

**For the register of educational programs**

1	Name of the educational program	7M05101 – Biology
2	Type of EP (current, new, innovative)	Current position
3	EP Goal	In-depth training of a qualified specialist with a system of general cultural and professional competencies, capable and ready for independent professional activity. The objectives of the educational programs 7M05101 – "Biology" correspond to the mission, strategic development plan of Astana Medical University and consist in training undergraduates in the specialty "Biology" in accordance with the Laws "On Education", "On Science" and State Standards of Education of the Republic of Kazakhstan.
4	EP Features (none, joint, two-degree program)	no
5	Partner university	-
6	Learning outcomes (at least 8 LO)	<p>LO-1 Plans professional activity in his field, based on modern achievements of science and practice;</p> <p>LO-2 Engaged in professional growth, demonstrates introspection skills, experience for teaching at the level of higher education;</p> <p>LO-3 Clearly and unambiguously communicates information, ideas, conclusions, problems and solutions to both specialists and non-specialists in their field of qualification in the field of natural sciences;</p> <p>LO-4 Demonstrates knowledge and understanding of the interdisciplinary nature of research in the field of radiobiology;</p> <p>LO-5 Is able to acquire new knowledge and skills of an applied nature in research, professional and pedagogical activities in the field of radiobiology;</p> <p>LO-6 Is able to solve problems in the field of radiobiology within the framework of his qualifications on the basis of scientific approaches;</p> <p>LO-7 Uses scientific information for the development of the field of radiobiology and the introduction of new approaches within the framework of his qualifications;</p>

7	Form of training	Full-time job
8	Language of instruction	Kazakh, Russian
9	Credit amount	120 credits
10	Academic degree awarded	Master of Natural Sciences in the educational program 7M05101 – "Biology"
11	EP accreditation (name of the accreditation body, duration of accreditation)	Certificate of specialized accreditation IAAR "Independent Agency for Accreditation and Rating" No. AB dated 10.06.2022 (06/10/2022 - 06/09/2027)

#### Information about disciplines:

№	Discipline code	Name of disciplines	Summary of the discipline	Cycle	Component	Credit card details you	Generated learning outcomes (codes)							
							LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8
1	HPhN 1201	History and philosophy of science	The history and philosophy of science studies the issues of the historical development of scientific knowledge, its structure and features, the general laws of scientific knowledge and the evolution of scientific knowledge.	BD	UC	3			+			+		
2	FL(P) 1202	Foreign language (professional)	Foreign language (professional) - to communicate in the professional and social spheres of the master's degree, learn the lexical,	BD	UC	3	+				+		+	

			grammatical and stylistic norms of a foreign language and teach them the basics of working with literature for communication and specialty.												
3	PHE 1203	Pedagogy of higher education	The discipline "Pedagogy and psychology of higher education" is aimed at mastering the theoretical, methodological and practical foundations of pedagogy and psychology of higher education, familiarization with domestic and foreign pedagogical concepts, theories and modern educational technologies.	BD	UC	3			+						
4	PsyM 1204	Psychology of management	The discipline "Psychology of management" is aimed at creating holistic ideas about the role of the human factor in management processes and its psychological mechanisms. The discipline makes it possible to develop psychological tools for	BD	UC	3			+						

			the effective management of leadership in a modern organization, which is important in the system of basic professional training of future managers.											
5	TP 1205	Teaching practice	The purpose of pedagogical practice is to study the basics of pedagogical and educational-methodical work in higher educational institutions, mastering the pedagogical skills of conducting certain types of training sessions in the disciplines of the profile corresponding to the direction of study	BD	UC	8		+			+			
6	PhBAR 2211	Module-Radiation ecology. Physical and biological aspects of radioecology	The subject studies the distribution, migration, circulation of radionuclides in the biosphere and the impact of ionizing radiation on ecological systems (biocenoses and populations of organisms). Physical and biological aspects of radioecology: the concept of radiation dose, dose from natural and artificial	BD	UC	5		+			+			

			radionuclides, biological effect of radiation											
7	AIRHFEP H 2212	Module-Radiation ecology. Assessment of the impact of radiation-hazardous facilities on the environment and public health	The subject studies methodological approaches to assessing the impact of radiation-hazardous objects on the environment and the state of public health, taking into account the specifics of enterprises, the natural and economic features of the region where they are located, as well as situations of exposure of personnel, the population and biota. Monitoring of the environment in the regions where nuclear and radiation hazardous facilities are located.	BD	UC				+				+	+
8	ECBD 2213	Module-Radiation ecology. Environment and conservation of biological diversity	The subject studies the basic notions, concepts and problems for the conservation and sustainable use of components of biological diversity, the development of a strategy for nature management and the legal basis for the conservation of biodiversity	BD	UC			+		+				+

9	BBAIR 2214	Module- General radiobiology. Basics of the biological effect of ionizing radiation	The subject studies theoretical ideas about the mechanism of the biological action of ionizing radiation: quantitative and qualitative directions in the development of concepts about the mechanism of the biological action of ionizing radiation. The principle of hitting and targets. Stochastic hypothesis. Hypothesis of primary radiotoxins and chain reactions. Structural-metabolic theory.	BD	UC	5	+				+			
10	IRM 2215	Module- General radiobiology. Interactions of radiation with matter	The subject studies the processes of interaction of charged particles, photons and neutrons with the atoms of matter. It studies of the dependence of these interactions on the type of particles, their energy and characteristics of matter.	BD	UC	5			+			+	+	
11	CR 2216	Module- General radiobiology. Cellular radiobiology	The discipline studies the main processes occurring at the cellular level of the organization of living matter when it is exposed	BD	UC	5		+		+			+	

			to ionizing radiation. Comparative radiosensitivity of cellular components. Cell responses to radiation. The role of proliferative activity, cell metabolism in radiosensitivity. Postradiation cell recovery. Radiosensitivity of tissues and organs. Reactions of cell renewal systems to irradiation.											
12	BMG 1306	Basics of molecular genetics	The discipline studies the structure and functions of nucleic acids, the principles and mechanisms of the realization of hereditary information, as well as the molecular foundations of the structure and functions of cells, the processes of growth, development, division, tumor transformation and cell death.	PD	RP		+				+			
13	BGG 1307	Basics of general genetics	The study of the discipline "Fundamentals of General Genetics" is aimed at obtaining fundamental basic	PD	RP				+			+	+	

			<p>knowledge about the nature of hereditary material, patterns of inheritance of genetic traits, patterns of variability at all levels of the organization of living matter.</p> <p>Undergraduates receive modern ideas about the structure and functions of genes, mechanisms and methods of regulating their action, replication, recombination and DNA repair. They acquire knowledge about the basics of genetic engineering, transgenic organisms, and gene therapy.</p>											
14	BC 1308	Basics of cytogenetics	<p>The discipline studies the modern theoretical foundations of the occurrence of hereditary chromosomal diseases, the formation of practical skills in the basic methods of classical cytogenetic examination of patients, the study of normal and aberrant karyotypes.</p>	PD	RP	5		+		+			+	
15	Bio 1309	Biostatistics	<p>The discipline studies statistical methods of</p>	PD	RP	3	+		+		+	+		



			analyzing research data in the field of biology, ecology, and healthcare.											
16	RP 1310	Research practice	Research practice of undergraduates is a type of educational work aimed at expanding and consolidating the theoretical and practical knowledge gained by undergraduates in the learning process, acquiring and improving practical skills in the chosen master's program, and preparing for future professional activities.	PD	RP	10		+	+		+		+	
17	BEIR 2317	Module-Animal radiobiology. Biological effect of incorporated radionuclides	The subject studies the mechanisms of the biological effect of ionizing radiation on the body of animals and biological populations exposed to internal irradiation. Studies the ways in which radioactive substances enter the body, the nature of their distribution, biological effects, as well as the prevention and treatment of damage by incorporated radionuclides	PD	OC	5	+				+			

18	BELDI 2318	Module-Animal radiobiology. Biological effects of low-dose irradiation	The subject studies the mechanisms of the biological effect of ionizing radiation on the body of animals and biological populations under external and internal irradiation, the concept of low doses of ionizing radiation, threshold and non-threshold concepts of the biological effect of low doses of ionizing radiation, stochastic effects of radiation. Carcinogenesis in the range of low doses.	PD	OC	5			+			+	+	
19	MRSOE 2319	Module-Animal radiobiology. Modification of radiation sensitivity. Oxygen effect	The subject studies the mechanisms of the biological effect of ionizing radiation on the body of animals and biological populations under external and internal exposure, the concept, types, mechanisms of radiosensitivity, the increase or decrease in the sensitivity of a living object to the action of ionizing radiation, the phenomenon of increasing the damaging effect of ionizing radiation in the presence of oxygen.	PD	OC	5		+		+			+	

20	RMTNRH E 2320	Module- Radioecological monitoring. Radioecological monitoring of the territory near radiation-hazardous enterprises	The subject studies the goals and objectives of radioecological monitoring, measures to monitor and control the radiation situation in the corresponding territory near radiation-hazardous enterprises, obtain basic information for its assessment and forecast.	PD	OC	5	+				+			
21	MADLPB 2321	Module- Radioecological monitoring. Methods for assessing the dose load on the population and biota	The subject studies the methods of radiation monitoring: monitoring of radiation fields, sampling of environmental components, monitoring of the radioactivity of the atmosphere, water, soil, methods for assessing the dose load of the population and biota	PD	OC	5			+			+	+	
22	PEPRC 2322	Module- Radioecological monitoring. Protection of the environment and the population from radioactive contamination	The subject studies the hygienic and ecological foundations of radiation protection of humans and the environment under conditions of contamination with radionuclides. Methods of farming, processing products in these conditions and the organization of nutrition of the population.	PD	OC	5		+		+			+	
23	SREMCR A 2323	Module- Basics of radiation safety. Sources of radiation exposure and	The subject studies evidence-based measures to ensure the	PD	OC	5	+				+			

		medical consequences of radiation accidents	protection of people from the harmful effects of ionizing radiation, radiation accidents and their medical consequences.											
24	SFRR 2324	Module- Basics of radiation safety. Scientific foundations of radiation regulation	It studies the main measures to ensure the health of the population, including the categories of people working with man-made sources of radiation, from the harmful effects of ionizing radiation by establishing and observing the basic principles and norms of radiation safety when using radiation in medicine, science and in various areas of the economy. International aspects of nuclear safety, radiation and nuclear safety of Kazakhstan.	PD	OC	5			+			+	+	
25	LTRE 2325	Module- Basics of radiation safety. Long-term effects of radiation exposure	The subject studies a set of measures when working with the use of radioactive substances and other sources of ionizing radiation, somatic and stochastic consequences that manifest themselves long after acute or chronic exposure. Carcinogenic and genetic long-term effects of irradiation.	PD	OC	5		+		+			+	

			Consequences of irradiation of the embryo and fetus.											
26	EM 2326	Module- Modern problems of ecology. Environmental monitoring	The discipline studies the system of observation, assessment and forecasting of the state of the environment and the consequences of anthropogenic impact on biota, ecosystems and human health, as well as the effectiveness of environmental protection measures.	PD	OC	5	+				+			
27	CEHMRB 2327	Module- Modern problems of ecology. Combined effect of heavy metals and radionuclides in biota	The subject studies the combined effect of heavy metals in biota (soil, water, plant, animal) as well as radionuclides and their pathways. The entry of heavy metals into the soil from mineral fertilizers, with sewage sludge, sewage and industrial waste.	PD	OC	5			+			+	+	
28	AIEHSAA 2328	Module- Modern problems of ecology. Assessment of emissions impact of harmful substances on atmospheric air	The subject studies the provisions of legal documents and their use in monitoring emissions of pollutants, setting maximum allowable and temporarily agreed emissions by industrial enterprises and monitoring their compliance. In addition, solving practical	PD	OC	5		+		+			+	

			problems related to the calculation of the concentration of pollutants in the atmospheric air											
29	RChNA 2329	Module- Bioindication as a method of radioecological monitoring. Radioecological characteristics of natural areas	The subject studies the definition, characterization and map of natural areas. Radioecological parameters and characteristics of natural zones.	PD	OC	4	+				+			
30	ABCTF 2330	Module- Bioindication as a method of radioecological monitoring. Assessment of biological consequences of technogenic factors	The subject studies the chemical and physical factors of the impact of man-made factors. Criteria and parameters for assessing biological consequences.	PD	OC	3			+			+	+	
31	SBRST 2331	Module- Bioindication as a method of radioecological monitoring. The system of bioindication of the radioecological state of the territory	The subject studies the concept of bioindication. Basic principles of bioindication of industrial pollution. Basic principles of bioindication in urban areas. Basic levels of bioindicative studies.	PD	OC	3		+		+			+	
32	RME 2332	Module- Dosimetry. Radiation monitoring of the environment	The subject studies the categories of control: monitoring at the source of the release ("source monitoring"), monitoring in the environment ("environmental monitoring") and monitoring of individual	PD	OC	4	+				+			

			exposure in emergency situations (“individual monitoring”). Also general guidance on the assessment of exposure doses to critical populations due to the presence of radioactive materials, or the presence of radiation fields in the environment.											
33	RFRHE 2333	Module- Dosimetry. Regulatory framework and regulation of human exposure	The subject studies the norms regulating exposure, regulatory documents on the requirement of radiation protection of people, the norms for exposure dose limits to the population and personnel working with sources of ionizing radiation	PD	OC	3			+			+	+	
34	CMDLPB 2334	Module- Dosimetry. Calculation and modeling of the dose load of the population and biota	The subject studies the development of dynamic modeling techniques for assessing the migration of radionuclides in ecosystems. Modeling the dose load of the population from external and internal radiation doses.	PD	OC	3		+		+			+	
35	RHFK 2335	Module- Radiation hazardous objects and their consequences. Radiation-hazardous facilities in Kazakhstan	The subject studies the terminology and concepts of radiation hazardous objects and their categories. Radiation hazardous	PD	OC	4	+				+			

			facilities in Kazakhstan, their location and requirements for them.											
36	MEPIR 2336	Module- Radiation hazardous objects and their consequences. Monitoring of environmental pollution of industrial regions	The subject studies the concept and tasks of ecological monitoring of the environment, types of ecological monitoring of the environment, levels of ecological monitoring, methods of ecological monitoring of the environment.	PD	OC	3			+			+	+	
37	PRW 2337	Module- Radiation hazardous objects and their consequences. Problems of radioactive waste	The subject studies the concept and types of radioactive waste, utilization and disposal of radioactive waste.	PD	OC	3		+		+			+	
38	DRMT 2338	Module- Radiation monitoring. Dosimetric and radiometric monitoring of the territory	The subject studies the concept of dosimetry, methods of dosimetry and radiometry, dosimetric and radiometric instruments, conducting dosimetric and radiometric monitoring in the territories.	PD	OC	4	+				+			
39	MARSRH ET 2339	Module- Radiation monitoring. Methods for assessing the radiation situation of the radiation hazardous enterprises territory	The subject studies forecasting and methods for assessing the radiation situation during normal operation and accidents, disasters at radiation-hazardous objects	PD	OC	3			+			+	+	



