2. CONTENT OF THE EDUCATIONAL PROGRAM

№	Code and name of modules	Total credits by module	№	Name of subject and code	Credits by subjects	Cycle/component
1	**ISE -1** **Integration of science and education**	16	1	**ISE 501** History and philosophy of science	4	CC/UC
			2	**ISE 502** Foreign language (professional)	4	CC/UC
			3	**ISE 503** Higher School Pedagogy	4	CC/UC
			4	**ISE 504** Psychology of management	4	CC/UC
2	**SAB -2 Selected Areas of Biology**	25	5	**SAB 501/1** Medical Microbiology	5	MC/OC
				SAB 501/2 Sanitary microbiology		
			6	**SAB** 502/1 Physiology of higher nervous activity	5	MC/OC
				SAB 502/2 Anatomy of the Nervous System		
			7	**SAB** 503 Biochemistry of Metabolism	5	MC/OC
			8	**SAB** 504/1 Evolutionary Biology	5	MC/OC
				SAB 504/2 Evolution of the Bioenergetic Processes		
			9	**SAB** 505/1 Algology	5	MC/OC
				SAB 505/2 Cultural plants		
3	**EP - 3 Education paradigms**	11	10	**EP** 501/1 Modern concepts of biological education	6	MC/OC
				EP 501/2 Methodology and methods of pedagogical research		
			11	**EP** 502/1 Methodology and technology of scientific research	6	MC/OC
				EP 502/2 Methodological aspects biological research		
4	**BB - 4 Bioinformatics and Biodiversity**	22	12	**BB** 501/1 Medicinal plants and their resources	5	MC/OC
				BB 501/2 Basis of Phytocoenology		
			13	**BB** 502/1 Current issues of flora and fauna of the world	5	MC/OC
				BB 502/2 Conservation of plants and animals biodiversity		
			14	**BB** 503/1 Bioinformatics	5	MC/OC
				BB 503/2 Enzymology		
			15	**BB** 504/1 Genomics	6	MC/OC
				BB 504/2 Biometric processing of experimental data		

5	**MRW – 5** **Master's student research work**	38	16	**MRW 5 (6).02** Research practice	10	CC/UC
			17	**MRW 6.01** Pedagogical practice	4	CC/UC
			18	**MRW 5 (6).03** Undergraduate research work, including internships and the implementation of a Master's thesis (MRW)	24	MRW
6	**FC** **Final certification**	8	19	**FE** 6.01 Registration and defense of the Master's thesis (RDMT)	8	FC
TOTAL:		**120**	**20**		**120**	

2.1. DESCRIPTION MODULES AND DISCIPLINES

ISE – 1 Integration of science and education

Module description: Possesses the skills of differentiation of scientific and informational texts at the academic level in the organization of research work, conducting scientific research, including various research methods related to the subject area of research.

№	Name of subject and code	Cycle/component	Credits	Subject discruption	Teaching methods	LO by EP	Assessment methods
1	**ISE 501** History and philosophy of science	CC/UC	4	**History and philosophy** of science is obligatory for all Master's degree programs and is an introduction to the general problems of philosophy of science. Science is considered in a broad socio-cultural context and in its historical development. Special attention is paid to the problems of the crisis of modern technogenic civilization and global trends in changing the scientific picture of the world, types of scientific rationality, value systems that scientists are guided by.	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - case study, - presentations	LO1 LO2	written
2	**ISE 502** Foreign language (professional)	CC/UC	4	**Foreign language** (professional) Its main goal is the development of speech skills: the ability to discuss, to express an opinion on various topics and in various situations. The study of grammar focuses on its use in oral speech. The program includes the acquisition and improvement of other language skills: listening, reading, writing, as well as speaking.	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.),	LO2 LO3	written

				Studying on this course will allow students to gain knowledge of grammar and vocabulary of the English language, increase the level of language proficiency, improve speaking, reading and translation skills, learn to perceive English speech by ear, overcome the language barrier. Elementary: understanding simple sentences, building separate phrases, understand written and spoken language hardly. Pre-intermediate: reading adapted texts, a small vocabulary. Intermediate: to have conversations on almost any topic, however, finding the right words, phrases and turns of speech, expressing opinions and understanding the interlocutor well, speaking quickly. Upper-intermediate: understanding ordinary English speech, regardless of the speed of speaking or the regional accent of the interlocutor. Advanced: knowledge phraseological units and idioms specific to the language, reading and understanding texts of any level of complexity. General English course offers learners the opportunity to become fluent in the language.	- creative work, - case study, - presentations		
3	**ISE 503** Higher School Pedagogy	CC/UC	4	**Higher School Pedagogy-** Higher education in the modern world. Professional and pedagogical culture of a higher school teacher. Pedagogical communication. Theory of the pedagogical process of higher education. Didactics of higher education. Content of higher professional education. Managing the learning process. Methods and forms of higher school education. Theory of higher school education. Theory of scientific activity of the higher school. Pedagogical technologies. University management.	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work,	LO 2 LO 3 LO 5	written

					- case study, - presentations		
4	**ISE 504** Psychology of management	CC/UC	4	**Psychology of management-** Methodological foundations of management psychology. The development of psychological management theories. General theoretical questions of management psychology. Management analysis. Features personality manager. Psychological features of management tasks. The psychology of ownership. Professional activity manager. Functions of the subject of management. Psychology of managerial communication. Psychological characteristics of the staff. Psychology of employee motivation. Technology management of human resources of the organization. Psychological support personnel policy of the organization. Psychology of conflict in the organization. Technology warning professional deformation of the individual.	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - case study, - presentations	LO1 LO2	written

SAB -2 Selected Areas of Biology

Module description: The professional competencies of undergraduates in modern branches of biology are being formed, the skills of conducting research work and creative abilities are being improved.

№	Name of subject and code	Cycle/component	Credits	Subject discruption	Teaching methods	LO by EP	Assessment methods
1	Medical Microbiology	MC/OC	5	Medical microbiology studies the biological properties of pathogens, pathogenic factors, their mechanisms of action at the cellular and molecular genetic levels, and also contributes to the improvement of diagnostic methods, prevention and treatment.	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books,	LO 1 LO 4	written

					lectures, the Internet, documents, etc.), - creative work, - case study, - presentations		
2	Sanitary microbiology			Ecology of microbes and viruses, methods of microbiological and virological assessment of the state of the environment, general ecology, microbiocenosis. We study the methods for determining the sanitary indicators of contamination by microorganisms of the geosphere, hydrosphere and atmosphere.	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - case study, - presentations	LO 1 LO 4	written
3	Physiology of higher nervous activity	MC/OC	5	Physiology of the functional features of the nervous system of the cerebral cortex and the study of the coordinated control of the function of the brain and spinal cord. The purpose of physiology is to study not only the performance of the functions of people and animals, also to find out with the help of what mechanisms the work of these functions is performed.	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - Case study, - presentations	LO 6 LO 9	written
4	Anatomy of the Nervous System			The anatomy of the nervous system is the basis of biological disciplines. The nervous system controls the psychological change of a person. Mind, memory,	- joint work (steam room, group); -individual and joint	LO 6 LO 9	written

				thought, demand and many other things form various habits, adaptation to different conditions of life, regulated by the nervous system. The study of the anatomy of the nervous system in the evolutionary process allows us to know the activities of the higher level of the nervous system.	research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - Case study, - presentations		
5 6	Biochemistry of metabolism	MC/OC	5	It studies special reference materials, biochemical, molecular biological and genetic terminology, obtains information from the electronic center of genetic information, etc. Studies the concepts of regulatory mechanisms in unicellular and multicellular organisms, the origin and evolution of hormonal regulation, the first recipient of hormones, their mechanisms of action, structure and biosynthesis with the modern concept of metabolism in living organisms.	- SMART technology, - joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - brainstorm, - presentations	LO 4 LO 6 LO 7	written
	Evolutionary Biology	MC/OC	5	The concepts of micro- macroevolution, and their mechanisms of percolation, the problem of the origin of life. To study the first evolutionary teachings, to understand their progressive significance for the further development of science, to see the parallelism of the development of life and related teachings in combination. The section on modern concepts of biological evolution is connected with the achievements of biology in the XX and XXI centuries	- SMART technology, - joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of	LO 6 LO 9 LO 10	written

				in the field of genetics and molecular biology. On the basis of these sciences, about ten modern theories of evolution have been created.	information (books, lectures, the Internet, documents, etc.), - creative work, - brainstorm, - presentations		
	Evolution of the Bioenergetic Processes			The influence of environmental factors on energy exc hange. Bioenergy and metabolic disorders. Bioenergy levels. Bioenergy and environmental disasters. Bioenergy is the main part of biochemistry. The value of biological free energy. Energy and work of living organisms. The main stages of energy production in plants. Isolation of energy during the redox reaction. Mechanic aerobic respiration. Krebs cycle. Energy efficiency of anaerobic respiration. The energy ratio of photosynthesis.	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - case study, - presentations	LO 9 LO 10	written
	Algology	MC/OC	5	Algology is the science of algae, one of the sections of botany. Algae are of interest both for research in basic science, differing in extreme specificity and diversity of morphology and anatomy, ontogenesis and life cycles, geography and ecology, and from a practical point of view - they are widely used in various sectors of the economy (food, microbiological, pharmaceutical, geological exploration).	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - Case study, - presentations	LO 7 LO 8	written
	Cultural plants			Centers of propagation of cultivated plants (Chinese, Indian, Indian-Malay, medium, old Asia, the	- joint work (steam room, group);	LO 1 LO 4	written

				Mediterranean, Western, Central Mexico, South America and the Chilean Andes). The classification of the Russian scientist P. M. Zhukovsky (1888 - 1975) (China, Japan, Indonesia, India, Australia, India, Central, Central Asia, the Mediterranean, Africa, Europe, Siberia, Central, South, North America).	-individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - Case study, - presentations		

EP – 3 Education paradigms

Module description: Undergraduates master modern concepts of biological education and research methodology, acquire the skills of optimal conduct of scientific and pedagogical activities with the effective use of STEAM technology.

№	Name of subject and code	Cycle/component	Credits	Subject discruption	Teaching methods	LO by EP	Assessment methods
1	Modern concepts of biological education	MC/OC	5	The problem of the optimal combination of basic education and training. Basic concepts of biological knowledge reflecting the problems of human evolution and interaction with the environment: anthropocentrism, ecology, ecological integrity, biocentrism. "Basic training" and special training. The problem of identity and use of master 's knowledge in a certain field of science, education, production and management.	- SMART technology, - joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - brainstorm, - presentations	LO 8 LO 9	written

2	Methodology and methods of pedagogical research			Methodology and methods of pedagogical research. In the unity of levels of philosophical methodology, general scientific dialectical principles, private scientific methods, specific methods and procedures of psychological and pedagogical research. Research methods: from the formulation of scientific problems to statistical and qualitative processing of materials and study results design.	- SMART technology, - joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - brainstorm, - presentations	LO 1 LO 5	written
3	Educational methodology for integrating STEM in teaching biology	MC/OC	6	The aim of the subject of the integrated educational methodology STEM in the teaching of biology is the integration of the fields of science, technology, engineering and mathematics in the development of the scientific qualifications of biologists. As a result of the organization of project work in connection with the integration of STEM into the learning process, obtaining a product and developing research skills among specialists.	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - Case study, - presentations	LO 1 LO 2 LO 5	written
4	Methodological aspects biological research			Studies methodological aspects of biology in a historical retrospective, methodological and world outlook problems of modern biology, methodology of scientific knowledge of biology, experimental methods, description methods, comparative methods, statistical methods, modeling, historical methods.	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information	LO 2 LO 5	written

				Control, description, identification, classification, breeding of biological objects.	(books, lectures, the Internet, documents, etc.), - creative work, - Case study, - presentations		

BB – 4 Bioinformatics and Biodiversity

Module description: Possesses methods of analysis and assessment of biodiversity at various levels of the organization of the biosphere, the ability to assess the state and dynamics of biodiversity, predict changes in biodiversity under the influence of natural and anthropogenic factors is formed.

№	Name of subject and code	Cycle/component	Credits	Subject discruption	Teaching methods	LO by EP	Assessment methods
1	Medicinal plants and their resources	MC/OC	5	Familiarity with the basic provisions on medicinal plants of the Republic of Kazakhstan; Formation of a common understanding of the characteristics, the main features of the families of medicinal plants of Kazakhstan; acquaintance with modern directions of use of medicinal plants; Formation of the ability to independently understand the beneficial qualities of medicinal plants and their raw materials for domestic medicine. Know the morphological and anatomical diagnostic features of medicinal plants and practical applications.	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - case study, - presentations	LO 1 LO 7	written
2	Basis of Phytocoenology			The study of the causes of the organization of groups of plants, their patterns, possible methods of management and effective use. Plants created by nature and people. Determination of phytocenosis composition. Determination of the structure and structure of phytocenoses. V.V. Dokuchaev, G.F.	- SMART technology, - joint work (steam room, group); -individual and joint research work, - discussions,	LO 1 LO 7	written

				Morozov, V.I. Vernadsky, V.N. Sukachev, their role in the development of science. Concepts of the biosphere. The planetary role of living organisms	-work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - brainstorm, - presentations		
3	Current issues of flora and fauna of the world	MC/OC	5	In the modern 21st century, the following serious environmental problems can be identified: destruction of flora and fauna; deforestation; the problem of forest fires; depletion of minerals; lack of clean air, saturated with oxygen without any kind of impurities and harmful components; violation of the ozone layer that protects all life on our planet from the destructive cosmic radiation and radiation; pollution of the land landscape.	- SMART technology, - joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - brainstorm, - presentations	LO 7 LO 8	written
4	Conservation of plants and animals biodiversity			Diversity of the animal world: past and present, problems of preservation. Taxanomic diversity of the animal world on earth. Plant diversity, theoretical and practical significance Algae, mushrooms, lichens, mosses, plounas, seed plants. Factors affecting biological diversity. Biological diversity of animals and plants of Kazakhstan. Laws of Kazakhstan on conservation of biological diversity.	- SMART technology, - joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work,	LO 7 LO 8	written

					- brainstorm, - presentations		
5	Bioinformatics	MC/OC	6	Bioinformatics is a science dynamically developing at the junction of biology, mathematics, chemistry, physics, and computer technology. The purpose of bioinformatics is to determine the reliability of information on the systematization and analysis of extensive data on wildlife. This requires the use of biometric methods, the study of the interaction between living organisms, the evolution of the main features of homology and the method of mathematical analysis.	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - Case study, - presentations	LO 1 LO 2 LO 5	written
6	Enzymology			This means that any rate of an enzymatic biochemical reaction depends on the size of the substances involved in the reaction. The reaction rate is equal to the amount of enzyme activity and the relationship between the substrate and the reaction rate. Introduction. Structure and general properties of enzymes. Chemical nature of enzymes. Molecular structure enzymes.The enzymes. Apoferments and prosthetic groups of complex enzymes. Coenzymes, cofactors and their role in the catalytic process. Isozymes and their biological significance. Enzyme synthesis and its regulation. The mechanism of action of enzymes. Effect of temperature and pH environment on the activity of enzymes.	- joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - Case study, - presentations	LO 6 LO 10	written
7	Genomics	MC/OC	6	The prokaryotic genome. Prokaryotes as a form of molecular genetic research. Structure and size of the prokaryotic genome. Intestinal stick (Ech. Coli). The eukaryotic genome. Drosophila melanogaster.	- SMART technology, - joint work (steam room, group); -individual and joint	LO 6 LO 10	written

				Features of the gene of higher plants. The human genome. Mapping of the human genome. Characteristics of living organisms, Biology and its goals, Structural levels of life; basic principles of cell theory; cell features of prokaryotic and eukaryotic organisms; cell division; fertilization, fetal development; The main role of chemical and organic substances of the cell; laws of individual development.	research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - brainstorm, - presentations		
8	Biometric processing of experimental data			Studies methods of data processing obtained during experience setting by mathematical calculations, application of modern methods of scientific research, processing and interpretation of experimental data, methods of carrying out statistical processing using various programs, methodological achievements and topical problems of modern science.	- SMART technology, - joint work (steam room, group); -individual and joint research work, - discussions, -work with various sources of information (books, lectures, the Internet, documents, etc.), - creative work, - brainstorm, - presentations	LO 4 LO 6 LO 7	written

MRW – 5 Master's student research work

Module description: Enables undergraduates to apply theoretical knowledge in pedagogical and research practice. The internship will determine the direction of research work, ncluding dissertation, and improve its quality.

№	Name of subject and code	Cycle/component	Credits	Subject discruption	Teaching methods	LO by EP	Assessment methods

1	Pedagogical practice	CC UC	4		Research work is Carried out aimed at developing the ability of undergraduates to make independent theoretical and practical conclusions. Develops skills of objective assessment of scientific information, the ability to integrate interdisciplinary knowledge into free scientific research. Considers ways of applying scientific knowledge in educational activities, discusses them in the scientific environment.	Practical work		report
2	Research practice	CC UC	3		Research work is Carried out aimed at developing the ability of undergraduates to make independent theoretical and practical conclusions. Develops skills of objective assessment of scientific information, the ability to integrate interdisciplinary knowledge into free scientific research. Considers ways of applying scientific knowledge in educational activities, discusses them in the scientific environment.	Practical work		report
3	Research practice	CC UC	7		Research work is Carried out aimed at developing the ability of undergraduates to make independent theoretical and practical conclusions. Develops skills of objective assessment of scientific information, the ability to integrate interdisciplinary knowledge into free scientific research. Considers ways of applying scientific knowledge in educational activities, discusses them in the scientific environment.	Practical work		report
4	Undergraduate research work, including internships and the implementation of a Master's thesis (MRW)	MRW	1	2	Research work is Carried out aimed at developing the ability of undergraduates to make independent theoretical and practical conclusions. Develops skills of objective assessment of scientific information, the ability to integrate interdisciplinary knowledge into free scientific research. Considers ways of applying scientific knowledge in educational activities, discusses them in the scientific environment.	Practical work		report
	Methods of scientific research		1					

	Undergraduate research work, including internships and the implementation of a Master's thesis (MRW)	MRW	2		Research work is Carried out aimed at developing the ability of undergraduates to make independent theoretical and practical conclusions. Develops skills of objective assessment of scientific information, the ability to integrate interdisciplinary knowledge into free scientific research. Considers ways of applying scientific knowledge in educational activities, discusses them in the scientific environment.	Practical work		report
5	Academic writing		2	4	The discipline considers principles and techniques of creating a scientific text, rules creating scientific texts of various genres (scientific, scientific-educational, etc.), creating and editing a scientific text for publication, and features of the academic tradition in a particular field of scientific activity. The discipline forms the skills of structured presentation of their own ideas, the ability to create scientific and scientific-informational texts of various types, taking into account the specifics of academic discourse.	Practical work		report
	Undergraduate research work, including internships and the implementation of a Master's thesis (MRW)	MRW	3		Research work is Carried out aimed at developing the ability of undergraduates to make independent theoretical and practical conclusions. Develops skills of objective assessment of scientific information, the ability to integrate interdisciplinary knowledge into free scientific research. Considers ways of applying scientific knowledge in educational activities, discusses them in the scientific environment.	Practical work		report
6	Methods of scientific research		4	7	The discipline examines the basic concepts of research work, scientific methods of research, the validity of the choice of groups of methods in conducting various studies, general scientific, formal-logical, interdisciplinary research methods in the field of subject research, the main problems of research practice. The discipline forms the skills of using research methods in the field of subject research.	Practical work		report

7	Undergraduate research work, including internships and the implementation of a Master's thesis (MRW)	MRW	11	Research work is Carried out aimed at developing the ability of undergraduates to make independent theoretical and practical conclusions. Develops skills of objective assessment of scientific information, the ability to integrate interdisciplinary knowledge into free scientific research. Considers ways of applying scientific knowledge in educational activities, discusses them in the scientific environment.	Practical work		report
8	**Final Certification**	8	FC	Registration and defense of the Master's thesis (RDMT)			