Sustainable development courses

№	Name of discipline (Bachelor)	Short description of discipline
1	Ecosystem and Law Transport ecology	Analyzes the main patterns of functioning of ecosystems at various levels of organization, the biosphere as a whole, and their stability, and the consequences of human intervention. Describes the safety and environmental friendliness of technical systems. Provides a modern understanding of the concepts, strategies and practical tasks of sustainable development in the Republic of Kazakhstan. Application of knowledge and understanding at the professional level in the field of transport law, legal regulation of all types of transport in the Republic of Kazakhstan. Describes the impact of transport, transport facilities, and technologies on the natural environment. Develops the ability to assess the environmental safety of motor vehicles, road transport complex and road transport enterprises. Develops skills to develop measures to reduce the negative impact of transport on the ecosystem as a whole.
2	Bases of radiation safety	Knowledge on recognition of methods of protection against ionizing radiation, methods of radiometric control and legal aspects of radiation safety are formed; application of knowledge on carrying out calculations of protection against ionizing radiation, analysis of environmental objects from the point of view of their radiation safety; analyze in matters of radiation safety, organization of work of the radiation safety service, work with sources of ionizing radiation.
3	Ecosystem and Law	Knowledge of the basic concepts and laws of ecological systems, its meaning and functions. Formation of judgments for the analysis of environmental problems of industrial complexes, the ecosystem approach and its regulation in law, the ecosystem in environmental and natural resource legislation. Demonstrates knowledge of the basics of modern economic thinking, legal mechanisms of conservation and restoration in the field of life safety and environmental protection.
4	Theoretical bases and pattems of environmental protection	Knowledge of the basic physical and chemical laws of aerosol, colloidal systems and wastewater treatment; basics of solid industrial waste management, to assess the basic parameters of physical and chemical processes of environmental protection; formation of judgments from a scientific point of view of the phenomenon, the processes occurring in the treatment of gas emissions in the atmosphere, wastewater in the hydrosphere and solid waste in the lithosphere;
5	Environmental engineering	Knowledge is acquired on familiarization with applied ecology, the processes occurring in the atmosphere and hydrosphere, the processes of utilization and processing of waste from industrial enterprises, organizational and technical measures to improve the environmental safety of industrial production, the assimilation of the basics of technologies for treating harmful industrial emissions into the atmosphere and wastewater, energy saving and reduction of energy impacts on the environment.
6	Methods and means of control and monitoring of environment	Contributes to the development of knowledge of the theoretical foundations of environmental monitoring, methods and means of reducing environmental pollution, man-made systems and environmental risk; methods and means of reducing

		environmental pollution; to apply environmental methods in solving typical professional tasks; to identify negative impacts of the environment and to contribute to the improvement of the environment;
7	Industrial safety, measurement control methods and means	The discipline promotes the development of theoretical and practical foundations of monitoring research. Methods and means of instrumental control of the ecological state of the atmosphere and harmful emissions into the atmosphere. Methods and means of ecological control of water environment and wastewater composition. Methods and means of ecological control of the soil layer.
8	Radiation Exposure of Animal	Considers the issues of the protection of animals and their offspring from the harmful effects of ionizing radiation on their health, issues of productivity, quality, safety of products obtained from them. The ability to correctly make decisions on the conduct of veterinary anti-radiation measures develops; timely and full implementation of general, private rules aimed at ensuring the radiation safety of animals, products of animal origin
9	Ecology of water resources	Identifies water resources, assesses the concept of environmental problems. Identifies sources of water pollution. Identification of major pollutants entering water streams of reservoirs and basins. Knowledge of standards and criteria for assessing the quality of natural water; formation of water protection measures, technical and economic analysis and management of the water management complex, organization and implementation of water legislation. Identifies the problems of the country's aquatic ecology and offers solutions.
10	Landscape-ecological melioration	Considers the concept of economic use of natural landscapes, classification of landscape lands. Theoretical justification of geoecology in the study of the relationship between society and nature; refinement of the object and subject of the study; formation and unification of basic geological concepts and terms. Study of the extent and intensity of the impact of industrial and agricultural production on the structure of ranked geosystems - zones, provinces, territories (landscapes); Identification of functional relationships between anthropogenic sources and environmental changes.
11	Innovative water treatment technologies	Provides membrane water treatment methods. Technology of desalination, demineralization of water by reverse osmosis. Discussion of desalination of Caspian Sea water by membrane methods. Water nanofiltration. Considers removal of metal ions from waste water, surfactants by membrane methods. Electrodialysis of water. Discussion on intensification of water membrane treatment processes. Water disinfections with ozone, ultraviolet rays, ultrasound and sodium hypochloride. Discussion on comparison of cost-effectiveness of decontamination methods. Artificial enrichment of groundwater reserves
12	Safety Regulations and Environmental Protection in Agriculture	Be ready to study the current state and tasks of mechanization of livestock farms; be able to determine safety and environmental protection measures for mechanization of feed preparation and storage, for machine watering of animals and for manure

		removal;Have the knowledge to use modern technologies and equipment to maintain an optimal microclimate in livestock premises.
13	Resource-saving technologies in adaptive landscape agriculture	Under the conditions of a market economy, he studies the processes of restructuring the economic mechanism in agriculture, taking into account the resource-saving factor and organizing production on the principles of resource and energy conservation. Forms practical skills to increase production efficiency while reducing costs and minimizing environmental damage through the use of released varieties and hybrid resource-saving technologies and precision farming.
14	Protection of Agricultural Cultures from Pests	The problem of protecting agricultural plants from pests, diseases, weeds can be successfully solved only on the basis of the chemical method. Chemical protection of plants is one of the major in the training of specialists. Rules for handling pesticides, occupational health and public health in connection with the use of chemicals in agriculture.
15	Chemical plant protection	The problem of protecting agricultural plants from pests, diseases, weeds can be successfully solved only on the basis of the chemical method. Chemical protection of plants is one of the major in the training of specialists. Rules for handling pesticides, occupational health and public health in connection with the use of chemicals in agriculture.
16	Ecological Bases Chemicalixation of Agriculture	Studies balanced chemicalization of agriculture, ensuring the production of environmentally friendly products, which is proposed to be understood as “products with high nutritional value, health-improving, not containing toxic substances, not having a carcinogenic, mutagenic or other adverse effect on the human body in the process of its consumption, in increasing soil fertility, improving acidic and saline lands, maintaining and increasing the nutritional value of feed. Receives skills in the production of environmentally friendly products.
17	Ecological mapping	It studies soil and landscape mapping using GIS technologies, methods for assessing the current ecological state of the territory and the agro-ecological safety of agricultural products. Forms the skills of geographical approaches in the main areas of environmental research using information technologies of various levels; the correctness of the compilation of ecological maps and cartographic methods in ecological and geographical scientific research.
18	Resource-saving Technologies in Adaptive - landscape Agriculture	Studies in a market economy the processes of restructuring the economic mechanism in agriculture, taking into account the resource-saving factor and the organization of production on the principles of resource and energy conservation. Forms practical skills to improve production efficiency while reducing costs and minimizing damage to the environment through the use of resource-saving technologies and precision farming.
19	Environmental labeling	Knowledge and understanding of the nature and objectives of environmental labeling, the requirements of international standards for environmental labeling, the ability to analyze the types and forms of environmental information for product labeling, features of environmental labeling for various

		categories and types of products, skills of forming the necessary information for labeling, the choice of environmental signs, depending on the object of labeling.
20	Land monitoring	The concept, tasks and content of land monitoring, its place and significance in the system of information on the state of the land fund of the Republic of Kazakhstan; the principles of its management, the structure of land monitoring; the main sources and types of land pollution; the concept, types and classification of pollutants.
21	Rational Use and Protection of Land	Rational use of land for industrial and social purposes, while respecting the priority of environmental requirements for its protection, are components of the project of inter-farm land management.
22	Ecology of water resources	Knowledge of standards and criteria for assessing the quality of natural waters; organization and maintenance of monitoring of natural waters, water legislation, formation of technical and economic analysis and management of the water management complex, water protection measures.
23	Landscape ecologists	The formation of spatially heterogeneous zones, whose landscapes are characterized by different interacting strata or ecosystems spanning agricultural and urban environments, from relatively natural land and water systems such as forests, grass fields, and lakes to environments dominated by humans
24	Complex use and protection of water resources	To teach students the basic methods of calculation and design of water management systems that use water resources efficiently, to develop measures to reduce unproductive water consumption, as well as to correctly implement water protection measures aimed at protecting water bodies.
25	Purification of natural and waste water	Study of technologies and processes of natural water treatment for drinking water supply and technological needs, as well as wastewater treatment. Determine the main indicators of water quality, select the device and calculate the technological parameters of the process, taking into account the implementation of the tasks of energy and resource conservation.
26	Protection of water resources	Protection of water resources and rational water use, Measures for the protection of water bodies, Sources of water pollution and irrational use of water resources, Use of natural waters,Pollution of natural waters, Zones of sanitary protection of water sources
27	Recycling and Utilization of Polymer Waste	Studies the relationship between the state of the natural environment and the level of man-made impact of human society, the composition of plastic masses, the purpose of individual components; the mechanism of plasticization of polymers, the effect of plasticizers and fillers on physical and mechanical properties; technologies and equipment for processing plastic waste. It instills the skills of choosing equipment for recycling and recycling of polymer waste, drawing up technological schemes for the preparation of polymer waste of various cycles, methods of choosing a rational way to minimize the impact on the environment.
28	Ecology and Environmental Protection of Polymer Enterprises	Studies the basics of environmental problems associated with the operation of polymer production enterprises; scientific and practical achievements in the field of industrial ecology and

		engineering environmental protection. Instills the skills to perform calculations of economic damage from environmental pollution by polymer production enterprises.
29	Environmental Problems of Perfumery and Cosmetics Production	Considers the classification of wastes in the perfumes and cosmetics production, the harmful effects of perfumes and cosmetics on the environment and human health, the ways of utilizing production wastes, the principles of creating environmentally friendly perfumes and cosmetics. Instills the performing calculations skills of economic damage from environmental pollution by enterprises producing perfumes and cosmetics.
30	Environmental Problems of Pharmaceutical Production	Considers the main environmental problems in the pharmaceuticals and plant materials production, ways of pharmaceutical waste recycling, the principles of green economy in the pharmaceuticals production. Develops performing calculations skills of economic damage from environmental pollution by pharmaceutical manufacturing enterprises.
31	Eco textile	They consider the principles of maximum saving of natural resources, waste-free production, and secondary processing of raw materials. Orientation of students to technological and organizational-managerial types of professional activity. Carry out an analysis of the environmental situation in the textile industry, and apply methods of wastewater treatment of textile enterprises.
32	Ecological Problems of Textile Industry	Describe the current environmental problems of textile production. Justify measures to prevent harmful emissions and environmental pollution by improving technological processes. Calculate the proportion of dust on the technological process and the principle of operation of the equipment. Justify the methods of wastewater treatment: neutralization, oxidation, reduction and removal of heavy metal ions.
33	Ecological safety of textile production	Calculate the maximum permissible concentrations of harmful substances contained in the air in textile production. Study the process of industrial wastewater treatment and disposal. Review of modern methods of environmental certification of textile products and environmental labeling in the textile industry.
34	Ecological Problems of Weaving Production	Describe the current environmental problems of the textile industry. Justify measures to prevent harmful emissions and environmental pollution by improving technological processes. Calculate the proportion of dust on the technological process and the principle of operation of the equipment. Substantiate the methods of wastewater treatment: neutralization, oxidation, reduction and removal of heavy metal ions
35	Environment Protection in Oil-and-Gas Industry	The objects and components of the environment are studied; the basic concepts and laws of ecology. The stability of the natural environment to the anthropogenic impact of the processes of construction and operation of wells, oil and gas transportation; the legal basis for environmental protection; sources, causes and nature of subsurface pollution during drilling and operation of wells. The collection and systematization of data on technical supervision of environmental protection are considered. Prospects for the implementation of environmental management

		systems based on ISO 14000 series standards.
36	Ecology and Protection of the Environment on Oil and Gas Crafts	Information on the impact of the activities of oil and gas industry enterprises on the environment is being studied. Technical supervision, environmental monitoring during oil and gas production on land and at sea. The prevention of environmental pollution during the preparation, transportation and storage of oil and gas is considered. Elimination of oil spills, features of oil pollution of the Caspian waters, the main sources of pollution during offshore oil production.
37	Ecological problem in silicate industry	Forms an ecological worldview and the ability to take scientifically-based decisions to prevent the impact of antropogenic factors on human health, to understand the effect of chemical pollutants on the environment; considers methods for cleaning waste gases, recycling solid waste, the effectiveness of dust collection devices, their design, design features, principles of dust deposition and selection of the necessary dust-removing equipment.
38	Ecological Equipment of Industrial Enterprises	Considers modern methods of cleaning gas emissions, wastewater and recycling of solid waste. Develops and implements measures to prevent the ingress of harmful substances into the environment through the improvement of equipment and technology, creates effective treatment systems with waste recovery. Forms skills for constructing technological schemes to protect the environment from emissions of pollutants
39	Principles of Waste-free Industrial Production	Considers the environmental problems of industrial production; the main directions of development of low and waste-free production. Forms the development and implementation of modern technologies for the collection of gaseous, liquid and solid industrial wastes using the most efficient equipment. Acquires the skills of a qualified selection of specific methods of disposal of industrial waste necessary to perform the functional duties of the specialist.
40	Environmental Aspects of Production and Application of Oil Refining Products	Examines the composition and characteristics of harmful emissions and waste from oil refineries into the environment, methods of cleaning and recycling them, and methods for reducing air and soil pollution during storage of petroleum products. Instills skills in the development and implementation of nature-saving technological processes and modes of production of oil refining products and utilization of gaseous, liquid and solid waste.
41	Environmental Safety of Oil Refining	Considers the main factors of negative impact of hydrocarbon systems, petroleum hydrocarbon systems and environmental aspects of their production and use; features of operation of devices with increased fire and explosion hazard; risk and probability of accidents; classification of zones of destruction in the event of an accident at an oil processing plant; prevention of accidents.
42	Environmental Safety of Oil Refining	Examines the main types and sources of environmental hazards associated with oil refining processes, the main ways to control and reduce the level of environmental hazards. Instills the skills of assessing and controlling environmental risks, taking into account international and Kazakh environmental legislation,

		finding ways to reduce the environmental risk of environmental pollution by oil refining products.
43	Environmental Problems of Production and Consumption of Petroleum Products	Considers the classification of atmospheric emissions and their characteristics; purification of atmospheric emissions from solid particles and acidic components. Considers wastewater treatment, processing of oil sludge, utilization of waste petroleum products; rationing of harmful substances. Instills skills of analyzing the problem and methods of hydrocarbons reducing emissions and their derivatives.
44	Environmental problems of electrochemical productions	Considers a system of water use and wastewater treatment in electrochemical production, parts washing schemes, equipment used. It analyzes the conditions for the discharge of wastewater into water bodies, the reagent and electrochemical method of wastewater treatment, the regeneration of precious and non-ferrous metals from spent galvanic solutions. Teaches to independently conduct calculations of rationing the flow rate of soluble and insoluble anodes, to evaluate the effectiveness of wastewater treatment.
45	Environmentally Safe Technologies	Considers the relevance and importance of environmentally friendly (low-waste and non-waste) technologies, the principles of organizing non-waste production: systematic, integrated use of raw materials, the cyclical nature of material flows, environmental safety, combination and intersectoral cooperation of production. It forms skills to evaluate the effectiveness of various methods of industrial waste treatment and the disposal of valuable components.
46	Non-Waste Texhnology	Considers technologies for complex processing chemical waste, the use of solid industrial waste from chemical production containing nutrients as additives in mineral fertilizers production, complex resource-saving technology for processing waste from phosphorus and wet-process phosphoric acid production. Forms skills to analyze industrial chemical waste, to solve problematic issues of processing technogenic waste.
47	Physico-Chemical Methods of Water Purification	Characterizes natural water, indicators of quality of natural and technological water, requirements for water quality at chemical enterprises, methods of sewage treatment. Considers physico-chemical bases of ion-exchange method of water desalination, membrane and thermal methods of water purification. Forms the skills of choosing rational water treatment system taking into account the requirements, calculating and analyzing the stages of water preparation.
48	Environmental problems in the technology of inorganic substances	Examines ways to reduce and eliminate harmful emissions, the properties of air polluting substances, methods for cleaning exhaust gases, gaseous and vapor impurities, used equipment. Analyzes the conditions for the release of wastewater into reservoirs, methods of disposal and processing of solid waste, the integrated use of raw materials components, methods of cleaning and recovery. Teaches to independently calculate mass balances of industrial waste treatment, to evaluate the effectiveness of various methods of industrial waste treatment.
49	Environmentally safe technologies	Considers the relevance and importance of environmentally friendly (low-waste and waste-free) technologies, principles of

		organization of waste-free production: consistency, the integrated use of raw materials, the cyclical nature of material flows, environmental safety, combination and inter-industry cooperation of production. Forms the skills to independently calculate mass balances of industrial waste treatment; evaluate the effectiveness of various methods of cleaning industrial waste and recycling valuable components.
50	Environmental Technologies at Thermal Power Plants	The basics of the theory of purification, methods and technologies for purifying flue gases from sulfur oxides and nitrogen oxides are studied. Considered methods for calculating the dispersion of harmful substances in the atmosphere, problems of environmental protection environment from the operation of a heat-and-power facility and the choice of environmental technologies. Skills for the use of methods for assessing economic damage from pollution atmosphere are formed.
51	Environmental Problems of Heat and Power Engineering	The ecological problems of thermal power engineering, the negative consequences of the impact of energy on the environment are being studied. The tasks of environmental measures in the heat power industry are considered; selection, calculation and operation of cleaning equipment and equipment for capturing harmful substances of technological and thermal emissions. The skills of using algorithms and programs for calculating the emission parameters of TPP equipment, developing generalized solutions to environmental problems are being formed.
52	Ecological chemistry	To describe the Earth's geosphere, global biogeochemical cycles of biogenic and abiogenic chemical processes occurring in the environment under the influence of anthropogenic activity, their patterns and factors, chemical transformations of substances in natural environments. To apply the skills of choosing effective methods for cleaning environmental components from various types of pollutants, predicting the behavior of pollutants, their distribution area in the natural environment.
53	Monitoring the State of the Natural Environment and Environmental Monitoring	To describe the information model of the controlled object, its state, the impact of interactions on flora and fauna, chemical interactions with each other and with the environment for processing and presenting the information received. To apply skills in control and monitoring of the state of the natural environment and objects of pollution, using physical and chemical methods of express analysis, chromatography, spectroscopy, spectrophotometry, calorimetry and work in a team.
54	Environmental Problems in Chemical Engineering	Considers ways to reduce and eliminate harmful emissions, properties of air polluting substances, methods for cleaning exhaust gases, gaseous and vapor impurities, used equipment. Analyzes methods of solid waste utilization and processing, sewage purification, complex use of raw material components. Teaches to independently calculate mass balances of industrial waste purification and utilization, to evaluate efficiency of various purification methods.
55	Chemical ecology	Students will be able to characterize the variety of chemical, biological processes in the environment, the circulation of

		substances and their impact on human life, chemical, biological methods and means of protecting the environment. To explain the natural and forced processes of transformation, accumulation and transport of substances in the biosphere; knowledge of their anthropogenic impact on the environment. To demonstrate skills in determining the ecological situation of a local and global nature; environmental monitoring and methods of its protection. To show teamwork skills when performing an experiment and processing results
56	Geoecology and nature conservation	Formation of students knowledge on the theoretical foundations of geo-ecology and environmental protection. Knowledge and understanding of the essence of the spatial-temporal patterns of interaction of communities with the surrounding environment, as well as the geographical patterns of the impact of the anthropogenic factor on the geo-ecosystem
57	Climate change and the "Green Economy"	Considers global warming and climate change; environmental pollution; ecological degradation of landscapes. Defines the concept of "desertification", the rate of desertification under the influence of natural and anthropogenic processes. Analyzes the current natural and socio-economic effects of climate change. The response of natural systems to the increase in global air temperature, population and economy on the growth of extreme events. Adaptation of natural and socio-economic systems to climate change. Technogenic pollution of air, soil, water.
58	Environmental problems of Physical Geography	Familiarization with the nature of Kazakhstan and the basic laws of its formation, the history of the study of the nature of the Republic, the features of the components of the nature of the territory. Geographical location and borders. History of research. Tectonic and geological structure of the territory of Kazakhstan. Relief Of Kazakhstan. Climate Of Kazakhstan. Internal waters of Kazakhstan. Soil and vegetation cover of Kazakhstan. Fauna of Kazakhstan. Natural areas of Kazakhstan.
59	Geographical basic of sustainable development of Kazakhstan	Formation of knowledge and concept of the population and economy of the Republic of Kazakhstan. The objects of research are the population and economy of Kazakhstan as a sovereign state with a developing economy, a country that occupies a prominent place among the countries of the world and as a leader in the Central Asian region. Natural conditions and resources of Kazakhstan. The population of Kazakhstan. Labor resources. External economic relations of Kazakhstan. Economic and geographical zoning
60	Geoecology and Nature Protection	Considers changes in the Earth’s geospheres under the influence of human activity and emerging geo-environmental problems, place and connections of geo-ecology among the earth sciences. Studies global environmental problems of the Earth, anthropogenic transformations of the Earth’s ecosystems, natural resources of Kazakhstan, its regional and national peculiarities. Analyzes environmental consequences of mining, reduction of natural biological productivity of ecosystems, hazard maps of anthropogenic desertification of part of the territory of Kazakhstan.
61	2. Climate Change and "Green	Explores climate change and its impact on natural and economic

	Economy"	systems, analyzes regulatory documents on climate change. Studies transition to the green economy, history of formation of the concept of sustainable development and green economy in Kazakhstan, main directions of the Concept of the transition of Kazakhstan to the green economy: sustainable use of water resources; development of sustainable and high-performance agriculture.
62	Green technologies for processing domestic wastes	Considers green technologies that can provide the necessary level of economic growth without creating additional environmental risks. Studies the efficient use of natural resources, the conservation and increase of natural capital, the reduction of environmental pollution, the conservation of ecosystems and biodiversity, and the growth of income and employment.
63	Engineering Economics and Entrepreneurship	Considers features of the content of business activities in a particular field of environmental protection. Discloses mechanism for formation of business ideas, technology of business planning, risk management, specifics of assessing and analyzing the effectiveness of business activities in a particular area or sector of the economy.
64	Modeling in Ecology	Explores brief description of models, principles for constructing ecological models, elementary mathematical models; creates elementary mathematical models. Conducts technical calculations using mathematical methods, uses methods of mathematical analysis and statistical modeling in ecology, independently integrates this knowledge to carry out engineering calculations, design and research and development tasks in the field of mathematical modeling.
65	Monitoring of Radioactive Waste and Physical Pollution	Considers types of radioactive wastes, quantitative assessment of industrial wastes, classification of elements depending on design of chemical process system, use and disposal of plastics waste, waste disinfection. Generates knowledge on disposal of radioactive wastes.
66	Rational Use and Protection of Land Resources	Considers the Land Code of the Republic of Kazakhstan, rational use of lands of the Republic of Kazakhstan, rational use of erosion-hazardous lands, rational use of lands in the areas of deflation, irrigation, salinization, rational use of lands in the specially protected natural areas. Studies rational use of agricultural lands, rational use of lands of industry, transport, communications, energy and mining industries, degraded land and their rational use, urban lands and problems of their rational use.
67	Environmental Management and the Basis of the Green Economy	Considers rational use and protection of natural resources of the Republic of Kazakhstan, classification of natural resources, problems depletion of natural resources, Analyzes principles of rational use of natural resources. Studies transition to the green economy, history of formation of the concept of sustainable development and green economy in Kazakhstan
68	Means of Control and Measurement in Industrial Ecology	Considers basic concepts and definitions in the field of monitoring and measurement in industrial ecology. Describes procedure for implementation of environmental monitoring of emissions into the atmospheric air in enterprise. Explores eco-

		analytical control of industrial emissions and experimental methods of monitoring. Defines placement and equipment of control points. Studies methods for measuring aerodynamic parameters of flow in the ACS, and determines static pressure in gas flue, linear and volumetric gas velocity.
69	Environmental Chemistry	Analyses main organic and inorganic environmental pollutants and emergence of chemical compounds. Studies mass-exchange processes of equilibrium systems in the biosphere, determines sources of chemical pollutants and their scale, their distribution and transformation in the biosphere, stability of the biosphere to the effects of external factors, impact on living organisms.
70	Eco-protective Equipment and Technologies	Considers impact of main technological processes of industry on the environment, protection technology of atmospheric air, water resources, technology of land reclamation. Studies technology of processing, recycling of industrial wastes and municipal solid wastes. Analyzes development and implementation of environmental protection technologies.
71	Ecological Problems in Agricultural Areas	Analyzes socio-environmental problems of agriculture, environmental aspects of intensification of agriculture, environmental problems of agricultural areas. Applies biological methods of pest control in agriculture; solves environmental problems of agricultural chemization; explores use of biological fertilizers and plant protection products, independently finds ways to solve environmental problems of land resources.
72	Ecological Resource Knowledge and of Natural Management	Investigates the geo-ecological assessment of the prospects for the use of minerals, the intersectoral nature of environmental resource management. Analyzes the environmental consequences of the location and structure of certain types of natural resources and their complexes. Assesses the environmental impact of industrial waste. Studies the types of economic mechanisms of environmental management, approaches to the economic assessment of natural resources.
73	Ecology of Animals, Plants and Biogeography	studies the ecology of animals and plants, the problems of systematizing biodiversity. Explores the diversity of living organisms, the comparative characteristics of prokaryotes and eukaryotes.Considers the main stages of development of biogeography, knowledge of the general distribution of organisms to the characteristics of individual biogeographic sections, evaluates the features of the distribution of species, their histories, mapping of the ranges of biological objects.
74	Biogeochemistry and Ecotoxicology	Considers formation and development of biogeochemistry as a science, origin and evolution of the Earth's geospheres, origin and evolution of the lithosphere, hydrosphere and atmosphere, biogeochemical circulation of elements in various biosphere environments. Analyzes laws and mechanisms of interaction of ecotoxicants with the environment and man. Understands conditions and mechanisms of global biotic regulation (circulation) of the environment.
75	Bioindication Research Methods in Ecology	Explores the environmental foundations of bioindication methods. He studies biological indices and coefficients in comparative bioindication studies. Describes bioindication at the molecular and cellular levels of organization of biological

		systems.
76	International Legislation in the Field of Ecology	Considers problems of interaction between society and nature, international organizations, role of international organizations in solving environmental problems of our time, international treaties, the Paris Agreement on Climate Change. Analyzes information about international organizations and international treaties.
77	Fundamentals of Environmental Regulation and Examination	Considers basics of environmental regulation, mechanisms of environmental regulation, history of the EIA, content and theoretical foundations of environmental regulation and expertise, terms and definitions; arguing principles, criteria and objects of environmental impact assessment. Independently used environmental regulations in the field of ecology. Analyzes principles and structure of environmental impact assessment.
78	Fundamentals of Environmental Law in Environmental Management	Studies the rights and obligations of control officials, the procedure for environmental control, work with regulatory documents, their processing, storage, use in professional activities and transfer, independently distinguishes between types of legal liability for violation of environmental laws.
79	Assessment and Accounting of Environmental Pollution Sources	Considers state registration of sites of environmental pollution. Describes procedure for keeping records of environmental pollution sites and their registers, accounting for disposal of hazardous substances, radioactive wastes and waste water disposal. Determines assessment of ecological situation of territories and impact on the environment. Considers types of impacts to be taken into account in the EIA process.
80	Urban Ecohydrology	Examines the interaction between water and ecosystems. Analyzes the ecological processes occurring within the hydrological cycle and uses them to improve environmental sustainability. Studying the principles of ecohydrology: hydrological, ecological, ecological engineering, explores ecosystem degradation using concepts that integrate terrestrial and aquatic ecosystems
81	Environmental Waste Inventory	Studies state cadasters of natural resources of the Republic of Kazakhstan, ecological inventory of wastes, classification of natural inventories. Analyzes main content of state cadasters and basics of cadastral work. Defines relationship of cadastral work with environmental management and nature protection.
82	Environmental Monitoring	Studies content and structure of environmental monitoring, objects of environmental monitoring, classification of types of monitoring by object tracking methods. Studies nature, specifics and properties of environmental monitoring; independently applies the knowledge gained in order to use modern methods and means of environmental monitoring using examples of educational data.

83	Ecology of Populations and Communities	Studies the ideas about ecological relationships in populations, interconnections in biological systems, about the dynamics and self-regulation of populations and biocenoses, methods of their study and modeling methods. Considers the formation of concepts about environmental communities. Describes the complex relationships of living organisms with each other and with the environment.
84	Rational use of Water Resources	Considers rational use and protection of water resources, problems, water shortage, water distribution on the ground, river flow in the Republic of Kazakhstan, features of river flow: distribution by territory, uneven distribution over time, dependence on climatic conditions. Analyzes principles of rational use of water resources.
85	Geoinformation Systems in Ecology	Studies modern computer technology in the collection, storage, processing, analysis and transmission of geographical information. It assesses the geo-ecological knowledge of the area of work using modern specialized software. Formulates the idea of geo-information systems, their general purpose and application in ecology, independently uses modern computer technologies to solve environmental problems.
86	Natural Resources Planning and Management	Studies assessment of natural resources of the Republic of Kazakhstan, monitoring the state of the environment, methods for determining and assessing environmental pollution. Considers development of mineral resources in ways that provide greater completeness and complexity of mining and processing, reducing impact of wastes on the environment, natural resource inventories and environmental policy of the Republic of Kazakhstan. Calculates environmental and economic damage from environmental pollution.
87	Solid Waste Disposal Technology and its Secondary Use	The quantitative assessment of industrial waste and the classification of elements depending on the design of the chemical process system are studied. Examples of complex use of raw materials and inorganic materials are determined. The use and disposal of waste plastics is investigated. It considers destructive polymers, waste disinfection and the use of secondary energy sources.
88	Geoecology and Nature Protection	To develop knowledge of environmental laws and laws of natural, natural and anthropogenic geosystems for the purpose of nature protection. Changes in the geosphere of the Earth under the influence of human activity. Global environmental problems of the Earth, anthropogenic transformations of ecosystems, natural resources of Kazakhstan. Environmental consequences of mining, reduction of natural biological productivity of ecosystems, maps of the danger of anthropogenic desertification of the territory of Kazakhstan.
89	Climate Change and "Green Economy"	To form students' understanding of the close relationship between economic activity and climate change, the introduction of a "green" economy. Climate change and its impact on natural and economic systems, regulatory documents on climate change

		and the history of the formation of the concept of sustainable development and green economy in Kazakhstan, the main directions of the concept of the transition of the Republic of Kazakhstan to a green economy.
90	Geoinformation Systems in Ecology	Formation of knowledge about modeling structural integration of GIS with remote sensing technologies, satellite positioning systems, Internet. Modern computer technologies in the collection, storage, processing, analysis, transmission of geographical information. Assessment of the geoecological study of the work area using modern specialized software. Geoinformation systems, their purpose, application in ecology.
91	Green technologies for processing domestic wastes	Purpose: to form students" understanding of the close relationship between economic activity and climate change, the introduction of a "green" economy. Climate change and its impact on natural and economic systems, regulatory documents on climate change and the history of the formation of the concept of sustainable development and green economy in Kazakhstan, the main directions of the concept of the transition of the Republic of Kazakhstan to a green economy.
92	Engineering Economics and Entrepreneurship	Students mastering the scientific and legislative foundations of organizing and conducting entrepreneurial activities in the RC. The specificity of the content of entrepreneurial activities in the field of environmental protection. Mechanisms for the formation of business ideas, business planning technologies, risk management, the specifics of assessing and analyzing the effectiveness of entrepreneurial activity in a particular sphere or sector of the economy.
93	Modeling in Ecology	Formation of knowledge about mathematical models used to solve scientific, applied problems in ecology. Brief description, principles of construction of ecological models, elementary mathematical models. Technical calculations using mathematical methods, methods mathematical analysis, statistical modeling in ecology, independently integrates the acquired knowledge for engineering calculations, design, research tasks in the field of mathematical modeling.
94	Environmental Management and the Basis of the Green Economy	Formation of knowledge about the principles and fundamentals of green technologies, effective and rational use of natural resources in society. Rational use, protection, problems of depletion of natural resources of the Republic of Kazakhstan. Principles of rational use of natural resources. The transition to a green economy, the history of the formation of the concept of sustainable development and the green economy in Kazakhstan.
95	Resource-Saving, Low-waste and Non-waste Technologies	To give an idea of the main objects, methods, principles of creating resource-saving, low-waste and non-waste technologies. Requirements of regulatory and technical documentation, control, product quality. Principles of development of low-waste, waste-free production, cyclical material flows, integrated use of raw materials, environmental safety. Construction of technological schemes of low-waste and non-waste technologies.
96	Social Ecology and Sustanable Development	To instill in students the sum of knowledge about the general laws that ensure the sustainable functioning of a variety of natural and social systems. Historical and socio-ecological

		prerequisites for the formation of a sustainable development strategy. The relationship between society and nature in different periods of civilization development, the stability of biological systems at the level of species populations, communities of organisms and ecosystems, problems of social ecology.
97	Technique of Environmental Protection	Formation of knowledge about the main technical means of environmental protection. The main treatment facilities and equipment for waste treatment, methods of industrial wastewater treatment (mechanical, biochemical, chemical, physico-chemical). Classification of methods of purification of liquid, gaseous, solid waste. Calculation of pollution costs and concentrations, main treatment facilities.
98	Environmental Chemistry	Formation of knowledge about the main organic and inorganic pollutants of the environment.Laws of chemistry, methods, means for studying the composition, structure of matter. The dependence of the properties of substances on their composition and structure. Scientific search for the necessary information about chemicals and processes occurring in the biosphere as a result of environmental pollution.
99	Ecological Problems in Agricultural Areas	To create knowledge about the impact of human agricultural activity on ecological equilibrium in nature. Social and environmental problems, environmental aspects of intensification of agricultural areas. Biological methods of controlling pests of agriculture in practice. Environmental problems of agricultural chemistry. Use of biological fertilizers and plant protection agents. Solutions to environmental problems of land resources.
100	Ecological Resource Knowledge and of Natural Managemen	To develop knowledge about natural resources and raw material deposits of RK and their rational use. Geoecological assessment of mineral use prospects, intersectoral nature of ecological resource management. Environmental consequences of location, structures of certain types of natural resources, their complexes. Impact of industrial waste on the environment. Types of economic mechanisms of approaches to economic assessment of natural resources.
101	Ecology of Animals, Plants and Biogeography	To develop knowledge, skills and moral responsibility for the conservation of biological diversity and habitats of living organisms.Ecology of animals and plants, problems of systematization of biodiversity. Stages of development of biogeography, knowledge of the general distribution of organisms to the characteristic of individual biogeographic secretions. Features of species distribution, their stories, mapping of biological sites.
102	Economical and Ecological Evaluation of Enterprises	Formation of knowledge about the mechanisms of economic and environmental assessment of enterprises. The essence, classification of external effects (externalities) in economic activity. Calculation of ecological and economic damage from environmental pollution by industrial enterprises. Types of economic assessment of natural resources, selection of criteria for assessing natural resources, methods of establishing taxes, payments for the use of natural resources.
103	Modern Urban Problems and Urboecology	Formation of knowledge about the state of the environment in the conditions of urbanization and to assess their consequences

		for human life. Features of urban ecosystems. The process of urbanization and its impact on the environment. Sources of urban pollution, noise pollution factors. Rational design and environmentally optimal options for the construction of urban structures. Urban landscapes, changes in the natural and spatial resources of the city.
104	Agroecology	Formation of knowledge about the current state and prospects of development of agro-ecological systems. Human interaction with the environment in the process of agricultural production, the impact of agriculture on natural complexes. The interaction between the components of agroecosystems, the specifics of the circulation of substances in them, the transfer of energy, the nature of the functioning of agroecosystems under man-made loads. Anthropogenic impacts on the agricultural system.
105	Biogeochemistry and Ecotoxicology	Formation of concepts of processes of migration and mass exchange of chemical elements between living organisms and the environment. The origin and evolution of the Earth's geospheres, the origin and evolution of the lithosphere, hydrosphere and atmosphere, the biogeochemical cycle of elements in various environments of the biosphere. Laws and mechanisms for the interaction of ecotoxicants with the environment and man.
106	Bioindication Research Methods in Ecology	To develop systematic knowledge in the field of environmental assessment by bioindicative methods. Environmental foundations of bioindicative research methods. Biological indices and coefficients in comparative bioindicative studies. Patterns of bioindication at different levels of the organization of living matter. Features of bioindication of agrocenosis resistance. Bioindication of water quality and water pollution.
107	Medical Ecology and Social and Environmental Problems of Mankind	To form knowledge about the socio-ecological problems of mankind and their impact on health. General patterns of adaptation of the human body to changes in the environment. Pathogenetic mechanisms of action of physical, chemical, biological factors on the human body. Environmental problems of nutrition, the impact on the human body of various genetically modified foods. Ecological, social characteristics of a person.
108	International Legislation in the Field of Ecology	Formation of knowledge about the totality of legislative norms and rights in the field of ecology. International organizations, the role of international organizations in solving environmental problems of our time, international treaties. The Paris Agreement on Climate Change. Interstate relations on conservation, rational use of international environmental resources and protection of human rights to a favorable environment.
109	Fundamentals of Industrial Ecology	Formation of knowledge about the impact of industrial enterprises on the biosphere and their consequences. Resources of the natural system and their use, technogenic pollution of the natural environment. Greening of technological processes, methods of selection of greening projects, optimization of the placement of pollution sources, sanitary protection zones. Calculation of the dispersion of pollutants from a single source, standards of the MPE and MPD.
110	Fundamentals of Environmental Regulation and Examination	To familiarize with the system of norms and rules of environmental activity, environmental management, rational use

		of natural resources and environmental expertise. Fundamentals of environmental regulation, mechanisms of environmental regulation, content and theoretical foundations of environmental regulation and expertise, terms and definitions; principles, criteria and objects of environmental expertise. Environmental standards in the field of ecology.
111	Fundamentals of Environmental Law in Environmental Management	Formation of knowledge of legal norms regulating public relations in the sphere of interaction between society and nature. Subjects and objects of environmental legal relations. The rights and obligations of officials exercising control, the procedure for environmental control, work with regulatory documents, their processing, storage, use in professional activities. Types of legal liability for violation of environmental protection legislation.
112	Fundamentals of Energy Ecology and Sustainable Development	Formation of knowledge about the general laws of sustainable development that ensure the diverse work of various natural and social systems. Fundamentals of energy ecology, historical and socio-ecological prerequisites for the formation of a sustainable development strategy. The relationship between society and nature in different periods of the development of civilization. Stability of biological systems at the level of species populations, communities of organisms and ecosystems.
113	Air Basin Protection	Formation of knowledge about methods and methods of protection of atmospheric air from technogenic effects. Aerodisperse systems, changes in the air environment as a result of the activities of industrial enterprises, atmospheric pollution. Types of pollutants, basic cleaning methods and equipment for cleaning gas and dust emissions, air pollution by motor vehicles, the impact of air pollution on human health.
114	Industrial Toxicology	Formation of toxicological assessment of harmful substances of industrial origin for the purpose of their hygienic regulation (rationing). Substantiation of levels of harmful substances safe for humans in various environmental objects. Study of the specific effect of production poisons on the body. Hygienic examination, rationing of industrial toxicants content in environmental facilities
115	Technology of Wastewater Treatment of Industrial Enterprises	Formation of fundamental knowledge on wastewater treatment technology. The quality of wastewater treatment in accordance with established standards. Theoretical foundations and principles of operation of technological equipment for wastewater treatment. Calculation of the required degree of wastewater treatment. Visual observations, instrumental examinations and tests. Compliance with the technology in accordance with the current regulatory documentation.
116	Urban Ecohydrology	Interaction between water and ecosystems. Ecological processes occurring within the hydrological cycle. Improving environmental sustainability. Principles of ecohydrology: hydrological, ecological, environmental engineering. Ecosystem degradation using concepts combining terrestrial and aquatic ecosystems.
117	Environmental Waste Inventory	Formation of knowledge about the norms of waste inventories, their properties and technologies of their processing. State cadastres of natural resources of the Republic of Kazakhstan,

		environmental cadastre of waste, classification of natural cadastres. The main content of state cadastres and the basics of conducting cadastral work. Connection of cadastral work with environmental management and nature protection.
118	Environmental Monitoring	To form knowledge about environmental monitoring. The content and structure of environmental monitoring, environmental monitoring objects, classification of monitoring types by objects and tracking methods. Thees sence, specifics and properties of environmental monitoring. Modern methods and means of environmental monitoring.
119	Ecology of Populations and Communities	To develop knowledge about the interaction of living organisms and the natural environment, the principles of the functioning of ecological systems and the biosphere as a whole. Ideas about ecological relationships in populations, relationships in biological systems, dynamics and self-regulation of populations and biocenoses, methods of studying them and methods of modeling. Formation of concepts about ecological communities. Complex relationships of living organisms with each other and the environment.
120	Environmental Biotechnology	Microorganisms' role in circulation of substances. Domestic, industrial and agricultural wastewater, its structure and quality assessment criteria. The use of microorganisms in wastewater treatment plants, biosorption of metals. During the study, the student is able to carry out an environmental assessment of the state of air, water and land objects.
121	Ecosystem and Law	Ecosystem preservation as basis of law rule. Regulations and regulatory documents of environmental protection. Citizens " rights to clean air, water and soil. Biotechnological methods for determining maximum permissible concentrations of nature pollutants. Student has knows regulatory documents, citizens " rights and methods for determining pollution level in urban areas.
122	Biological Processing of Industrial and Agricultural Waste	Biotechnological processing of industrial waste. Efficient resource-saving technologies. Problems of biological processing of wastewater from chemical enterprises. Assessment of impact of industrial and economic activities on environment state. Student learns basic processes and equipment in field of waste processing and disposal; able to prepare production reports in waste management.
124	Ecology of populations and communities	Knowledge and understanding of modern ecology, peculiarities of spatial and social structure of animal population, genetic processes of living organisms-plants and animals. The use of modern methods of studying the General laws of nature, environmental, human impacts, the organization of joint activities.
125	Environmental biology	Consideration of the General laws of functioning of ecological systems, mechanisms of formation and protection of the environment, the degree of influence of human activity on the laws of ecological biology, the main world and local environmental problems at the present stage. Analyze and explain these environmental problems. Comparison of ways to preserve and improve the environment.

126	Environmental problems of the Republic of Kazakhstan	To characterize the main environmental problems of the Republic of Kazakhstan: the current state of the atmosphere, hydrosphere, lithosphere, the impact of oil production and uranium on the environment, radiation situation; preservation of biodiversity of Kazakhstan. Analysis of the causes of these environmental problems. Apply modern methods of rational use of natural resources in solving problems, performing practical work
127	Natural resource assessment	Considers general provisions and principles of state technical account and technical inventory of objects of town-planning activity. Studies regulatory framework of technical inventory of objects. Develops abilities to carry out technical inventory of new objects of town-planning activity and current registration of inventory changes of objects captured by primary inventory.
128	Ecosystem and law	It reveals the relationship between ecology and other sciences, the essence of the biosphere and its stability. The basics of safe human interaction with the environment and protection from negative factors in extremely dangerous situations are revealed. The skills of conducting discussions on legal issues in the field of ecology, on the application of norms in the modern period; legal analysis of various documents is formed.
129	Environmental audit	This discipline considers and studies the content and essence, tasks of environmental audit. Stages of formation and development of the eco-audit system in Kazakhstan and abroad. Foreign and domestic experience in the field of environmental audit. International Standards for Environmental Audit. Regulatory framework for environmental audit. Assessment of economic damage from environmental violations in EA. The procedure, procedures and stages of environmental audit.

№	**Name of discipline** (Master's Programs)	**Short description of discipline**
130	Ecobiosafety in the agricultural and industrial zone	Deepens knowledge of problems of environmental pollution in agricultural industry, its importance in modern society. Considers issues of biological processing of industrial wastes of various industries, use of microorganisms – hydrocarbondestructors for cleaning contaminated soils and safety problems of using microorganisms obtained by genetic engineering methods, and some products of microbial synthesis. Allows to acquire skills of applying in practice a complex of modern research methods in the field of environmental biotechnology for treatment of wastewaters and soils.
131	Ensure Genetic Security in the Biotechnological Production	Considers biosafety issues regarding basic principles and methodology for assessing the risk of adverse effects of genetic engineering activities at biotechnological enterprises and possible adverse effects of genetic engineering organisms on the environment and human health. Regulatory and legislative framework for food safety in the Republic of Kazakhstan. Forms skills to comply with the biological safety of genetically modified sources in food production and to carry out food toxicological and hygienic assessment of genetically modified food sources.

132	Environmental aspects of biotechnological processes	Characterizes methods of biological wastewaters treatment, biotechnological methods of leaching, disposal of solid wastes and obtaining non-traditional energy sources, aerobic and anaerobic methods of processing industrial and agricultural wastes, biotechnological methods of cleaning objects contaminated with heavy metals and radionuclides. Substantiates the role of microorganisms in biodegradation of organic substances of the environment and relationship of plants with soil microorganisms in the efficiency of extraction of toxicants. Considers issues of using sulfate-reducing bacteria in deposition of metals, conditions of their functioning, use of microorganisms for biosorption of metals, biological processing of industrial wastes of various industries, use of microorganisms – destructorsof hydrocarbons for cleaning wastewaters from oil refineries and soils polluted with oil.
133	Principles of waste management in Biotechnological industries	The main principles of effective waste management for improving the environment, promoting the recovery, reuse and recycling of material flows from industry and municipalities, which are priority issues in Kazakhstan and the world, are considered. The issues of the structure of production and consumption, the development of project standards for the formation and location of production and waste disposal, the planning, implementation, monitoring and analysis of measures for the management of production and waste disposal are considered.
134	Actual Problems of Geoecology and Landscape Ecology	Studies changes in the Geosphere of the Earth under the influence of human activity and emerging geoecological problems. Considers the basic concepts, object, tasks, methods, evolution of views, place and connection of actual problems of Geoecology and the land reclamation section, covering the improvement of the natural conditions of agricultural land with protective forest plantations. Theoretical and methodological bases of actual problems of Geoecology and landscape ecology. System character of actual problems of Geoecology and landscape ecology.
135	Organization of Environmental Audit	Considers the principles of the Environmental law book of the Republic of Kazakhstan "Regulation of public relations in the field of interaction between man and nature, environmental audit of the activities of enterprises that have an impact on the environment." Discusses and details decisions on the adoption of legal and regulatory documents in the field of monitoring the state of the environment.
136	Modern Problems of Ecology	Consider nature management and environmental problems at the early stages of the development of civilization, the current impact of human production on nature, the extent of human impact on the environment, the effects of industrial activities process for the production of petroleum products, various types of fuel and raw materials for subsequent chemical processing, forecasts of negative phenomena for the biosphere, ways to solve environmental and environmental problems.
137	Ecological Standardization, Certification and Licensing	Examines the activities to establish norms, rules and characteristics in order to ensure product safety, State standards

		of the Republic of Kazakhstan, international standards, Kazakhstan classifiers of technical and economic standardization. It examines the standards of industries, enterprises, scientific and technical, engineering companies and other public associations, government agencies engaged in standardization, licensing of certain activities in the field of environmental protection.
138	Ecological Examination	Explores the basic concepts and definitions. Examines the history of environmental impact assessment in Kazakhstan and abroad. Analyzes the goals, principles and objectives of the state environmental expertise, discusses the Legislation of the Republic of Kazakhstan in the field of environmental expertise, legal and regulatory documents that define the legal framework governing and organizing the state environmental expertise.
139	Biological Diversity of Ecosystems and Urban Systems of RK	It studies methods of analysis of species diversity at different levels, strategies for restoration and conservation of biodiversity of ecosystems and urban systems of Kazakhstan, modern research areas for the assessment, conservation of biological diversity of ecosystems and urban systems of Kazakhstan. Analyzes international biodiversity research programs. Discusses the National Strategy of Kazakhstan and the action Plan for the conservation of biodiversity, on issues of environmental protection, forest reproduction and afforestation
140	Green Technologies in Production and Transport	Considers environmental activities in Kazakhstan, monitoring and control of the environment in transport. Studies the organization of the state environmental control of emissions of pollutants into the atmosphere at transport enterprises. Analyzes the management of environmental activities in the transport and transportation system in Kazakhstan, international cooperation in the field of environmental protection in transport, the introduction of green technologies.
141	Study of the Latest Achievements in the Field of Waste Processing	Considers the classification of waste according to their aggregate state and the risk of impact on the environment, sources of education, the volume of accumulation, morphological and chemical composition, characteristics of waste management system, the scheme of sanitary cleaning of cities from household and industrial waste. He investigates the main methods of industrial processing of solid waste, disposal of solid waste by storage at landfills and landfills.
142	Environmental Impact Assessment	Considers the assessment and stages of environmental impact of industrial enterprises, the procedure for environmental impact assessment. Compares the classification of objects of environmental impact assessment by the significance and completeness of the assessment. Explores the documentation of the assessment of the impact on the environment. Develops a methodical provision of the assessment of the impact on the environment.
143	Assessment and Management of Environmental Rrisk	Considers the main provisions of the theory of risk, concept, sources of risk and risk factors. Studies the development of risk in industrial facilities, the basics of the methodology of analysis, assessment and risk management: quantitative risk indicators, acceptable risk, risk comparison, environmental risk

		management in industry and energy, environmental assessment of projects. Examines the assessment of environmental risks of major accidents and their management.
144	Rational Use of Natural Resources	Considers the concept of environmental management. Assesses the use of natural resources and its place in the cycle of natural Sciences, extensive and intensive way of development of natural resources. Analyzes the rational and irrational use of natural resources, the definition of natural resources, their classification and importance, forms and uses. Selects research methods used in environmental management. Afforestation to control dry winds, drought and soil erosion. Applies the concept of ecological crisis and ecological catastrophe.
145	Modern Methods and Measuring Instruments in Ecology	Considers methods and means of monitoring and control over the state of the environment, contact methods of environmental control, remote methods of environmental control, biological methods of environmental control. Analyzes environmental control, modern methods of air pollution control, methods of atomic spectroscopy, reporting on the results of instrumental measurements.
146	Digitalization in Ecology and Nature Management	Considers the digital economy in ensuring environmental safety, IT technologies for monitoring natural and anthropogenic systems and digital services in the field of environmental management.
147	Environmental Assessment and Mapping of Localities in South Region	Investigates the theoretical basis of environmental mapping and assessment of SKR, the content and methods of environmental mapping, mapping of atmospheric problems, mapping of land-based pollution, mapping of physical pollution, mapping of soil pollution and other deposition media, mapping of geological and geomorphological pollution, Considers bio-ecological aspects of mapping, geographical analysis pollution.
148	Ecological Safety Tehnology in Industry	Examines the basic concepts and methodological principles of the formation of waste-free production, the basic concepts and methods of organizing low-waste production, the requirements for waste-free technological processes and equipment, the problems of developing highly efficient technological processes, environmental protection processes and technologies. Analyzes the mathematical modeling of technological processes, taking into account the criteria of chemical-technological and environmental factors for efficiency indicators.
149	Ecosystem Studies of Biological Resources	Explores methodological aspects of the ecosystem studies of biological resources, the application of the ecosystem approach in the elaboration of the development strategy of biological resources, systems and species for ecosystem studies of biological resources, environmental monitoring as one of the main methods of studying the dynamics of ecosystems (biogeocenoses), occurring under the influence of natural and anthropogenic factors, the historical approach as a tool for predicting the state of ecosystems.
150	Expertise and Monitoring of Ecological Nature Management Safety	Explores the definition and objectives of environmental monitoring and examination of common beliefs about the monitoring and examination of environmental security environmental Sciences, theoretical and methodical

		fundamentals of ecological expertise, principles of an estimation of ecological safety, principles of environmental assessment, Considering modern methods of environmental assessment, the procedure of state ecological expertise, in an interdisciplinary scientific field uniting studies of composition, structure, properties, process c, physical and geochemical fields of the Earth's geospheres as a human environment and other organisms.
151	Resource-Saving Technologies in Oil Products Provision	Considers the characteristics of petroleum products supply systems; sources of pollution of petroleum products during their transportation, storage and distribution; main sources of resource losses of petroleum products; rational methods to prevent resource losses. Instills the skills of evaluating innovation risks when introducing new technologies, equipment and systems.
152	Alternative Energy and Energy Saving in Petrochemistry	Considers renewable energy sources, their use in the general energy balance of the country and regions; global energy conservation issues in industry; use of secondary energy resources; improve ecological conditions. Instills the skills of practical calculations and selection of power plants based on renewable energy sources.
153	Industrial Ecology of Hydrocarbon Systems	Examines the ecological problems of processing hydrocarbon systems, environmental monitoring, production of hydrocarbon systems with improved environmental characteristics, ecological quality management, industrial and ecological safety in the processing of hydrocarbon systems. Instills the skills of managing technological processes of processing hydrocarbon raw materials, the production of organic substances.
154	Energy Efficient Technologies of Mineral Acids	Considers the prospects for development of energy-technology and resource-saving schemes for production of sulfuric, nitric, hydrochloric, phosphoric acids, synthetic ammonia. Deepens knowledge about methods of chemical reaction heat utilization, the use of intensive energy-chemical units, rational instrumentation of processes.Forms the skills of making operational decisions in energy efficient industries, performing technological calculations of energy saving and their use in scientific research.
155	Agroecological assessment of soils	Studies soil-agro-climatic resources of ecosystems, level of potential bioproductivity as a factor in choosing optimal use of soils, criteria for environmental assessment and decrease in fertility as a factor in soil degradation. Considers the technology of reducing pollution of agricultural products, environmental risks of land reclamation. Forms the skills of calculating costs of reclamation, environmental assessment of fertilizersinteraction and ameliorants with the soil based on judging.
156	Resource Saving Technologies of Technogenic Waste Processing	Considers directions for creating resource-saving waste-free and low-waste mineral fertilizer technology, methods for storing and disposing of chemical plant waste, complex technology for recycling waste from phosphorus manufactures, wet-process phosphoric acid and phosphoric fertilizers. Allows to master methods of utilization of solid industrial waste, treatment of sewage, gaseous emissions from mineral fertilizer production and methods for their regeneration.
157	Energy Efficient Technologies of	Considers the prospects for development of energy-technology

	Mineral Acids	and resource-saving schemes for production of sulfuric, nitric, hydrochloric, phosphoric acids, synthetic ammonia. Deepens knowledge about methods of chemical reaction heat utilization, the use of intensive energy-chemical units, rational instrumentation of processes.Forms the skills of making operational decisions in energy efficient industries, performing technological calculations of energy saving and their use in scientific research.
158	Environmental risk management	Considers the issues of assessing the degree of influence of factors on the amount of environmental risk, methods of analyzing man-made risk, reducing the degree of risk, the structure and magnitude of possible damage.It allows you to acquire skills in calculating damage from environmental pollution by industrial wastes of inorganic compounds, economic damage from industrial accidents and emergencies.
159	Transport ecology and its processes	Formation of modern ideas about the concepts, strategies and practical tasks of sustainable development in various countries and the Republic of Kazakhstan. Implementation of calculations for the assessment of anthropogenic impact on the environment, development of methods and methods of its protection. Identifies and analyzes natural and anthropogenic ecological processes and possible ways of their regulation.
160	Transport infrastructure and ecology	Introduces you to the organization of production, the profile, specialization and features of transport infrastructure facilities. It reveals the mechanism of domestic and foreign experience in the formation of transport infrastructure in a market economy. Develops skills to identify problems when analyzing specific situations of transport infrastructure, suggest ways to solve them and evaluate the expected results taking into account environmental safety
161	Ecological Village	The role of science in modern life is highlighted, the ability of rational use of available resources is formed when designing eco-houses, taking into account the national tradition in the philosophy of the Kazakhs. The principles of eco-settlements are applied to existing rural settlements. Necessary design conditions is considered for creating a favorable architectural environment for tourism are considered. It develops a kills in the application of innovative methods for the implementation of eco-projects for the development of tourist infrastructure.
162	Energy Efficient Design	It deeply considers the development of methods and means of designing energy-efficient buildings and structures with increased modern requirements for thermal protection, improved characteristics of efficient energy consumption and energy resources. The use of modern building materials in architecture at the level of nanotechnology, which are achieved through the use of innovative, technically feasible and economically sound solutions acceptable from an environmental and social point of view. It offers an architectural solutions for the development of tourism, based on the provisions and categories of the philosophy of science. The skills of using innovative energy-efficient design systems based on the results of scientific research are being improved.

163	Renewable Energy Sources and Its Utilization	Introduces the use of renewable energy for heating buildings. Develops the ability to organize the heating of buildings, the choice of equipment for obtaining heat from non-traditional energy sources, to assess the economic efficiency of non-traditional renewable energy sources. Advantages and disadvantages of systems, principles of operation of systems, their device are given. Analyzes the energy of the Sun, wind resources, geothermal energy, hydropower.
164	Modern aspects of energy saving in the desing and operation of buildings	Considers the strategic objectives of the Republic of Kazakhstan, programs and initiatives of the European Union in the field of energy efficiency of buildings. Develops the ability to design energy-efficient buildings using eco-efficient materials and energy-efficient exterior walling, to carry out experimental construction, to distinguish energy efficiency barriers of buildings. Develops critical thinking on energy efficiency in terms of building life cycle and building management.
165	Modern materials of energy saving in construction	The classification of modern energy-saving materials in construction is given. Analysis of the main properties of modern energy-saving materials, methods of production of high-porous materials and products. Develops the ability to develop technical conditions for the use of materials, test building materials according to standard techniques. Analyzes modern effective thermal insulation materials in construction, develops critical thinking.
166	Energy Efficient Building Materials	Considers modern representations about heat transfer,classification of energy-saving materials. Develops the ability to distinguish the basic properties of energy-saving materials, methods of production of highly porous materials and products, to predict the reliability and durability of materials in structures, to determine the economic efficiency of production and use of energy-saving building materials. Evaluation of modern energy-saving building materials, effective thermal insulation materials.
167	Energy efficient construction in the of Kazakhstan	Describes the Requirements of Directive 2010/31/EC; the necessary documents for permission to design and survey work; obtaining the initial permit data; architectural and planning task. Develops the ability to carry out the examination of the project, to issue permits for construction, to carry out architectural supervision and state architectural and construction supervision; to approve design and estimate documentation. Knowledge of the rules of Technical supervision of the customer, supervision, State architectural and construction supervision develops critical thinking.
168	Energy efficient eco-houses	It introduces eco-building, its history, the principle of regenerative design. Develops the ability to choose energy-efficient solutions for buildings and structures of modern construction, to choose the most economical energy-efficient design solution, to process information for further use in the design of energy-efficient buildings in Kazakhstan. Develops critical thinking when considering issues of global warming, the impact of the environment, the use of environmentally friendly materials.

169	Ensuring genetic security in the biotechnological production	Explains biosafety issues regarding the basic principles and methodology for assessing the risk of adverse effects of genetic engineering activities in biotechnological enterprises and possible adverse effects of genetically engineered organisms on the environment and human health. Acquires the skills to determine the biological safety of genetically modified sources in the production of food products and to carry out a food toxicological and hygienic assessment of genetically modified food sources.
170	Ecobiobasafety in the agro-industrial and industrial zone	It enhances knowledge about the problems of environmental pollution in agricultural production, its importance in modern society. Explains the issues of biological processing of industrial waste from various industries, the use of microorganisms-destructors for cleaning contaminated soils. It allows you to acquire the skills of applying in practice a set of modern research methods for carrying out work on wastewater and soil treatment.
171	Environmental aspects of biotechnological processes	It offers biotechnological methods of leaching, solid waste disposal and production of non-traditional energy sources, aerobic and anaerobic methods of processing industrial and agricultural waste, biotechnological methods of cleaning objects contaminated with heavy metals and radionuclides. Acquires skills in the use of microorganisms in the biodegradation of organic substances in the environment. Analyzes the relationship of the microbiota in the efficiency of toxicant extraction.
172	Modern energy saving technologies in electric power industry	Issues of saving energy resources and improving the efficiency of using various types of energy at energy facilities, energy surveys of facilities, energy saving measures, methods of rationing, forecasting and planning of energy consumption, control systems, accounting and management of energy consumption. A master"s student can perform calculations with the necessary justifications for measures to save energy resources, develop promising, current plans for the electrification of production as a whole.
173	Environmentally friendly technologies in the electric power industry	Modern technologies of non-traditional energy sources, nuclear energy and radiation components are studied. The master's student acquires the skills of setting tasks and problems, their systematic solution with the use of innovative approaches; can solve, prepare proposals for optimizing operating modes, modernizing the design, performing organizational and technical measures aimed at improving the level of technical operation of equipment
174	Sustainability of power generation systems	Classical methods of control and optimization of homogeneous digital power supply systems are studied. As a result of the studied discipline, the master's student develops the knowledge necessary to ensure robust operating modes of distributed generation power nodes, which allow to quickly solve emerging problems in the power supply during the operation of such systems.
175	Formation of an ecosystem for work of RES	The main issues of hydro and aerodynamics in the creation of controlled hydro and aerodynamic flows for the continuous generation of electricity of mobile power systems based on a fundamentally new type of renewable energy, the formation of

		microecosystems for renewable energy facilities. The master's student develops knowledge, practical skills, can develop fundamentally new energy systems, form the necessary energy flows regardless of the regional environment.
176	Engineering and Environmental Safety of Equipment in the Oil and Gas Industry	Considers engineering methods of air protection and protection of water resources from industrial pollution. Identifies main factors affecting environmental safety in the introduction of new equipment and technologies. Allows developing an action plan aimed at meeting the requirements of regulatory acts in the field of environmental protection, taking into account the best practices of domestic and foreign companies to improve environmental safety.
177	Ecological Management	The disclosure of the concept of "environmental management" and its system, the general provisions of EM. Determination of the system of international standards ISO 14000 and EM for the enterprise. Assessment of the initial environmental situation in enterprises and the planning of activities in the field of EM. Commentary on the organization of activities in the field of EM and the regulatory framework of EM. Comparison of elements of the EM and EM systems at different stages of the investment process.
	Name of discipline (Doctorate program)	**Short description of discipline**
178	Ecological And Economic Problems Of Exploitation Of Natural Resource Potential	Studies methods of rational environmental management and environmental problems Investigates approaches to assessment of natural and resource potential and indicators of efficiency of its use in region. Reveals spatial localization of resources. Defines efficiency of resource use, Gives a technique of assessment ecologic-economic components natural and resource capacity of Kazakhstan
179	Global trends in the world economy in forecast scenarios	Studies the main directions of development of modern economic phenomena. Studies integration processes in the world economy. Identifies the reasons and prerequisites for the creation of integration groups. Identifies the main problems of the world economy. Studies the experience of functioning of free economic zones in individual countries using methods of expert assessments, comparisons and comparisons, scientific analysis and abstraction, identifying the essential values of events occurring in the national and world economy
180	Economic Modernization and Spatial Development	The issues of spatial development as a mechanism of socio-economic modernization are considered. Analysis of regional economic differences allows us to formulate a development strategy based on using the advantages of traditional specialization with an emphasis on increasing the degree of processing of raw materials.
181	Modern agrarian economy	Opens an essence agrarian reform at present stage. Explains place and role agrarian and industrial complex in conditions of market and formation market relations in agricultural industry. Investigates forms and methods state regulation agricultural industry. Gives a technique of assessment of cost efficiency agricultural production. Studies commodity policy in agromarketing

182	Sustainable economic development of the Republic of Kazakhstan	Studies the objectives and goals of sustainable development of the economy, research methods, measurements, system diagnostics and assessment of spatial economic systems. Allows you to acquire skills identifying a system of indicators of economic sustainable development, the innovative component of sustainable development. Forms the skills of economic analysis and the ability to use them to understand the socio-economic processes of economic policy evaluation
183	Innovative Technologies for Processing and Reuse of Lliquid, Solid and Gaseous Wastes	Examines relevance and significance of low-waste and non-waste technologies, their role and place in the concept of sustainable development of the biosphere, waste-free and low-waste production processes. Studies methods of cleaning and disposal of waste gases, processing of solid wastes, methods of cleaning industrial waters, waste-free processing of wastes of chemical, metallurgical, and mining industries, waste-free processing of wastes from construction industry, secondary raw materials, secondary energy resources, power generation, innovative methods in the field of waste processing.
184	Comprehensive Assessment of Natural and Iindustrial Potential of the Territories	Examines mechanisms of human exploration of natural resources and resource ecological function of the lithosphere, mineral reserves (minerals). Assesses the main geological and industrial types of deposits of metallic and non-metallic minerals. Identifies geoecological problems of mining and processing of mineral and energy raw materials. Assesses natural resource potential and criteria for environmental management. Argues the general issues of economic assessment of natural resources and the system of accounting and assessment of certain types of resources. Compares the accounting of mineral reserves / resources in foreign countries.
185	Environment and People	Investigates the concept of ecosystems, energy characteristics of the environment and biogeochemical cycles, solves the problem of pollution and environmental degradation, factors of environmental degradation. Predicts pollution of the environment and ecological significance of pollution of the biosphere. Solves issues of environmental protection and sustainable development of society. Refers to the legislative framework for the protection of biological and ecosystem diversity in the Republic of Kazakhstan. Discusses the main directions of international cooperation in matters of sustainable development and environmental protection.
186	Physico-Chemical Tests in the Field of Ecology	Examines ttypes and characteristics of environmental pollution, physical and chemical methods of analysis in ecology, main methods of environmental analysis, studies methodology and methods of research, general characteristics of physical and chemical methods, general information about spectroscopic methods of analysis, conducting a comprehensive analysis of the environment and quantitative assessments environmental analysis, spectra of pollutants in the water of aqueous bodies.
187	Environmental Aspects of Green Technologies	Examines role of “green” technologies in solving the most important problems of mankind and classification of “green” technologies, the main types of renewable energy sources, geothermal energy and heat pumps, problems of measuring the

		efficiency of renewable energy sources, analyzing trends in the development of “green” technologies and risks of introducing “green” technologies, analysis of international measures of anthropogenic impact and stimulation of “green” technologies.
188	Environmental Problems of Natural and Technical Systems	Considers various aspects of emergence and functioning of natural-technical systems, fundamentals of natural-technical systems, formation mechanisms of natural-technical systems and forms of technogenesis. Restores natural and technogenic objects. Assesses the natural-technical system as a structural-functional unit of biotechnosphere. Improves formation and functioning of the natural-technical system, mode of operation and control interactions. Argues the principles of optimization of the natural-technical system and management of its operation.
189	Ecological Clean Innovative Technologies of Production and Processing of Mineral Resources	Examines environmentally friendly technologies and modern technologies for environmental protection, examples of environmentally friendly technologies, low-waste technology, principles for development of low-waste or non-waste production, comprehensive use of resources, integrated economical use of raw materials. Studies directions and development of waste-free and low-waste technology in selected industries, modern technologies for processing of solid domestic wastes, creation and development of waste-free production in Kazakhstan.
190	Complex Processing of Technogenic Wastes of Petrochemical Industries	It considers modern methods of utilization of man-made waste; ecological complex processing of waste petrochemical production. Forms skills of development of economically accessible and technically feasible technologies of involvement of petrochemical production wastes in resource turnover.