



## 18. Learning outcomes

No	Learning outcome of the EP	Code
1	Applies the acquired knowledge in studying and mastering the material, have a clear understanding of the chosen profession, and justify the selection of microorganisms, plants, or animals as objects for scientific research and practical work with the aim of applying them in various areas of biotechnology.	LO1
2	Establishes the relationship between the structure of chemical compounds and their properties, identify general patterns in chemical processes; calculate the kinetic and thermodynamic characteristics of chemical reactions, predict the direction and feasibility of their progression; apply methods of theoretical and experimental research; conduct chemical experiments and process their results.	LO 2
3	Knows the structure and properties of the main classes of substances in living nature, the relationship between the structure and functions of biomolecules, the primary metabolic pathways of substance and energy transformations in organisms, and the key principles of organizing biological molecules into systems with properties of self-assembly, self-organization, and self-replication. The student understands the processes occurring at different levels of organization: physical, physicochemical, and biophysical processes – molecular, subcellular, cellular, tissue, organ, organismal, and biocenotic.	LO 3
4	Designs biotechnological processes using computer-aided design systems and supports a unified information space for planning and managing the enterprise at all stages of the product life cycle.	LO 4
5	Uses methods of scientific research and existing information technologies to obtain and apply enzymes, viruses, microorganisms, animal and plant cell cultures, products of their biosynthesis, and biotransformation in the field of biotechnology.	LO 5
6	Knows the characteristics of the structure of cells, tissues, and organs of living organisms, the laws of organism development; general patterns of structure, life activity, and physiology of microorganisms, as well as cultivation methods. The student is able to investigate the composition of nutrient media and culture liquids during fermentation; determine the composition of target products of cultivation; use biological equipment, work with magnification techniques, prepare temporary preparations, and conduct experiments; perform microbiological control of production.	LO 6
7	Participates in the preparation and formatting of technical, analytical, scientific, and reporting documentation for completed and planned work, processes raw data, laboratory analysis results, and experiment outcomes using modern resources and computer technologies, and conducts theoretical and experimental research in various fields of applied biotechnology.	LO 7
8	Monitors the organization of technological processes to ensure the standard mode of production of finished biotechnological products and addresses engineering analysis tasks to create innovative processes and products.	LO 8
9	Is able to independently search for information, interpret it to form judgments based on a developed worldview, civic, and moral stance, and argue their own opinions regarding phenomena and events in the social and industrial spheres.	LO 9
10	Demonstrates a desire for self-improvement, including physical and professional development, works effectively in a team, makes decisions, resolves conflict situations, exhibits leadership qualities, and is oriented toward a healthy lifestyle.	LO 10
11	Knows the fundamental concepts and facts of classical branches of mathematics and physics, and is able to apply theoretical knowledge to solve practical problems in natural sciences; applies theoretical knowledge to model phenomena and processes on a computer. The student demonstrates the ability to comprehensively apply the studied	LO 11



	statistical techniques and methods in the analysis of specific phenomena and processes.	
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### 19. Competency modules

Module name	Name of the components of the OP	Code
Key Competencies Module 1	Foreign language Kazakh language English language Foreign Language Workshop 1 Foreign Language Workshop 2 Foreign Language Workshop 3	KCM 1
Key Competencies Module 2	Module of socio-political knowledge	KCM 2
Key Competencies Module 3	History of Kazakhstan Succeeding as a Global Wildcat/Leadership and Innovation Management Succeeding as a Global Wildcat 2/Leadership and Innovation Management 2 Fundamentals of Law and Anti-Corruption Culture/Economics and Entrepreneurship Fundamentals/Scientific Research Methods/Ecology and Sustainable Development/Life Safety Fundamentals/Climate Change Philosophy Features of Entrepreneurial Activity Introduction to Theater	KCM 3
General professional competencies module 1	General Chemistry Theoretical Fundamentals of Inorganic Chemistry Organic Chemistry 1 / Theoretical Fundamentals of Organic Chemistry Organic Chemistry 2 / Chemistry of Functional Derivatives of Organic Molecules Biochemistry	GPCM 1
General professional competencies module 2	General Biology / Introduction to Biology Biology with Basics of Ecology / Evolutionary and Ecological Biology Microbiology / Cell Biology with Fundamentals of Histology and Embryology	GPCM 2
General professional competencies module 3	Mathematics Physics 1 Physics 2 Statistics	GPCM 3
Professional competencies module 1	Introduction to Professional Activity Agrobiotechnology Introduction to Biotechnology Statistical Foundations of the Information Era / Data Processing Educational Practice Production Practice 1	PCM 1
Professional competencies module 2	Food Biotechnology / Fermentation of Food Products and Beverages Plant Biotechnology / Technology of Storage and Processing of Crop Products Industrial Biotechnology	PCM 2
Professional competencies module 3	Plant and Animal Genetics Microbial Genetics Key Concepts of Molecular Microbiology	PCM 3



	Plant Genetics and Genomics	
Professional competencies module 4	Biotechnology Laboratory Applied Biotechnology Senior Capstone Microbial Genetics Laboratory	PCM 4
Final assessment module	Diploma Thesis Defense / Preparation and Passing of Complex Examination Pre-graduation practice// Production Practice 2	FAM