP;
  - close cooperation with employers;
  - modern educational and methodological base, with students' access to information and analytical resources of the world scientific world;
  - use of modern and interactive technical teaching aids;
  - academic mobility (external and internal);
  - high-quality professional infrastructure (educational resources);
  - for conducting laboratory and practical classes there are training laboratories equipped with special equipment and materials.
- The provision of educational programs with educational and methodological complexes of disciplines is 100%.
  - The teaching staff of the department have personal computers and free access to the Internet.

The presence of high-quality professional infrastructure (educational resources) necessary for the implementation of EP is a guarantee of the training of highly qualified specialists of modern times.

At the department, a practice base is determined for students in the educational program, agreements and contracts are concluded with enterprises for educational, industrial and pre-graduate internships. Currently, there are concluded and valid agreements on industrial technological internships in the following enterprises:

1. Farm «Kalikanuly», Semey, East Kazakhstan region (Aisha);
2. «Vostok-Moloko» Corporation LLP, Ust-Kamenogorsk, East Kazakhstan region;
3. JSC «Sut», Pavlodar, Pavlodar region;
4. JSC «Food Master», Esik, Almaty region;
5. «Bagration Ulan» LLP, p. Proletarka, Ulansky district, East Kazakhstan region;
6. «Kondiz» LLP, Semey, East Kazakhstan region;
7. «Semnan» LLP, Semey, East Kazakhstan region;
8. LLP «Emil», Ust-Kamenogorsk, East Kazakhstan region;

#### 9. LLP «QAZAQ ASTYQ GROUP» Semey, East Kazakhstan region.

The implementation of academic mobility of students and teaching staff, scientific internships for students is carried out with such universities of the Republic of Kazakhstan as: NJSC «Toraigyrov University», NJSC «Kokshetau University named after Sh. Ualikhanov», NJSC «Kazakh Agrotechnical Research University named after S. Seifullin», «Almaty Technological University», etc. and foreign universities Pamukkale University, Turkey; «Federal Altai Scientific Center of Agrobiotechnology», department of the Siberian Research Institute of Cheese Making, Barnaul, Kemerovo State University, Kemerovo, Novosibirsk State Agrarian University, Novosibirsk. A memorandum of cooperation was concluded with the Northwest China University of Agriculture and Forestry - Northwest A & F University (China, Xinyang, Shaanxi Province).

One of the department's objectives is to develop a joint educational program with leading universities, the implementation of which is aimed at integration into the international scientific space through academic exchange of teachers and students, as well as obtaining two diplomas.

#### 2.4 Information about teaching staff implementing the educational program

<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>	<b>2027-2028 учебный год</b>
1	Share of teaching staff with an academic degree in EP	%	<b>62</b>	<b>63</b>	<b>64</b>	<b>65</b>
2	Including the share of teaching staff with an academic degree in the cycle of general education disciplines	%	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>

#### 2.5 Characteristics of the achievements of the EP

The achievements of EP 6B05102 – «Biotechnology» include the training of scientific and pedagogical personnel and the implementation of:

1. A joint scientific project for grant funding from the Ministry of Education and Science of the Republic of Kazakhstan on the topic: “Scientific and practical basis for the use of collagen-containing concentrate in the production of specialized curd products for nutrition of athletes.” Performers: Ph.D. Kakimova Zh.Kh., PhD Zharykbasov E.S.

2. A joint project under the Targeted Financing Program with «Kazakh research institute of processing and food industry» LLP on the topic «Development of resource-saving technology for processing secondary raw materials of cattle and poultry in the production of functional meat products». Performed by Doctor of Technical Sciences, Professor Kakimov A.K.

3. Postdoctoral grant from Jumazhanova M.M. AP14973033 «Development of technology for drinking yoghurt with encapsulated probiotic cultures». Scientific supervisor, candidate of technical sciences, associate professor Kakimova Zh.Kh.

4. It is planned to submit an application for the PTF for sustainable development of the agro-industrial complex (submitted by NTZ).

The achievements of the EP also include the functioning, on the basis of an agreement on the creation of a branch of the department on the basis of the Semey Branch of the «Kazakh research institute of processing and food industry» LLP, a branch of the department.

Concluding a memorandum with the Northwestern University of Agriculture and Forestry (Xianyang, People's Republic of China), it is planned to implement a double-degree education and an academic mobility program for students and teaching staff in EP 6B05102-Biotechnology.

### **3. Main objectives of the EP development plan**

The goals and objectives of the educational program are formulated taking into account the requirements and requests of potential consumers, and based on an assessment of the demand for the educational program, which are determined by the interests of potential employers, applicants, the potential of the university, the requirements of the state and society as a whole. The educational program 6B05102-Biotechnology is focused on training specialists competitive in the labor market to carry out biotechnological processes with biological objects of microbial, plant, and animal origin for the purpose of using them in food and processing production.

Main objectives of the EP development plan:

1. Training of in-demand personnel that meets the demands of the internal and external labor market.
2. Providing conditions for obtaining a full-fledged, high-quality professional education.
3. Formation of basic professional competencies among future specialists.

4. Graduate of competitive specialists with knowledge of a professional foreign language
5. Interaction between the university and employers to assess the competencies of university graduates and satisfaction with the quality of graduates' training
6. Increasing the research potential of the EP

#### 4. Risk Analysis of the Educational Program

№	Name of risks	Corrective measures
1	Decrease in the number of students enrolled in the EP	Development of a comprehensive plan for career guidance for university undergraduate students. Attracting a contingent of students on a paid-contractual basis
2	Insufficient level of language knowledge to introduce trilingual education	Strengthening the language training of students and teaching staff through mandatory attendance at foreign language courses created both at the university and outside it
3	Insufficient development of external and internal academic mobility of students and teaching staff	Intensify work with foreign universities for the exchange of students and teaching staff on academic mobility
4	The risk of reducing the degree of teaching staff in the EP	Increasing degree of maturity by defending doctoral dissertations
5	An improving digital infrastructure could lead to rapid aging of the existing infrastructure	Timely planned purchase of modern equipment and instruments
6	Weak activity of teaching staff in publishing scientific works in journals with a high citation index	Publication plan for teaching staff of scientific articles in journals included in the Web of Science and Scopus databases, in scientific journals with an impact factor

## 5. Action plan for the development of EP

№	Criteria	Expected results	Unit	2024-2025 academic year		2025-2026 academic year		2026-2027 academic year		2027-2028 academic year	
				plan	Actual Execution	plan	Actual Execution	plan	Actual Execution	plan	Actual Execution
<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 «6B05102-Biotechnology» in order to increase practice orientation and develop 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 labor market demands	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	Introduction into the educational process of modern teaching technologies that contribute to the development of cognitive activity and 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.	+		+		+		+	

<b>1.3.1</b>	Introduction into the educational process of massive open online courses (MOOC) according to the educational program «6B05102-Biotechnology»	Introduction of disciplines into the educational process 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	unit	1		1		1		1	
<b>1.4</b>	Involving social partners and employers in the development and examination of the implementation of educational programs	Improving the quality of implemented educational programs taking into account market demands and employer recommendations	unit	1		1		1		1	
<b>1.5</b>	Development and implementation of elective courses in English	Introduction of disciplines in English into the educational process	unit	-		1		-		1	
<b>1.6</b>	Conducting seminars and round tables on the use of innovative technologies in the educational process	Introduction of innovative technologies into the educational process	unit	1		1		1		1	
<b>1.7</b>	Publication of educational, educational-methodological and scientific literature on implemented educational programs	Improving educational and methodological support in the disciplines of implemented educational programs	unit	1		1		1		1	
<b>1.8</b>	Concluding agreements with foreign and domestic partner universities in order to develop academic exchange of students of all levels and teaching staff	Creation of a base of foreign and domestic universities - partners for the development of academic exchange of students of all levels and teaching staff	unit	-		1		-		1	
<b>1.9</b>	Inviting students from partner universities to study for a semester, short-term internships, practice, etc.	Development of international recognition of educational programs, implementation of academic mobility programs for students	number of people	1		1		1		1	



1.10	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 Biotechnology	number of people	1		1		1		1	
1.11	Development of outgoing academic mobility of teaching staff and students in the direction «6B05102-Biotechnology»	Improving the educational program based on the experience of implementing similar programs in leading foreign universities	number of people	-		1		-		1	
<b>Direction 2. Teaching staff</b>											
2.1	Increasing the professional level and training of scientific and pedagogical personnel for the implementation of educational programs once every 5 years	The share of teaching staff who have undergone advanced training at the republican and international level is at least 20%	number of people	1		1		1		1	
2.2	Completion of advanced training, retraining, internship of teaching staff at the international level	Completion of at least 2 teachers in advanced training, retraining, and internship programs for teaching staff at the international level	number of people	1		1		1		1	
2.3	Promotion of publications of teaching staff works in international publications indexed by the Web of Science and Scopus databases	Increasing 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	%	30		30		30		30	
2.4	Involving specialists from the practical field of activity in teaching and scientific activities	Participation in the implementation of educational programs of practitioners (at least 20% of specialists)	%	20		20		20		20	
<b>Direction 3. Internationalization of educational programs</b>											

3.1	Concluding agreements on international cooperation with foreign universities	Implementation of joint projects, preparation of scientific publications with foreign partners, creation of bases for scientific internships for students	unit	1		1		1		1	
3.2	Attracting foreign students to study under the educational program «6B05102-Biotechnology»	Increase in the number of foreign students	number of people	1		1		-		1	
3.3	Organization of joint scientific and practical events with international partners	Increasing the efficiency of scientific and scientific-methodological activities of teaching staff, exchange of experience with foreign partners	unit	1		1		1		1	
3.4	Inviting foreign specialists to give lectures and provide 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	-		1		-		1	
3.5	Expanding 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	number of people	1		1		-		1	
<b>Direction 4. Logistics and digitalization</b>											
4.1	Stage-by-stage equipment of classrooms with technical teaching aids (projectors, panels, interactive and multimedia boards, multifunctional devices, webcam, projector screen, etc.)	Equipping classrooms assigned to the department with technical teaching aids (projectors, panels, interactive and multimedia boards, multifunctional devices, webcam, projector screen, etc.)	unit	1		1		1		1	

4.2	Carrying out automation of the educational process (testing, session management, student movement, dean's office, department, teaching staff load, schedule, library, syllabuses)	Information management based on automation of the educational process (testing, session management, student movement, dean's office, department, teaching load, schedule, library, syllabuses)	fact.	+		+		+		+	
4.3	Replenishment of the full-text database of scientific research results of teaching staff and students, teaching staff (articles, monographs, etc.)	Increasing the number of results of scientific works of scientists, research of teaching staff and students, teaching staff (articles, monographs, etc.)	unit	5		7		7		7	
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		10	
4.5	Monitoring the content and improvement of the faculty website	Formation of the faculty website on various aspects of the implementation of educational programs.	%	20		20		20		20	

Head of the department

**Kakimova Zh.Kh.**

**REVIEWED**

at the meeting of the Commission on Academic Quality  
of the Research School of Food Engineering

Protocol of the meeting No. 1 dated 06.06.2024

Chairman Toleubekova S.S

**AGREED**

Dean Nurymkhan G.N.

06.06.2024