

**KAZAKH NATIONAL UNIVERSITY NAMED AFTER AL-FARABI**

**Faculty of Biology and Biotechnology  
Department of Biotechnology**

**Approved**

At a meeting of the Faculty Academic  
Council

Protocol No. 8 dated 23.02 2024

**Dean of the Faculty**

\_\_\_\_\_ Kurmanbaeva M.S.

**PROGRAM**

According to production practice

" 6B05103 - BIOTECHNOLOGY "

“6B05103 – NIS BIOTECHNOLOGY”

“6B05107 – MICROBIOLOGY”

"6B05101-BIOLOGYAL ENGINEERING"

Form of study (full-time)

2nd year

Number of credits 3

Program is compiled on the basis of the curricula of educational programs “6B05103 – Biotechnology”, “6B05103 – NIS Biotechnology”, “6B05107 – Microbiology” and “6B05101- Biological Engineering”.

Compiler of the program: Asrandina S.Sh., Associate Professor of the Department of Biotechnology, Ph.D.

**Agreed**

Considered and recommended at a department meeting  
" 16 " 02 2024, protocol No. 9

Head Department of Biotechnology \_\_\_\_\_ Kistaubaeva A.S.

## **Program content**

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## **1. Purpose of practice**

The main goals of industrial practice are: application of theoretical knowledge in practice: students must learn to use the knowledge acquired in training courses to solve real problems in a production environment ; o introduction to modern methods and technologies: to give students an idea of the current state of science and technology in the field of biotechnology, including the latest developments and equipment; development of professional skills and competencies: students must develop skills (teamwork, communication, time management and problem solving ) that they will need in their professional activities; gaining work experience in real conditions: provide students with the opportunity to work in real production conditions or a research laboratory; Formation of professional networks: Students should be able to establish contacts with professionals in their field, which can help them in future employment.

## **2. The task of practice**

1. Studying scientific and technical information, performing literary and patent searches on the topic of research ;

2. Familiarization with the equipment and methods used at the enterprise. Conducting experiments and participating in research work under the guidance of experienced staff;

3. Solving specific problems using biotechnological methods and techniques. Collection and analysis of data, preparation of presentation reports on the results of work performed;

4 Formation of the ability to critically analyze and evaluate modern scientific achievements.

## **3. Place of practice in the structure of the EP**

The internship is aimed at developing the personality of a specialist who is capable of: solving professional problems in the field of biotechnology, formulating production tasks in professional language and implementing them using modern technologies; assess the current state, problems and prospects for the development of biotechnology; determine society's needs for biotechnological products ; use different types of information and communication technologies; demonstrate an understanding of the various methods used in testing scientific biotechnological theories, plan and organize the conduct of research; build a personal educational trajectory.

Theoretical knowledge is consolidated during practical training. The main objective of practical training is to teach students the ability to correctly analyze and evaluate problems and prospects for development in biotechnology.

## **4. Place of practice**

1) RSE NA RPV “ Institute of Biology and Plant Biotechnology ” of the Committee of Science of the Ministry of Education and Science of the Republic of Kazakhstan ;

2) National Center for Biotechnology, Astana;

3) LLP “Research and Production Center for Microbiology and Virology”;

4) RSE at the REC “Center for Sanitary and Epidemiological Expertise” of the medical center of the Administration of the Presidential Affairs of the Republic of Kazakhstan;

5) Kazakh National Academic Center for Agrarian Research and Food Industry, Talgar;

6) “Molecular Genetic Expertise” LLP;

7) BioClean LLP ;

8 ) VivaPharm LLP ;

9) OAD-27 LLP;

10) Ak- Bulak Product LLP;

11) Maslo-Del LLP MZhK;

12) Koksus LLP S & M Company ";

Carlsberg LLP Kazakhstan ";

14) LLP Dairy Factory “Natizhe”, Kokshetau;

15) Bimbo QSR Kazakhstan LLP.

## **5. Base of practices :**

1) RSE NA RPV “ Institute of Biology and Plant Biotechnology ” of the Committee of Science of the Ministry of Education and Science of the Republic of Kazakhstan ;

2) National Center for Biotechnology, Astana;

3) LLP “Research and Production Center for Microbiology and Virology”;

4) RSE at the REC “Center for Sanitary and Epidemiological Expertise” of the medical center of the Administration of the Presidential Affairs of the Republic of Kazakhstan;

5) Kazakh National Academic Center for Agrarian Research and Food Industry, Talgar;

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12) Koksus LLP S & M Company ";

Carlsberg LLP Kazakhstan ";

14) LLP Dairy Factory “Natizhe”, Kokshetau;

15) Bimbo QSR Kazakhstan LLP.

## **6. Competencies developed as a result of internship**

### **6.1 Functional** be able to :

Ability to conduct various laboratory methods (cell and tissue culture, analysis of biomaterials, conducting biochemical tests, etc.) and field experiments.

Knowledge of basic methods of molecular biology, genetics, biochemistry and other disciplines related to biotechnology.

Have skills in working with modern laboratory equipment including spectrophotometers, PCR machines, separators, analyzers and other devices.

Ability to analyze data obtained from laboratory research and draw conclusions based on that data.

Willingness to use modern information technologies in their professional field, including databases and application software packages ;

Design and conduct research projects, including experimental design, data collection, analysis, and interpretation.

### **6.2 System** be able to :

Understand and analyze information about methods and approaches to managing biotechnological processes, as well as have the skills to work with various sources of data on possible methods and techniques for managing these processes;

o Reasonably select instruments and equipment for measuring key parameters of biotechnological processes, have the skills to statistically evaluate these parameters and be able to make informed decisions on the safe management of the technological process in order to guarantee product quality ;

Ability to apply strategies for implementing a biotechnological process management system and mastery of methods for searching and structuring solutions to implement the development of such a management system;

Select and apply technical means and technologies taking into account their environmental consequences, as well as own methods of searching and making decisions when choosing such means and technologies, taking into account their impact on the environment;

Ability to understand and evaluate the principles of safety, industrial sanitation, fire safety and labor protection, as well as possession of relevant knowledge in these areas;

Apply information technologies in your professional field and have the skills to use them within the framework of your professional activities;

Improve skills in working with programs necessary for computer-aided design and develop the ability to effectively manage information using a computer.

### **6.3 . Social**

Social norms shaping future biotechnological professionals. Must have : the norm of social justice; the norm of social responsibility; the norm of social reciprocity;

Have the ability to work in a team.

### **6.4. Meta competencies** to be able to :

develop clear and realistic research goals and objectives, taking into account the current economic situation in the field of biotechnology and manufacturing in the region. Deep understanding of industry needs to effectively plan and conduct research. The ability to critically evaluate and analyze the results obtained for the purpose of one's own professional growth . Identify major trends in key aspects of experience .

## **7. Rights and obligations of the student during the internship period**

### **The student is obliged.**

1. The biotechnologist is obliged to control the quality of products and keep a log;
2. His responsibilities include working with reagents, various chemical solutions, raw materials and biotechnological products ;
3. On the territory of biotechnological production, strictly observe all internal Rules, including labor protection, safety and sanitation rules ;
4. Handle devices, instruments, equipment, and documentation of the biotechnology industry with care ;
5. Consolidate theoretical knowledge, acquire practical skills in your chosen specialty ;
6. Observe the routine and mode of operation at the base enterprise (follow the instructions and tasks of the manager and specialists of the enterprise) ;
7. Listen to safety instructions during the internship;
8. O get acquainted with the goals and objectives of production practice;
9. Receive an individual assignment from the head of practice from the university;
10. O get acquainted with your tasks at the enterprise; - study legislative and regulatory documents, materials regulating the activities of the enterprise related to production processes;
11. O get acquainted with the organizational structure of the enterprise and acquire skills in working with documentation at the enterprise;
12. And learn the job descriptions adopted at the enterprise;
13. O get acquainted with the main technological processes implemented at the enterprise;
14. Participate in the public life of the department, laboratory, department, gain experience in organizational, managerial and educational work ;
15. Maintain and elevate the image of Al-Farabi Kazakh National University;
16. Provide the head of practice from KazNU with a report on the completion of all tasks, a practice diary and a reference certified by the head of the enterprise.

### **The student has the right.**

1. Contact the head of practice from the University, the leadership of the specialized organization and the head of the specialized organization on all issues arising during the internship;
2. Make proposals for improving the organization of practice, participate in conferences and meetings;
3. Use the library, teaching rooms, teaching aids, technological regulations, SOPs located in them – and other documents necessary for drawing up a report on practices ;
4. Do not participate in work not provided for by the internship program ;
5. Act in accordance with the regulations on professional (industrial) practice.

## **8. Rights and responsibilities of the practice manager from the practice base**

### **The practice manager from the practice base is obliged.**

1. Coordinates individual assignments in accordance with the program and academic calendar of the university, the content and planned results of practice with the head of practice from the university, jointly organizes and supervises students for continuous professional (industrial) practice ;
2. Monitors students' compliance with production discipline and reports to the head of practice from KazNU University about all cases of student violations of internal labor regulations ;
3. Provides jobs for students ;
4. Provides safe internship conditions for students that meet sanitary rules and labor protection requirements ;
5. Provides instruction on familiarization with labor protection, safety, fire safety requirements, as well as internal labor regulations ;
6. Introduces students to the organization of work at a specific workplace, to the management of the technological process, equipment, technical means and their operation, production economics ;
7. Helps students complete all tasks at a given workplace ;
8. Introduces best practices and advises on production issues ;
9. At the end of professional (industrial) practice, give characteristics of the work and the quality of the prepared report to each student intern ;
10. Together with Al - Farabi Kazakh National University , within the framework of its competence, carry out career guidance work to attract young people to study in the educational programs “ 6B05103 - Biotechnology ”, “6B05103 - Biotechnology NIS”, “6B05107 - Microbiology” and “6B05101- Biological Engineering”.

### **The practice manager from the practice base has the right.**

1. Require from the trainee strict compliance with the Rules and Regulations governing issues of labor protection, safety, sanitation, internal regulations in force on the territory of the Enterprise ;
2. Require from the trainee to take care of the property of the Enterprise (including documentation, instruments, literature, furniture, equipment, etc.) used by them during the internship and compliance with the internal Rules of the Enterprise ;
3. In case of violation by a trainee of the Rules, Regulations governing issues of labor protection, safety, sanitation, internal regulations in force on the territory of the Enterprise, grant him access to the territory of the Enterprise with immediate notification of KazNU about the refusal of admission ;
4. In case of loss, breakdown, failure of the Company's property (including documentation, instruments, literature, furniture, equipment, etc.) due to the fault of the trainee, demand compensation for material damage from KazNU .



## 9. Structure and content of practice stages

The organizational work of completing the internship is divided into three stages: introductory, main and final. The introductory stage, which takes place in the first week, is intended to provide students with a general introduction to the organization: its status, goals and structure. Here the object of practice is also determined, the task and program are drawn up. The main stage, which occurs in the second week, focuses on achieving the goals and objectives of the practice and ends with the preparation of a report. At the final stage, which takes the last two days of practice, students prepare reporting documents, coordinate them and approve them in the organization. To increase the effectiveness of practice, each student is given an individual assignment aimed at in-depth study of the features of professional activity in the chosen field. This assignment also creates the prerequisites for conducting research work in the field of biotechnology. During practice, students must master the necessary skills.

1. Justify the choice of microorganisms, plants or animals as objects for scientific research and practical work for the purpose of application in various fields of biotechnology;

2 Familiarity with the preparation and conduct of laboratory analyzes and experiments includes the use of a variety of methods: physicochemical, molecular biological and biotechnological, as well as various technological techniques, apparatus and equipment. This is necessary for a more complete assessment of the compliance of biological objects, raw materials, intermediate substances and finished products with the requirements of biotechnological production.

3 Conduct laboratory, industrial and field tests of biological objects in order to develop technologies for their use to obtain new biotechnological products;

4 Organization and conduct of research work, application of basic technologies for the production of biotechnological drugs and analysis of stages of industrial processes in biotechnology to increase the productivity of biological objects, production efficiency and compliance with environmental standards;

5 Organization of technological processes to ensure standard production of biotechnological products, as well as solving engineering problems to create innovative processes and products;

6 Introduction to methods of technological control of raw materials and target products to assess their quality compliance with GOSTs, technical specifications, SanPiN and satisfaction of the organization of biotechnological production with the rules of *good manufacturing practice* (GMP);

7 Assessing the real possibilities of practical use of the results of genetic and cellular engineering, biocatalysis and nanobiotechnologies to obtain products of microbiological synthesis;

8 Introduction to the organization and control of production and quality of manufactured biotechnological products in accordance with local acts of the enterprise (technological regulations, job descriptions, analysis methods) to confirm its compliance with the requirements of the legislation of the Republic of Kazakhstan in the field of technical regulation

9 Drawing up and execution of technical, analytical, scientific and reporting documentation on completed and planned work, including processing of initial data, results of laboratory analyzes and experiments using modern resources and computer technologies. Conducting theoretical and experimental research in various fields of applied biotechnology.

### **10. Types of SRO performed during practice**

1. Formulation and solution of professional problems in the language of specialists in the field of biotechnology, including the use of modern technologies for their implementation.

2. Mastering and practical application of skills in working with information technology in professional activities in the field of biotechnology.

3. Acquaintance with methods for searching and systematizing solutions for the implementation and management of biotechnological processes, as well as analysis of the current state, problems and prospects for the development of biotechnology.

4. Mastering the skills of working with various sources of information necessary for the implementation and management of biotechnological processes.

5. Familiarization with the technological process in accordance with established regulations and the use of technical means to measure the main parameters of biotechnological processes, as well as the properties of raw materials and products.

### **11. Certification forms and time of certification**

The results of practical training are presented in the form of a report drawn up in accordance with the requirements of current regulatory documents for regulatory and technical literature. The amount of work completed during the internship is reflected in the diary. The student fills out a diary every day, briefly recording the types of work completed during the day. Sample title pages for a report, individual assignment, diary and internship certification sheet are presented in Appendices A and B.

The report and diary are checked and signed by the head of practice from the enterprise, their signatures are certified by the seal of the organization. Signed diaries, characteristics from the enterprise and a report are submitted by students to the Department of Biotechnology no later than the last day of practice.

The form of certification of the results of practice is a report, the purpose of which is to develop the student's skills in substantiating the theoretical and practical material of practice and a deep understanding of the work performed. The report defense takes place the day after the end of the internship. During the defense, the student answers brief questions from the supervisor. The assessment takes into account the characteristics from the enterprise, the quality of the report, knowledge gained in practice, and the student's creative approach. The student is personally responsible for the accuracy of the information in the report and the quality of the individual assignment.

## 12 Evaluation criteria

Criteria-based assessment : learning outcomes are assessed in relation to descriptors, checking the level of competence at the defense of the report.

Below are the minimum scores in percentage:

95% - 100%: A	80% - 84%: B	65% - 69%: C	50% - 54%: D
90% - 94%: A -	75% - 79%: B -	60% - 64%: C -	25-49% FX
85% - 89%: B +	70% - 74%: C +	55% - 59%: D +	0% - 24%: F

Title page of the practice report

KAZAKH NATIONAL UNIVERSITY named after Al-Farabi »

Faculty of Biology and Biotechnology

Department \_\_\_\_\_

REPORT

according to \_\_\_\_\_ practice

type of practice

based on materials

\_\_\_\_\_  
name of the specialized organization

Student( s)

\_\_\_\_\_

Group

\_\_\_\_\_

Direction ( specialty) \_ \_\_\_\_\_

Head of practice from the university \_\_\_\_\_

Full name

Head of practice from a specialized organization \_\_\_\_\_

Full name

M.P.

Protection assessment

\_\_\_\_\_

Almaty 20\_\_

Practice diary title page form

KAZAKH NATIONAL UNIVERSITY named after Al - Farabi »

Faculty of Biology and Biotechnology

Department \_\_\_\_\_

DIARY

\_\_\_\_\_ student practice  
type of practice

Full Name \_\_\_\_\_

Well \_\_\_\_\_

Group \_ \_\_\_\_\_

Place of internship \_\_\_\_\_

Head of practice from the university \_\_\_\_\_

Full name

Head of Practice  
from the specialized organization

\_\_\_\_\_

Full name

M.P.

Start of practice

" \_\_\_\_\_ " \_\_\_\_\_ 20\_\_

End of practice

" \_\_\_\_\_ " \_\_\_\_\_ 20\_\_

Almaty 20\_\_

Table - Accounting for educational practice activities

No. p/p	Contents of events and their type	Quantity hours	date	Full name, position of consultant	Signature of the practice manager (from the enterprise)

Note:

- the report is drawn up during the internship;
- the internship report is accompanied by a sealed review from the internship supervisor from the enterprise, characterizing the student and the results he obtained during the internship;
- submission of a report on the internship - at the end of the internship period;
- the signatures of the manager on the part of the enterprise on the title page of the report and in the diary must also be certified by the seal of the organization.