MINISTRY OF SCIENCES AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
M. AUEZOV SOUTH KAZAKHSTAN UNIVERSITY

«APPROVED»
Chairman of the Board - Rector
D.Sh.Ahmetzhaki
2025

EDUCATIONAL PROGRAM

6B05210 – Ecology

Registration Number	6B0520031
Code and Classification of Education	6B05 – Natural sciences, mathematics and statistics
Code and Classification of Areas of Training	6B052 – Environment
Group of educational programs (EP)	B051 – Environment
Type of EP	Operating
ISCE level	6
NQF level	6
IQF level	6
Language learning	Russian
The complexity of EP	240 credits
Distinctive features of EP	-
Partner University (JEP) -	-
University partner (DDEP) -	-

Shymkent, 2025

Developers:

Full name	Position	Signature
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Kozybayev E.T.	Republican state institution "Department of ecology for the city of Shymkent of the committee for environmental regulation and control of the ministry of ecology and natural resources of the Republic of Kazakhstan". Head of the Department of Ecology for the city of Shymkent.	
Orman A. O.	Head: LLP "Water resources-Marketing"	
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Dostiyarova E.K.	Head of the Shymkent State Arboretum Park named after A.Askarov, Department for the Development of a comfortable Urban Environment in Shymkent	
Kushbai D.	Student of XT-23-4tk group	

The EP was considered at a meeting of the Academic Quality Committee of the or the Higher School "Chemical Engineering and Biotechnology", Minutes # 7 «13» 03. 2025 y.

Chairman of the Committee _____ Daurenbek N.M.

The EP was considered and recommended for approval at Educational-methodical meeting of M.Auezov SKU
Minutes #4-1 «18» 03. 2025 y.

Chairman of the EMM _____ E.Imangaliyev

The EP was approved by the decision of the Academic Council of the University
Minutes # 10 « 27 » 03. 2025 y.

CONTENT

1 CONCEPT OF THE EDUCATIONAL PROGRAM

Mission of the University	Generating new competencies, training a leader who translates research thinking and culture.
University Values	– Openness - open to change, innovation and cooperation. – Creativity - generates ideas, develops them and turns them into values – Academic freedom - free to choose, develop and act. – Partnership - creates trust and support in a relationship where everyone wins. – Social responsibility - ready to fulfill obligations, make decisions and be responsible for their results.
Graduate Model	– Deep subject knowledge, their application and continuous expansion in professional activity – Information and digital literacy and mobility – Research skills, creativity and emotional intelligence – Entrepreneurship, independence and responsibility for their activities and well-being – Global and national citizenship, tolerance to cultures and languages
Uniqueness of the EP	the program was developed in accordance with the Atlas of New Professions and Competencies, and is aimed at training competent specialists for transport and logistics and scientific and pedagogical structures who are able to organize and manage the activities of a structural enterprise, independently determine the goals of professional activity, choose and justify methods and means to achieve them.
Academic Integrity and Ethics Policy	The university has taken measures to maintain academic integrity and academic freedom, protection from any type of intolerance and discrimination: • Rules of academic integrity (order No. 212 of October 10, 2022); • Anti-corruption standard (order No. 8 n/a dated 08/01/2025). • Code of Ethics (Order No. 212 of October 10, 2022)
Regulatory and legal framework for the development of EP	1.Law of the Republic of Kazakhstan “On Education”; 2. «Model Rules for the Activities of Organisations of Higher and Postgraduate Education», approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated June 24, 2024. No. 307; 3. Standard rules for admission to training in educational organizations implementing educational programs of higher and postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 600 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 26, 2024. No. 372; 4. State mandatory standards for higher and postgraduate education, approved by order of the Ministry of Education and Science of July 20, 2022 No. 2 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated March 04, 2025. No. 90; 5. Rules for organizing the educational process in credit technology of education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152 as reworded

	by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated April 29, 2024. No. 203; 6. Qualification reference book for positions of managers, specialists and other employees, approved by order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated December 30, 2020 No. 553 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated June 20, 2024. No. 207; 7. Methodological recommendations for introducing ECTS principles into the educational process and expanding academic freedom. Appendix to the order of the Minister of Science and Higher Education. of the Republic of Kazakhstan dated February 12, 2024 No. 57 8. Guidelines for the development of educational programs for higher and postgraduate education, Appendix 1 to the order of the Director of the National Center for the Development of Higher Education of the Ministry of Education and Science of the Republic of Kazakhstan dated May 4, 2023 No. 601 н/к
Organization of the educational process	– Implementation of the principles of the Bologna Process – Student-centered learning – Availability – Inclusivity
Quality assurance of EP	– Internal quality assurance system – Involvement of stakeholders in the development of the EP and its evaluation – Systematic monitoring – Updating the content (updating)
Requirements for applicants	They are established in accordance with the Standard Rules for admission to training in educational organizations implementing educational programs of higher and postgraduate education by order of the Ministry of Education and Science of the Republic of Kazakhstan No. 600 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 26, 2024. No. 372
Conditions for the implementation of educational programs (EP) for persons with disabilities and special educational needs (SSN)	For students with SEN (special educational needs) and persons with disabilities (PSI), tactile PVC tiles, specially equipped toilets, a mnemonic diagram, and shower bars have been installed in educational buildings and student dormitories. Special parking spaces have been created. Crawler lift installed. There are desks for people with limited mobility (PLM), signs indicating the direction of movement, ramps. In the educational buildings (main building, building No. 8) there are 2 rooms with six working places adapted for users with disorders of the musculoskeletal system (DMS). For visually impaired users, the SARA™ CE Machine (2 pcs.) is available for scanning and reading books. The library website is adapted for the visually impaired. There is a special NVDA audio program with a service. The JIC website http://lib.ukgu.kz/ is open 24/7. An individual differentiated approach is provided for all types of classes and in the organization of the educational process.

2 PASSPORT OF THE EDUCATIONAL PROGRAM

Purpose of the EP	Training of specialists able to analyze the state of nature and natural resources, owning effective methods of environmental impact assessment, as well as those in demand in the field of environmental protection.
Tasks of the EP	– education of socially responsible behavior in society, understanding the importance of professional ethical standards and following these standards; – providing lifelong learning skills and abilities that will enable them to successfully adapt to changing conditions throughout their professional career; – providing conditions for acquiring a high general intellectual level of development, mastering competent and developed speech, culture of thinking and skills of scientific organization of work in the field of environmental protection; – training of specialists capable of searching for and obtaining new information necessary to solve professional problems, as well as to actively participate in the activities of an enterprise or organization; – Establishing conditions for the development of in-demand knowledge and skills, as well as a conscious attitude towards enhancing the welfare of society and conserving the planet within the framework of the SDGs.
Harmonization of EP	• 6th level of the National Qualifications Framework of the Republic of Kazakhstan; • Dublin descriptors of the 6th level of qualification; • 1 cycle of a Framework for Qualification of the European Higher Education Area); • 6^{th} Level of European Qualification Framework for Life long Learning).
Connection of the SP with the professional sphere	The educational program is focused on professional and social order through the formation of professional competencies related to the necessary types of research, practical and entrepreneurial activities, adjusted to meet the requirements of stakeholders. 1. Professional standard "Hydrometeorology and Ecology" Appendix No. 79 to the order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated 09/01/2023 No. 136.; 2. Professional standard "Forensic Environmental Expertise" (Appendix 2 to the Order of the Minister of Justice of the Republic of Kazakhstan dated January 23, 2024 No. 60).; 3. Professional Standard: "Forest Reproduction and Afforestation" Annex No. 10 to the Order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated December 26, 2019, No. 263; 4. Professional Standard for Geo-Environmental Research (Geo-Ecologist) No. 128 dated 22.08.2023; 5. Professional Standard for Forensic Examination of Soils (Appendix 14 to Order No. 60 of the Minister of Justice of the Republic of Kazakhstan dated 23 January 2024).

Name of the degree awarded	After successful completion of this educational program, the graduate is awarded the degree: “Bachelor of Natural Science on educational Program 6B05210 - "Ecology".
List of qualifications and positions	Bachelors of the EP 6B05210 – Ecology may hold positions of environmental engineer, inspector for protection and use of mineral resources, forestry engineer, wastewater treatment engineer, environmental technician, geoecologist, geoecologist, operator for processing and sorting wastes in environmental research institutions, research laboratories, in the pedagogical field, as well as in all environmental organizations without requirements for work experience in accordance with the qualifications requirements of “Qualification directory of positions for heads, specialists and other employees”, approved by the order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated 21 May 2012 № 201-ө-ми.
Field of professional activity	The sphere of professional activity of the bachelor of the EP 6B05210 – Ecology is production, managerial, research and educational sphere, environmental monitoring service, quality control of the natural environment and human health.
Objects of professional activity	The objects of professional activity of graduates according to the EP 6B05210 – Ecology are: regional and city departments of ecology, territorial departments of environmental protection, national parks, reserves, conservation areas, biosphere reserves, industrial enterprises, agro-industrial complexes, landfills, energy facilities, secondary specialized educational institutions, research institutes and ecocenters.
Subjects of professional activity	The objects of professional activity of graduates according to the EP 6B05210 – Ecology are: regional and city departments of ecology, territorial departments of environmental protection, national parks, reserves, conservation areas, biosphere reserves, industrial enterprises, agro-industrial complexes, landfills, energy facilities, secondary specialized educational institutions, research institutes and ecocenters.
Types of professional activity	Bachelors in the EP 6B05210 – Ecology can perform the following professional activities: - organizational and managerial; - production and technology; - service and operational; - experimental research; - training (teaching); - project.
Learning outcomes	**LO1** Communicate freely in the professional environment and society in Kazakh, Russian and English, taking into account the principles of academic integrity and the culture of academic writing.
	LO 2 Demonstrate socio-cultural, professional development based on the formation of ideological, civil, spiritual and social responsibility, methods of scientific and experimental research.
	LO3 Have information and computing literacy, use professional programs in professional activities.
	LO 4 Demonstrate the integrity of thinking based on a deep study of the fundamentals of ecology, the principles of sustainable development for environmental education and enlightenment.
	LO 5 To discuss theoretical and practical problems of ecology of animals, plants and biogeography, conservation of biological diversity,

	bioindication research and methods of analysis and assessment of biodiversity at different levels of the biosphere organization, principles of sustainability and productivity of wildlife and ways to optimize it under the influence of anthropogenic factors.
	LO 6 To assess environmental safety based on the analysis of data from geoinformation systems on the state of the environment, the organization of state environmental monitoring, climate change, rational use of natural resources and waste disposal methods.
	LO 7 To use in professional activity the principles of environmental legislation and other regulatory legal acts of the Republic of Kazakhstan in the field of forensic expertise, as well as the results of geoecological assessment of the use of minerals.
	LO 8 To carry out a comprehensive analysis of data on the state of the environment, predict changes in the environmental situation and develop measures to reduce pollution of the built-up area and adjacent natural objects.
	LO 9 Calculate the dispersion of pollutants in MPE and MPD, and ecological damage to the environment to assess the ecological condition of cities and industrial enterprises using neural network models for forecasting.
	LO 10 Develop a set of wastewater treatment measures using AI to optimise the performance of wastewater treatment plants to reduce the environmental load on water bodies and the rational use of natural resources;
	LO 11 Propose environmental protection measures to create low-waste and waste-free technologies, to improve environmental performance through the development and implementation of new methods of waste processing, using AI to find ways to replace or improve existing technological schemes of production, sources of waste generation, sanitary norms and rules, collection, accounting and disposal of waste.
	LO 12 To work effectively individually and in a team, using research, entrepreneurial and leadership skills and self-education skills.

3. COMPETENCIES OF AN EP GRADUATE

GENERAL COMPETENCIES (SOFTSKILLS). Behavioral skills and personal qualities	
GC 1. Competence in managing one's literacy	SS1.1.The abilityofself-learn, self-develop and constantly update theirknowledgewithinthechosentrajectory and in an interdisciplinaryenvironment. SS1.2. The abilityto express thoughts, feelings, facts and opinions in the professional field. SS1.3. The abilityformobility in the modern world and criticalthinking.
GC 2. Language competence	SS2.1.The abilitytobuild communication programs in thestate, Russian and foreign languages.
GC 3. Mathematical competence and competence in the field of science	SS3.1.The ability and willingnesstoapplytheeducational potential, experience and personal qualitiesacquiredduring the study of mathematical, naturalscience, technicaldisciplines at theuniversitytosolve professional problems.
GC 4. Digital competence, technological literacy	SS4.1. The ability to demonstrate and develop information literacy through the mastery and use of modern information and communication technologies in all areas of their lives and professional activities. SS4.2. The ability to use various types of information and communication technologies: Internet resources, cloud and mobile services for searching, storing, protecting and disseminating information.
GC 5. Personal, social and educational competencies	SS5.1.The ability for physical self-improvement and focus on a healthy lifestyle to ensure full-fledged social and professional activities through the methods and means of physical culture. SS5.2. The aility to social and cultural development based on the manifestation of citizenship and morality. SS5.3 The ability to build a personal educational trajectory throughout life for self-development, career growth and professional success. SS5.4. The ability to successfully interact in a variety of socio-cultural contexts during study, work, home and leisure. SS5.5. The abilityfor interpersonal social and professional communication in the conditionsofinterculturalcommunication.
GC 6. Entrepreneurialcompetence	SS6.1. The abilitytobecreative and entrepreneurial in a varietyofenvironments. SS6.2. The abilitytowork in a modeofuncertainty and rapidlychangingtaskconditions, makedecisions, allocateresources and manage your time. SS6.3. The abilitytoworkwithconsumerrequests.
GC 7. Culturalawarenessandabilitytoexpressyourself	SS7.1. The abilitytoshowworldview, civil and moralpositions. SS7.2. The abilitytobe tolerant of the traditions and cultureofotherpeoplesoftheworld, tohave high spiritual qualities.
PROFESSIONAL COMPETENCIES (HARDSKILLS).	
Theoretical knowledge and practical skills specific to this field	PC1–the ability to apply monitoring methods, analyze situations in various industries, demonstrate creativity and initiative in management processes that include training others

	in order to improve teamwork. The ability to identify dangerous and harmful factors and ensure the safety of production.
	PC2 – the ability to assess the environmental harm of industrial emissions of enterprises in the region and report the results to the public. The ability to use state and international standards in environmental fields.
	PC3 – Ability to apply monitoring methods, analyse situations in the field of various branches of production using artificial intelligence, demonstrate creativity and initiative in management processes involving training others to improve teamwork. Ability to identify hazardous and harmful factors using AI to collect accurate and timely data to ensure safe production.

3.1 Matrix for correlating learning outcomes in the EP as a whole with the competencies being developed

	LO1	**LO2**	**LO3**	**LO4**	**LO5**	**LO6**	**LO7**	**LO8**	**LO9**	**LO10**	**LO11**	**LO12**
GC 1	+	+	+	+	+	+	+	+	+	+	+	+
GC 2	+	+	+	+	+	+	+	+	+	+	+	+
GC 3	+	+	+	+	+	+	+	+	+	+	+	+
GC 4	+	+	+	+	+	+	+	+	+	+	+	+
GC 5	+	+	+	+	+	+	+	+	+	+	+	+
GC 6	+	+	+	+	+	+	+	+	+	+	+	+
GC 7	+	+	+	+	+	+	+	+	+	+	+	+
PC1	+	+	+	+	+	+	+	+	+	+	+	+
PC2	+	+	+	+	+	+		+	+	+	+	+

4. MATRIX OF THE INFLUENCE OF MODULES AND DISCIPLINES ON THE FORMATION OF LEARNING OUTCOMES AND INFORMATION ON LABOR INTENSITY

Module	Cycle	Component	Name of the discipline	Brief description of the discipline	Quan-ty loans	Formed LO (codes)											
						LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO 10	LO 11	LO 12
Fundamentals of the Public Sciences	GED	OC	History of Kazakhstan	*Purpose:* The purpose of the discipline isformation of an objective idea of the history of Kazakhstan based on a deep understanding and scientific analysis of the main stages, patterns and originality of the historical development of Kazakhstan. *Contents:* Ancient people and the formation of nomadic civilization. Turkic civilization and the great steppe. Kazakh Khanate. Kazakhstan in the era of modern times. Kazakhstan as part of the Soviet administrative-command system. Declaration of Independence of Kazakhstan. State system, socio-political development, foreign policy and international relations of the Republic of Kazakhstan. Methods and techniques of historical description for the analysis of the causes and consequences of events in the history of Kazakhstan.	5	V	V										
	GED	OC	Philosophy	*Purpose:* The formation of a	5	V	V										

				holistic idea among students about philosophy as a special form of knowledge of the world, about its main sections, problems and methods of studying them in the context of future professional activity. And also the formation of philosophical reflection, introspection and moral self-regulation among students. *Contents:* Emergence of a culture of thinking. Subject and method of philosophy. Fundamentals of philosophical understanding of the world: questions of consciousness, spirit and language. Being. Ontology and metaphysics. Cognition and creativity. Education, science, technology and technology. Human philosophy and the world of values. Ethics. Philosophy of values. The subject of aesthetics as a field of philosophical knowledge. Philosophy of freedom. Philosophy of art. Society and culture. Philosophy of history. Philosophy of religion. "Mangilik El" and "Modernization of Public Consciousness" are a new Kazakhstan philosophy.													
Socio-Political	GED	OC	Social and Political Studies	*Purpose:* The goal of forming knowledge about social and political activities, explaining social	4	V	V										

knowledges				and political processes and phenomena. *Contents:* Consideration of the system of socio-ethical values of the society. Ways to use social, political, cultural, psychological institutions, features of youth policy in the modernization of Kazakhstani society and solve conflict situations in society and professional environment based on them.To study the methods of analysis and interpretation of political institutions and processes, ideas about politics, power, state and civil society, to understand and use the methods and methods of sociological, comparative analysis, to understand the meaning and content of the political situation in the modern world. Analysis and classification of the main political institutions. Socialization, identity and deviant behavior: the role of an inclusive approach.													
	GED	OC	Cultural Studies and Psychology	*Purpose:* the formation of scientific knowledge of history, modern trends, current problems and methods for the development of culture and psychology, the skills of a systematic analysis of psychological phenomena. *Contents:* Morphology, language, semiotics, anatomy of culture.	4	V	V										

				Culture of nomads, proto-Turks, Turks. Medieval culture of Central Asia. Kazakh culture at the turn of the XVIII - XIX centuries, XX century. Cultural policy of Kazakhstan. State Program "Cultural Heritage". National consciousness, motivation. Emotions, intellect. The will of man, the psychology of self-regulation. Individual typological features. Values, interests, norms are the spiritual basis. The meaning of life, professional self-determination, health. Communication of the individual and groups. Socio-psychological conflict. Models of behavior in conflict. Social and psychological foundations and development of an inclusive culture in modern society. Psychological characteristics and conditions for professional adaptation of individuals with special needs. Psychological support and tolerance as a way of social integration of people with special needs. Social and psychological barriers to interaction of people with special needs in modern society..Include in the content of the discipline "Ecosystem and Law" the topic Inclusion - a strategy of														

				international legislation.													
Socio-ethnic Development	GED	EC	Ecosystem and law	*Purpose*: Formation of integrated knowledge in the field of economics, law, ecology and life safety, methods of scientific research to achieve sustainable development of society. *Contents:* Basics of safe interaction between man and nature, productivity of ecosystems and biosphere. Increasing the competitiveness of entrepreneurial activity of society, business and national economy in conditions of limited resources within the framework of sustainable development goals of Kazakhstan. Systemic understanding of environmental problems and principles of sustainable development. Knowledge and observance of Kazakhstan rights, obligations and guarantees of subjects, state regulation of public relations to ensure social progress. Legal foundations of artificial intelligence.	5	V	V		V									
	BD	EC	Abai Studies	*Purpose*: based on the creativity of A.Kunanbayev, the preservation of the «national code» and in the project «Kazakhtanu» *Contents:* historical overview of the history of Kazakhstan and Kazakh literature of the XIX-XX centuries.	3	V	V										

				Studies of Abai's legacy of the XX-XXI century. Chronology of Abai's creativity. Abai is a great poet, ethnographer, founder of Kazakh written literature. Abai is the compiler of the code of laws «The Position of Karamola», social significance. Abai is a thinker, religious scholar, philosopher. The role of Abai in education and science, the concept of a «Holistic person». «Words of Edification»by Abai, an epic novel by M.Auyezova «The Way of Abai» . K. Tokayev «Abai and Kazakhstan in the XXI century», role, significance.													
	BD	EC	Basics of Financial Literacy	*Purpose:* to form students' knowledge system in the field of economics and finance for making informed decisions in various areas of life. *Content:* Financial literacy: concepts and role in shaping economic behavior. Personal budget: accounting for income and expenses. Debts and loans: opportunities and risks. Personal savings: how to save and multiply. Taxes and taxation of individuals. Insurance of individuals. Personal financial security.		V	V										
	BD	EC	Мukhtar Studies	*Purpose*: Formation of a historical, literary idea of M. Auezov's work in the context of literary history,		V	V										

				patriotism and cultural and spiritual position. Development of artistic thinking, skills of independent research activity. *Contents:* The life and creative path of M. Auezov Semipalatinsk, Tashkent, St. Petersburg periods. M. Auezov's activity in the magazines «Sholpan», «Abai». M. Auezov's journalism. An artistic review of the short stories "Korgansyzdyn kuni", "Kyr suretteri", "Okagan azamat", "Kokserek", the play Enlik-Kebek and the stories "Kili Zaman", "Karash-Karash" okigasy", the monograph "Abai Kunanbayev", the epic novel "Abai Zholy".													
	BD	EC	Foundations of Anticorruption Culture	*Purpose:* formation of an anti-corruption worldview, strong moral foundations of a personality, civic position, stable skills of anti-corruption behavior. *Content:* Overcoming legal nihilism, formation of the basics of students' legal culture in the field of anti-corruption legislation. Formation of a conscious perception/attitude towards corruption.Moral rejection of corrupt behaviour, corrupt morality and ethics.Development of skills necessary to fight corruption.Development of anti-		V	V										

				corruption standards of conduct. Anticorruption propaganda, dissemination of lawfulness and respect for the law. Activities aimed at understanding the nature of corruption, awareness of social damage caused by its manifestation, ability to defend one's position with arguments, seeking ways to overcome manifestation of corruption. Application of AI in combating corruption.												
	BD	EC	Basics of Artificial Intelligence	*Purpose*: develop skills in the basics of academic writing. *Contents:* The ability to create and edit academic texts, such as essays, abstracts, abstracts, term papers, term projects, theses, graduation papers and/or projects. Formation of skills for creating reports and presentations. The use of acquired skills for the correct compilation of a bibliographic description. Demonstration of the acquired knowledge in practice when solving strategic, managerial, and financial tasks and using proper writing skills in professional area		V	V										
	BD	EC	Fundamentals of artificialintelligence	*Purpose:* To develop competencies in the use of knowledge and practical application of artificial intelligence tools and methods, in alignment with the priorities of the AI-Sana program.		V	V										

				Contents: Introduction to Artificial Intelligence (AI). Development of practical skills and abilities, including: using AI tools; working with large language models (LLMs); utilizing no-code AI platforms; employing generative AI tools; image recognition; natural language processing (NLP); and data visualization through AI. Understanding the application of AI in various fields and exploring its potential through the integration of AI-Sana program approaches.													
Communication and Physical Training	GED	OC	Kazakh (Russian) Language	*Purpose:* formation of communicative competence using the Kazakh (Russian) language in the socio-cultural, professional and public life, improvement of the ability to write academic texts. *Content:* Levels A1, A2, B1, B2-1, B2-2 (B2, C1 Russian language) are presented in the form of cognitive-linguocultural complexes, consisting of spheres, themes, sub-themes and typical situations of communication of the international standard: social, social - cultural, educational and professional, modeled by forms: oral and written communication, written speech works, listening. Demonstration of understanding of the language material in the texts on the	10	V												

				educational program, knowledge of terminology and development of critical thinking.													
	GED	OC	Foreign Language	*Purpose:* a formation of students' intercultural and communicative competence in the process of foreign language education at a sufficient level A2 and a level of basic sufficiency B1. Student reaches B2level of common European competence if the language level at the start is higher than B1level of common European competence *Content:* Levels A1, A2, B1, B2 are presented in the form of cognitive-linguocultural complexes, consisting of spheres, themes, sub-themes and typical situations of international standard'scommunication: social, social - cultural, educational and professional, modeled by forms: oral and written communication, written speech works, listening. Demonstration of language material's understanding in texts on educational program, knowledge of terminology and critical thinking development.	10	V											
	GED	OC	Physical Training	*Purpose:* the formation of social and personal competencies and the ability to purposefully use the means and methods of physical	8		V										

				culture that ensure the preservation and strengthening of health in preparation for professional activity; to the persistent transfer of physical exertion, neuropsychic stresses and adverse factors in future work. *Content:* Implementation of physical culture and health and training programs. A complex of general development and special exercises. Sports (gymnastics, sports and outdoor games, athletics, etc.). Control and self-control during classes, insurance and self-insurance. Refereeing competitions, Means of professionally applied physical training. Modern health-improving systems: the breathing system according to A. Strelnikova, K. Buteyko, K. Dinaiki, joint gymnastics according to Bubnovsky.													
	BD	PD	Professional Kazakh (Russian) Language	*Purpose:* to provide professionally oriented language training of a specialist who is able to competently construct communication in professionally significant situations and speak the language norms for special purposes. *Content:* Professional language and its components. Professional terminology as the main feature of	3	V	V										

				scientific style. Scientific vocabulary and scientific constructions in educational-professional and scientific-professional spheres. Algorithm of work on the analysis and production of scientific texts on specialty. Producing scientific and professional texts. Basics of business communication and documentation within the framework of future professional activity.													
	BD	PD	Professionally Oriented Foreign Language	*Purpose:* the formation of intercultural and communicative competence of students in the process of foreign language education at a sufficient level A2 and the level of basic sufficiency B1. *Content:* A professionally oriented foreign language is used in the field of ICT. The issues of programming, database development, network technologies, the use of Big Data, DB, Machine Learning tools in English are studied. Practical skills of analysis, design, implementation of ICT developments in a foreign language.	3	V	V											
	GED	OC	Information and Communication	*Purpose:* formation of the ability to critically evaluate and analyze processes, methods of searching, storing and processing information,	5			V										

			Technologies	methods of collecting and transmitting information through digital technologies. Development of new "digital" thinking, acquisition of knowledge and skills in the use of modern information and communication technologies in various activities *Contents:* Introduction and architecture of computer systems. Software. Operating systems. Human-computer interaction. Database systems. Data analysis. Data management. Networks and Telecommunications.Cybersecurity. Internet technologies. Cloud and Mobile technologies. Multimedia technologies. Smart technology. E-technologies. Electronic business. Electronic government.													
Fundamentals of Mathematical and Natural sciences	BD	EC	Higher mathematics	*Purpose:* formation of ideas about the theoretical foundations of higher mathematics; practical skills of performing the necessary measurements, related calculations, application of theorems, formulas, mathematical methods for solving professional problems. *Content:* Matrices. Determinants. Methods for solving systems of linear equations. Vectors. Various equations of a straight line on a plane and a straight line and a plane in space. Curves and surfaces of the	5		V	V									

				second order. Function. The limit of the function. Remarkable limits. Differential and integral calculus of a function of one variable. Derivatives and differentials of higher orders. Function research and plotting. Indefinite and definite integrals. Functions of several variables. Differential equations of the first and second orders. Rows.													
	BD	EC	Probability Theory and Mathematical Statistics	*Purpose:* Formation of knowledge about the basic properties of probabilities, their calculation. *Content:* Determination of numerical characteristics by continuous, discrete random variables. Correlation analysis. Software calculation of moments of distribution functions. Estimates of basic distributions in statistics (MMP). Practical application of Minitab, Stat Soft, State applications for the development of k-th order probabilistic models, verification of hypotheses of homogeneity, significance of coefficients, adequacy of models. Conducting regression analysis.		V	V										
	BD	EC	Origin and Development of Biosphere	*Purpose:* To give a complete and unambiguous idea of the Earth's biosphere,the role of living organisms in maintaining the integrity of the biosphere. *Contents:* Research the formation of the					V		V					

				concept of the biosphere and the teachings of Vernadsky,the main regularities of the functioning of the biosphere. Negative consequences of violation of homeostasis of the biosphere. Human activity in different eras of the historical past. Environmentalcrises. Stability and dynamicsofthebiosphere.												
	BD	EC	Physics	*Purpose:* to form a scientific method of cognition among students, for which it is necessary to provide a presentation of the course based on the qualification characteristics of a future specialist, to ensure that the student learns the relationship between classical and modern physics and the limits of applicability of certain theories and laws. *Content:* the laws of classical and modern physics are considered; modern scientific equipment and methods of physical research; techniques of modern physical experiment. The degree of reliability of the results of theoretical and experimental studies is evaluated; an experiment is planned and its results are processed. The acquired knowledge is used to solve specific problems from various fields of physics: mechanics, thermodynamics and	5		V										

				molecular physics, electrodynamics, optics, etc.													
	BD	EC	Fundamentals of Quantum Mechanics	*Purpose:* Formation of students' skills in using qualitative and quantitative methods of quantum mechanics. *Contents:* Quantum physics and physics of the atomic nucleus. Quantum nature of electromagnetic radiation. Quantum theory of electromagnetic field interaction with matter. Nuclear forces. Radioactive transformations of atomic nuclei			V	V									
	BD	EC	General Biology	*Purpose:* Formation of knowledge about basic biological concepts, assimilation of leading ideas, development of skills for applying relevant knowledge in professional activities. *Contents:* The diversity of the animal world. Basic properties of living organisms. Levels of organization of living systems. Morphological, physiological and biochemical aspects of the vital activity of the organism. Cellular theory. Fundamentals of genetics and breeding. Biological characteristics of tree and shrub species.	5					V							
	BD	EC	Origin and Development of	*Purpose:* To give a complete and unambiguous idea of the Earth's biosphere,the role of living						V		V					

			Biosphere	organisms in maintaining the integrity of the biosphere. *Contents:* Research the formation of the concept of the biosphere and the teachings of Vernadsky,the main regularities of the functioning of the biosphere. Negative consequences of violation of homeostasis of the biosphere. Human activity in different eras of the historical past. Environmentalcrises. Stability and dynamicsofthebiosphere.													
Chemical Engineering	BD	EC	General Chemistry	*Purpose:* formation of a modern idea of substances, mechanisms and methods for the transformation of one substance into another; properties of various types of materials, compositions, compounds; development of chemical thinking; skills in setting up and conducting experiments, solving problems, formulating conclusions, discussing the results of chemical experiments. *Content:* Basic concepts and laws of chemistry. Classes of inorganic compounds. The structure of the atom. Periodic law D. M. Mendeleev. Chemical bonds. complex compounds. Chemical thermodynamics. The rate of chemical reactions. Conditions of chemical equilibrium. Types of solutions. Ways of expressing the	4		V											

				concentration of solutions. Salt hydrolysis. Redox processes. electrolysis processes. Corrosion. Chemistry of non-metal compounds													
	BD	EC	Theoretical Fundamentals of Inorganic Chemistry	*Purpose:* Formation of fundamental knowledge on classes of inorganic compounds, the structure of the atom, elements of chemical thermodynamics and kinetics, the doctrine of solutions and electrolytic dissociation, methods of formation of chemical bonds, OVR, hydrolysis, electrolysis. *Contents:* Skills of working with chemical utensils, reagents and devices for conducting chemical experiments, solving problems are being developed.			V										
	BD	EC	Engineering Economics	*Purpose:* development of economic thinking and practical skills in performing engineering and economic calculations based on the study of the economic mechanism of the enterprise functioning in market conditions. *Contents:* Engineering economics, the purpose and objectives of the course. The main features, tasks and functions of the enterprise. The fixed and working capital of the enterprise. The staff of the enterprise. Labor payment at the enterprise. Investment and innovation activity of the	4						V			V			V

				enterprise. Planning of the production activity of the enterprise. Marketing activity of the enterprise. Production costs and prime cost. Profit and profitability. Economic efficiency of the enterprise's activity.												
	BD	EC	Organization of Production and Management	*Purpose:* Formation of knowledge about entrepreneurial activity of enterprises and management. *Contents:* Public production, types of economic systems and patterns of transition economies in the field of environmental protection. The essence and mechanism of the functioning of a market economy, the foundations of the theory of supply and demand, the essence of capital, the round-robin and capital turnover.						V						V
	BD	EC	Standartization, Certification and Metrology	*Purpose:* To develop knowledge of standardization, certification and metrology in the field of nature protection. *Contents:* Use of legal norms regulating relations of subjects in the process of standards implementation. Requirements in the field of environmental norms and standardisation (norms, regulations, standards). Modern trends and requirements of standardisation, certification and metrology systems for preservation	4						V		V	V			

				and protection of the environment. Methods of analysis of experimental data processing, systematisation of scientific and technical information.													
	BD	EC	System of Technical Regulation and Providing of Unity of Measurement/	*Purpose:* Formation of knowledge about physical quantities, units of their measurement, standards and verification schemes. *Contents:* The history of the emergence of standardization as a science. Provisions of the state standardization system. Law of the Republic of Kazakhstan "On ensuring the uniformity of measurements. Systematic errors, methods of their elimination. Random error distribution laws, point, interval estimates. Barcode the product, its purpose and application.						V		V				
Fundamentals of ecology	BD	EC	Introduction to Specialty	*Purpose:* Basic concepts of the specialty "ecology". Studies the structure of the university: administration, higher school, department. *Contents:* Considers basic laws of ecology, interaction of living organisms with the environment, land resources, air pollution, water resources and their consequences, natural resources and environmental management. Analyzes social and environmental problems of our	4					V	V						

				time, environmental problems of Kazakhstan.													
	BD	EC	Fundamentals of Acadimic Writing	*Purpose:* develop skills in the basics of academic writing. *Contents:* The ability to create and edit academic texts, such as essays, abstracts, abstracts, term papers, term projects, theses, graduation papers and/or projects. Formation of skills for creating reports and presentations. The use of acquired skills for the correct compilation of a bibliographic description. Demonstration of the acquired knowledge in practice when solving strategic, managerial, and financial tasks and using proper writing skills in professional area		V	V										V
			Educational Practice	*Purpose:* Studies the flora and fauna of South Kazakhstan, with the environs of the city of Shymkent, environmental problems and biological diversity of the city, Turkestan region and the Republic of Kazakhstan as a whole. Draws up the results of studies on the plant and animal world of Kazakhstan and South Kazakhstan.	1				V	V							V
	BD	EC	Ecology and Sustainable Development	*Purpose:* formation of an ecological worldview, obtaining deep systemic knowledge and ideas about the foundations of sustainable development of society and nature, theoretical and practical knowledge	3				V	V							V

				on modern approaches to the rational use of natural resources and environmental protection. *Contents:* Ecology and problems of modern civilization. Autoecology is the ecology of organisms. Demecology – ecology of populations. Synecology is the ecology of communities. The biosphere and its stability. Evolution of the biosphere. The concept of living matter. Modern biosphere. Global biogeochemical cycles. Ecological crisis and problems of modern civilization. Strategies, goals and principles of sustainable development. Ecoenergy. Global energy-ecological strategy for sustainable development of the XXI century. Water is a strategic resource of the XXI century. Renewable energy sources. Environmental policy of the Republic of Kazakhstan. The concept of sustainable development of the Republic of Kazakhstan.														
	BD	EC	Ecological Aspects of Natural Science	*Purpose:* formation of fundamental knowledge in different directions of the modern complex of natural sciences, disclosure of the general methodology of natural sciences. *Contents:* The process of natural science cognition. Ecological aspects of biology. Biological					V	V							V

				ecology. Ecological aspects of chemistry. Chemical ecology. Chemistry of pollutants in the environment. Ecological aspects of physics. Physical ecology. Technogenic physical pollution and natural background. Fuel and energy resources of the Earth. Energy flows in the biosphere. Energy exchange. Environmental consequences of using traditional energy sources. Global energy-ecological strategy for sustainable development of the XXI century. The G-global project. Low-carbon development and green economy. Global Partnership for Sustainable Development.														
	BD	EC	Ecology of Animals, Plants and Biogeography	*Purpose:* To develop knowledge, skills and moral responsibility for the conservation of biological diversity and habitats of living organisms. *Contents:* 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.	5				V	V								
	BD	EC	Landscape	*Purpose:* formation of knowledge					V	V	V							

			studies with basics of ecology	about the structure of natural-territorial complexes, their functioning, dynamics and evolution, familiarity with natural and natural-anthropogenic landscapes. *Contents:* Introduction. Stages of landscape science development. lecture session. Basic theories and methodologies of landscape studies. The main variants of the landscape sphere. Conceptual foundations of landscape studies. Natural components of the landscape. Morphological structure of the landscape. Approaches to the construction of landscape classification. The history and genesis of landscapes. The dynamics of the landscape. Landscape space-time. The doctrine of natural and anthropogenic landscapes. Optimization of modern landscapes. Functional use of landscapes. Principles, methods and directions of assessment of anthropogenic landscapes. Landscape and environmental mapping. Landscape zoning of the Republic of Kazakhstan.													
Baisics of Geoecology	PD	EC	Bioindication Research Methods in Ecology	*Purpose:* To develop systematic knowledge in the field of environmental assessment by bioindicative methods.	6					V	V						V

and Nature Management				*Contents:* 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.													
	PD	EC	Agroecology	*Purpose:* to form knowledge about the current state and prospects of development of agroecological systems. *Content:* 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, energy transfer, the nature of the functioning of agroecosystems under man-made loads. Anthropogenic impacts on the ecosystem.					V	V							V
	BD	PD	Geoecology and Nature Protection	*Purpose:* To develop knowledge of environmental laws and laws of natural, natural and anthropogenic geosystems for the purpose of nature protection. *Contents:* Changes in the Earth's geospheres under the influence of	5					V	V	V					

				human activity. Global environmental problems of the Earth, anthropogenic transformation of ecosystems, natural resources of Kazakhstan. Ecological consequences of mining, reduction of natural biological productivity of ecosystems, hazard maps of anthropogenic desertification of the territory of Kazakhstan. Classification and properties of components of the environment (soil-geological and geological objects, water objects, biocoenoses). Sources and types of sources, scale, circumstances and characteristics of negative anthropogenic impact on the surrounding environment.												
	PD	EC	Soil Science With Fundamentals of Ecology	*Purpose:* To create knowledge about the soil, its properties, education and ecology. *Contents:* Soil formation process and factors of soil formation, soil-forming rocks, relief, biological factors of soil formation. Soil profile and its properties, soil profile structure, genetic horizons of soils, their diagnostics, symbolism, types of soil profile structure and their connection with soil-ecological conditions. General knowledge about soils, soil properties; Conditions of	4				V	V	V						

				production environment (temperature, humidity) when carrying out ex-permitisation/research; To keep and draw up notes on calculations, analysis, evaluation and processing of research results.													
	PD	EC	Ecological Problems in Agricultural Areas	*Purpose:* To create knowledge about the impact of human agricultural activity on ecological equilibrium in nature. *Contents:* 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					V	V	V						
			Industrial Practice I	*Purpose:* Studies sources of anthropogenic pollution of the city, analyzes provisions of ecological services of the city and the region, organizes and conducts local monitoring by carrying out physical, chemical and bacteriological monitoring of emissions and discharges into the environment. Draws up high-quality, professional report with conclusions and suggestions.	4				V	V	V						V

Environmental Monitoring and Modeling	PD	EC	Environmental Monitoring	*Purpose:* To form knowledge about environmental monitoring. *Contents:* The content and structure of environmental monitoring, environmental monitoring objects, classification of monitoring types by obje tsandtrackingmethods. The essence, specific sandproperties of environmental monitoring. Modern method sandmeans of environmental monitoring. The role of artificial intelligence in environmental monitoring.	5						V			V			
	PD	EC	Environmental monitoring of Enterprises	*Purpose:* formation of knowledge about the integrated observation system, assessment and prediction of changes in the state of the environment under the influence of factors, skills and abilities in the development of industrial environmental monitoring systems, selection of necessary equipment, sampling of all components of the natural environment, methods of analysis, processing of results, calculation and forecast of determining production parameters. *Content:* Environmental monitoring. The legal basis of industrial environmental monitoring. The procedure for organizing and conducting industrial environmental monitoring (PEM). Industrial							V			V			

				environmental monitoring systems.													
	BD	EC	Geoinformation Systems in Ecology	*Purpose:* Formationof knowledge about modeling structural integration of GIS with remote sensing technologies, satellite positioning systems, Internet. *Contents:* 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. The role of artificial intelligence in geographic information systems	5						V			V			
	BD	EC	Modeling in Ecology	*Purpose:* Formation of knowledge about mathematical models used to solve scientific, applied problems in ecology. *Contents:* 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.							V			V			

Environmental Design and Fundamentals of Scientific Research	PD	EC	Ecological Construction	*Purpose:* to gain knowledge about environmental protection strategies in the context of urbanization; promising areas of construction development, taking into account its greening; measures to reduce environmental risks in construction activities; *Content:* Conceptual foundations of a sustainable development strategy. The natural environment and modern environmental problems. State policy in the field of protection. Environmental protection and environmental management. Ensuring environmental safety in the implementation of construction activities. Urban planning, architecture and the natural environment. Monitoring to ensure environmental safety in construction. State ecological expertise of construction projects Ecological foundations of urban planning General requirements for the procedure for the development and composition of the section "environmental protection" in urban planning documentation. General requirements for the development procedure and the composition of the section "Environmental	5								V	V			

				protection" in the design of individual construction projects." Information support of the section "Environmental protection".														
	PD	EC	Eco-analytics in Constructio n	*Purpose:* to form students' ecological worldview and the ability to use environmental laws and principles to make design decisions in their professional activities. *Content:* The concept of the biosphere, noosphere, ecology. Features of the modern ecological situation. he concept of industrial ecology. Construction ecology. Environmental problems of construction. Government policy and legal regulation regulation in the field of environmental protection during construction. X The characteristics of enterprises in the construction industry in terms of their danger to the surrounding air environment. The choice of the construction site of the object. Sanitary protection zones of enterprise facilities. The sizes of zones and hazard classes of enterprises. Measures to reduce air pollution. Organization of atmospheric air quality control in residential areas and near construction sites. Statistical								V	V			

				generalization of data on atmospheric air pollution in cities and large settlements. Processing and generalization of the results of subfactual observations of the state of atmospheric pollution. Protection of the aquatic environment in the onstruction complex. Wastewater treatment of construction industry enterprises. Drainage and purification of stormwater and eltwater from construction sites Characteristics of soil pollution. Protection of soils from pollution. Environmental protection during construction work. Disposal of construction waste.												
	BD	EC	Ecological Resource Knowledge and of Natural Managemen t	*Purpose:* To develop knowledge about natural resources and raw material deposits of RCs and their rational use. *Contents:* 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.	5						V				V		

	BD	EC	Environmental design in the field of environmental protection	*Purpose*: to form basic knowledge and skills in the work on the environmental justification of the economic activities of enterprises, the development of environmental design documentation, the use of methods and principles of environmental impact assessment. *Content:* Basic concepts, subject, purpose and history of environmental design. Stages of environmental design. The state environmental assessment is the final stage of investment justification. Principles of environmental design. Areas of application and features of environmental design, depending on the type of environmental management. Assessment of the economic potential of the territory and the severity of natural and economic conflicts. Ecological justification of urban development facilities. Ecological justification of urban facilities. Systemic aspects of urban life support. Landscape-streaming zoning and criteria for evaluating streaming systems when creating an ecological urban framework.								V			V		
	PD	EC	Planning and Setting up of	*Purpose:* to form the basic concepts and definitions, methodology and methods of scientific research.	6		V								V	V	

			Scientific Research Works	*Contents:* The process of preparation, registration of a scientific abstract, literary review, development of programs, research schedule, calculation of the technical and economic efficiency of the results of the introduction of research into production. Organization of scientific research work. Methods of theoretical and empirical research, the choice of the direction of scientific research and the stages of research. Development of new AI methods or algorithms. Application of existing AI algorithms to solve specific scientific or technical problems.												
	PD	EC	Fundamentals of Sefting up Research and Patenting	*Purpose:* Formation of knowledge about the impact of industrial enterprises on the biosphere and their consequences. *Contents:* Fundamentals of scientific research and patent search, choosing the direction of scientific research, accumulation and processing of information. Generalization of research results, methods of conducting scientific and production experiments. Scientific research and their generalization in the form of student scientific papers Start-Up	6		V									V	
Fundamentals	PD	EC	Fundamentals of	*Purpose:* To familiarize with the system of norms and rules of	5						V	V	V				

of Ecological Legislation and Management			Environmental Regulation and Examination	environmental activity, environmental management, rational use of natural resources and environmental expertise. *Contents:* 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.													
	PD	EC	Environmental Examination and Audit in Production	*Purpose*: the formation and development of the environmental audit procedure for technologies, industries and territories in order to ensure sustainable development, allows us to develop a scientific approach to the study of complex multifactorial, interdisciplinary and intersectoral problems of rational use, reproduction of natural resources and environmental protection, as well as to master the principles, methods and techniques of management in this area. *Contents:* Theoretical and applied foundations of environmental listening. Legal and regulatory methodological support of environmental auditing. International and domestic							V	V	V			

				standards on environmental auditing. Criteria, procedures, stages and information support of environmental audit. Environmental audit of technologies, industries and territories.													
	PD	EC	Fundamentals of Environmental Law in Environmental Management	*Purpose*: to form knowledge of the legal norms governing public relations in the field of interaction between society and nature. *Content:* Subjects and objects of environmental legal relations. Rights and duties of officials exercising control, procedure of environmental control, work with regulatory and legal documentation, their processing, storage, use in professional activities. Types of legal responsibility for violation of legislation on environmental protection. Legislative and other normative legal acts in the field of judicial-expert activity. Legislation of the Republic of Kazakhstan on the issues of nature protection and environment protection. Peculiarities of judicial-ecological-legal ex-pertise on facts of infringement of inter-industrial ecological-legal relations. Methods and methods of judicial-expertise research, domestic and foreign achievements in the field of judicial ecological-legal expertise.	5						V	V					

			Environmental legislation of the Republic of Kazakhstan	*Purpose:* formation of knowledge about the environmental legislation of the Republic of Kazakhstan, definition of legal bases, tasks and principles, as well as mechanisms for the implementation of the unified state environmental policy in the Republic of Kazakhstan. *Content:* The main provisions. Public administration in the field of environmental protection. State regulation of environmental relations. Economic regulation of environmental protection. Objects of historical pollution. Elimination of the consequences of activities at facilities that have a negative impact on the environment. State monitoring of the environment and natural resources. Activities in the field of meteorological monitoring, hydrological monitoring and environmental monitoring. National Hydrometeorological Service. State cadastres of natural resources of the Republic of Kazakhstan. Environmental control. State environmental control. Industrial environmental control. Public environmental control. Environmental culture, education and enlightenment. Protection of atmospheric air. Protection of water bodies. Land protection.	5						V	V					

				Nature conservation. Environmental requirements for the use of wildlife. Protection of the gene pool of plants, animals, microorganisms and the use of genetic resources. Protection of the ozone layer of the atmosphere.												
Industrial Ecology	PD	EC	Emissions into the environment and their calculation	*Purpose*: to form knowledge about the content, purpose, regulatory and legal procedures for assessing the environmental impact of planned and projected economic and other activities. *Content:* Regulatory and legal support of the EIA. Stages of the EIA procedure. Planning of the event The EIA. Methodological foundationsof the EIA. EIA methods. Analysis and forecast of the environmental situation. Assessment of the state of individual components and environmental parameters forecasting the effects on them. Preparation of an opinion on the EIA. Environmental design and expertise. The impact of existing engineering and technical facilities on the natural environment. Environmental support of economic activities. Convention on Environmental Impact Assessment in a Transboundary Context. Requirements of the European	5								V	V			

				Bank for Reconstruction and Development for EIA. Foreign practice of conducting an EIA.														
	PD	EC	Regulation of Emissions into the Environment	*Purpose*: to form knowledge about the main provisions of regulatory documents in the field of atmospheric air protection, on which computer programs for environmental calculations are based, their structure and capabilities, and the calculation algorithm. *Contents*: General information about programs for environmental calculations. Inventory of sources of pollutant emissions. Determination of mass emissions of pollutants. Methods for determining mass emissions of pollutants. Methods for calculating industrial emissions of pollutants into the atmosphere. Development of standards for permissible emissions of pollutants into the atmosphere. Environmental quality regulation. Standards for permissible emissions of pollutants into the atmosphere. Calculations of atmospheric pollution. Software products of the Ecologist series. The program "PDV-Ecologist". UPRZA "Ecologist". the programs "Ecologist PRO", "Prism",							V		V			

				"Atmosphere", "LIDA".													
	PD	EC	Industrial Ecology	*Purpose:* to form knowledge about the impact of industrial enterprises on the biosphere and their consequences. *Content:* Resources of the natural system and their use, man-made pollution of the natural environment. Greening of technological processes, methods of selecting greening projects, optimization of the placement of pollution sources, sanitary protection zones. Calculation of the dispersion of pollutants from a single source, MPE standards, MPD.	5								V	V	V		
	PD	EC	Integrated environmental management system	*Purpose*: to provide students with information, legal and methodological foundations for the development of plans and implementation of environmental management systems, rational use of natural resources, promotion of resource- and energy-saving environmental technologies. *Content:* The concept of sustainable development and environmental management. Standards and international recommendations in the field of environmental management systems. The main elements of the							V	V	V				

				environmental management system. Environmental audit													
	PD	EC	Air Basin Protection	*Purpose:* Formation of knowledge about the current state and prospects of development of agro-ecological systems. *Contents:* 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.	5						V		V	V			
	PD	EC	Assessment of the ecological and economic efficiency of production	*Purpose:* to form knowledge about modern methods of forecasting, planning and analysis of ecological and economic results of resource use, the functioning of various production facilities, the introduction of low-waste technology, the implementation of environmental protection measures. *Contents:* Introduction to the economics of environmental management. The subject and objectives of the economics of environmental management. Patterns of environmental							V		V	V			

				management. Ecological and economic needs and interests. Ownership of natural resources. Economic development and the environmental factor. Environmental and economic costs. Greening the economy and the final results. Economic efficiency of environmental management. The economic mechanism of nature management and environmental protection activities. Payments for environmental pollution. Economic assessment of natural resources and environmental quality. payments for the use of natural resources.												
	PD	EC	Technique of Environmental Protection	*Purpose:* Formation of knowledge about the main technical means of environmental protection. *Contents:* 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.	5								V	V	V		
	PD	EC	Economical and Ecological Evaluation of	*Purpose:* formation of knowledge about the mechanisms of economic and environmental assessment of enterprises. *Contents:* The essence,									V	V	V		

			Enterprises	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.												
			Industrial Practice II	*Purpose:* Studies technological schemes of enterprises, standards, technical conditions and maintenance of regulatory and technical documentation; production technology and sources of industrial emissions, gas and water treatment systems, structures used and possible drawbacks. Draws up high-quality, professional report with conclusions and suggestions.	6							V	V	V	V		
Protection of Water Resources	PD	EC	Technology of Wastewater Treatment of Industrial Enterprises	*Purpose:* formation of fundamental knowledge on wastewater treatment technology. *Contents:* The quality of wastewater treatment in accordance with established standards. Theoretical foundations and principles of operation of technological equipment for wastewater treatment. Calculation	6									V	V		

				of the required degree of wastewater treatment. Visual observations, instrumental examinations and tests. Compliance with the technology in accordance with the current regulatory documentation.													
	PD	EC	Urban Wastewater Treatment	*Purpose:* to teach future specialists the rational use and protection of water resources: independent design of the entire complex of wastewater treatment plants based on modern achievements of domestic and foreign science and technology in this field. *Content:* Composition and properties of wastewater. Reservoirs, their protection from wastewater pollution. Methods of wastewater treatment and sludge treatment. Mechanical wastewater treatment. Preliminary aeration and biocoagulation of wastewater. Treatment, neutralization and use of sediment. Biological wastewater treatment in natural conditions. Biological wastewater treatment under artificial conditions. Secondary settling tanks and silt compactors. Methods and facilities for deep purification of biologically treated wastewater. Disinfection of wastewater. General schemes of wastewater treatment plants.										V	V		

	PD	EC	Integrated Use and Protection of Water Resources	*Purpose:* formation of knowledge, skills and abilities of using methods of designing water use systems and protection of water bodies *Content:* Water as a resource. The state and prospects of the use of water bodies. Assessment of available surface and groundwater resources. Water management complexes and water management systems. Public utilities. Industry. Animal husbandry. Recreation. Energy. Crop production. Fisheries. Water protection measures. Schemes of integrated use and protection of water bodies (SIUPWB). Water management balances. Measures to protect against the harmful effects of water.	5									V	V		
	PD	EC	Technique and Technology of Water Purification	*Purpose:* to form knowledge of the technique and technology of natural and wastewater treatment and to solve the issues of integrated use of natural water supply sources. *Content:* Factors determining the amount and mode of receipt of generated wastewater for various sewerage facilities. Dependence of wastewater disposal on water consumption. Water disposal standards. Wastewater disposal standards (unit costs) for various industries. Methods of wastewater treatment and sludge treatment.										V	V		

				Technological schemes of wastewater treatment. Mechanical, chemical, and biological cleaning. The purpose of the rain network. Rainwater drainage systems. Designs and location of rain receivers. Treatment, neutralization and use of sediment. Methods and facilities for deep wastewater treatment. Disinfection of wastewater. The main directions of intensification and reconstruction of wastewater disposal systems and their structures. Wastewater disposal and wastewater treatment systems in large cities and sparsely populated areas.													
Environmental Protection and Sustainable Development	PD	EC	Modern Urban Problems and Urboecology	*Purpose:* Formation of knowledge about the state of the environment in the conditions of urbanization and to assess their consequences for human life. *Contents:* 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.	5					V	V		V				
	PD	EC	Social	*Purpose:* to give an idea of the					V		V		V				

			Ecology and Sustanable Developme nt	main objects, methods, principles of creating resource-saving, low-waste and non-waste technologies. *Contents:* 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.													
	BD	PD	Climate Change and "Green Economy"	*Purpose:* To form students' understanding of the close relationship between economic activity and climate change, the introduction of a "green" economy. *Contents:* 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.	4						V		V				
	PD	EC	Resource-Saving, Low-waste and Non-waste Technologie	*Purpose:* to give an idea of the main objects, methods, principles of creating resource-saving, low-waste and non-waste technologies. *Contents:* Requirements of regulatory and technical	5						V					V	

			s	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.												
	PD	EC	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. *Contents:* 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.							V					V	
Module acquisition of new professional competencies	BD	EC	Subjects on the additional educational program	*Purpose:* To master an additional educational program forming additional competencies. *Contents:* An additional educational program, the disciplines of which form additional competencies. At the same time, the disciplines are non-core for the direction of training. It consists of several disciplines. Advantages: interdisciplinarity and expanding	12										V	V	

				horizons of competencies.													
Module of final Certification			Predegree or Industrial Practice	*Purpose:* development of theoretical knowledge, skills, abilities obtained in the process of theoretical training, previous types of industrial practice, preparation for the thesis. *Content:* The choice of research direction, technological scheme of production, the main processes and equipment used, treatment facilities. Technological scheme of movement of raw materials, materials, intermediates, finished products and the resulting environmental pollutants.	10								V	V	V	V	
			Writing and Defending a Thesis, a Graduate work, or Preparing and Passing a Comprehensive Exam	*Purpose:* Carries out literature review and patent search, technological part. *Content:* Summarises the abilities and skills, based on the acquired in-depth knowledge, independently solves the problems of his/her professional activity at the modern level, professionally presents special information, scientifically argues and defends his/her point of view, analyses the content of professional literature in the chosen field of research. Discusses and draws up the results of research according to the requirements of the university.	8								V	V	V	V	
Total on educational programme:					240												

5. SUMMARY TABLE REFLECTING THE VOLUME OF DISBURSED LOANS BY EP MODULES

Course of training	Semester	Amount of the mastered modules	Amount of the studied disciplines			Amount of KZ credits						Total in hours	Total KZ credits	Amount	
			Compulsory component	University component	Optional component	Theoretical training	Physical education	Training practice	Production practice	Pre-diploma practice	Final attestation			exam	dif. pass
1	1	5	3	-	3	28	-		2	-	-	900	29	5	2
	2	4	3	-	3	27	-		2	-	-	900	31	5	3
2	3	5	3	2	2	28	-		2	-	-	900	30	6	2
	4	6	-	1	4	24	-		2	4	-	900	30	4	3
3	5	4	-	1	5	30	-		-	-	-	900	30	5	1
	6	4	-	-	3	12	-	12	-	6	-	900	30	3	1
4	7	4	-	-	4	21	-		-	-		630	21	3	1
	8	4	-		4	21	-		-	-	-	630	21	4	-
	9	1	-	-	-	-				10	8	540	18	-	1
Total on ducational programme:			9	4	26	191	-	12	8	20	8	7200	240	35	14

6. STRATEGIES, TEACHING METHODS AND ARTIFICIAL INTELLIGENCE, MONITORING AND ASSESSMENT

Learning strategies	Student–centered learning: The student is the center of teaching/learning and an active participant in the learning and decision-making process. Practice-oriented training: orientation to the development of practical skills.
Teaching methods	Conducting lectures, seminars, various types of practices with: • the use of innovative technologies: • problem-based learning; • case study; • work in a group and creative groups; • discussions and dialogues, intellectual games, olympiads, quizzes; • reflection methods, projects, benchmarking; • Bloom's taxonomies; • presentations; • * rational and creative use of information sources: • * multimedia training programs; • * electronic textbooks; • * digital resources. • * machine learning methods Organization of independent work of students, individual consultations.
Monitoring and evaluation of the achievability of learning outcomes	Current control on each topic of the discipline, control of knowledge in classroom and extracurricular classes (according to syllabus). **Assessment forms:** • survey in the classroom; • testing on the topics of the discipline; • * control works; • protection of independent creative works; • discussions; • trainings; • colloquiums; • essays, etc. **Boundary control** at least twice during one academic period within the framework of one academic discipline. Intermediate certification is carried out in accordance with the working curriculum, academic calendar. Forms of holding: • exam in the form of testing; • oral examination; • written exam; • combined exam; • project protection; • protection of practice reports. **Final state certification.**

7. EDUCATIONAL AND RESOURCE SUPPORT FOR EP

Information Resource Center	-The structure of the JRC has 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The basis of the network infrastructure of the OIC consists of 180 computers with Internet access, 110 automated workstations, 6 interactive whiteboards, 2 video dvoiki, 1 videoconferencing system, 3 scanners of A-4, 3 format.??? IRBIS-64 OIC – AIBS software for MSWindows (a basic set of 6 modules), an autonomous server for uninterrupted operation in the IRBIS system. -The library fund is reflected in the electronic catalog available to users on the website http://lib.ukgu .kz is on-line 24 hours 7 days a week. -Thematic databases of its own generation have been created: "Almamater", "Works of scientists of SKSU", "Electronic Archive". Online access from any device 24/7 via an external link http://articles.ukgu.kz/ru/pps . -Work with catalogs in electronic form. The EC consists of 9 databases: "Books", "Articles", "Periodicals", "Works of the teaching staff of SKSU", "Rare books", "Electronic Fund", "SKSU in print", "Readers" of "SKU". -The JIC provides its users with 3 options for accessing its own electronic information resources: from the Electronic Catalog terminals in the catalog hall and divisions of the JIC; through the university's information network for faculties and departments; remotely on the library's website http://lib.ukgu.kz /. -Access to international and national resources is open: "SpringerLink", "Envoy", "Web of Science", "EVSSO", "Epigraph", to electronic versions of scientific journals in open access, "Zan", "RMEB", "Adebiet", Digital library "Akpigress", "Smart-kitar", "Kitar.kz", etc. -For people with special needs and disabilities, the library's website has been adapted to the work of visually impaired users in the JRC.
Material and technical base	Aerocon aerosol . Analyzer "Fluorate 02-3M". Laboratory Ionomer 0.001rH-150MI., Biomed microscope . Exhaust cabinet. 4pcs Tubular Oven SUOL. Distiller DE-10, Stereomicroscope X40 U X80 YJ-T101G, Set of laboratory bench installation (7 pieces), Digital microscope 2 pcs, Concentrator KN-3, Analytical scales 2 pcs. Calculation of dispersion of the UPRZA-"Ecologist" Software, Humidity analyzer, Table d / scales 2 pcs, Sterilization TP-20, Reagent cabinet, Island table, Table for appliances, Photocolorimeter KFC, Scales VLTE 150, Thermostat TS 1/80, Microscope studies, Gas analyzer PGA, Aspirator 822, Kom / t sieve d / soil, Scales MK, Distiller DEK, Electric chambers. Furnace, Elan CO Gas analyzer, Radiometer-dosimeter, Pneumatic tube.constr. NIIOGAZ 2 pcs, A set of hydrometers 2 pcs, Lab.furniture, Centrifuge, Pump RK t 60, Lockers met.1-door, Lockers met.6-door, 2-section file cabinet, Oxygen cylinder, Lab.cabinet for dishes, Lab.tables, Table for scales, color printer, Interactive whiteboard HJ-89 complete with mounting system

	projector, laptop 2 pcs, Interactive whiteboard included, Interactive whiteboard, Computer 2, Printer, Printer 3b1, MFP 3B 1-3 pcs, Computer 3 pcs, Computer 5 pcs, LASER printer 2018, Computer included 2 t, Computer, office (universal).

Auditorium no	**Names of lecture halls**	**Describe the hall**		
		square, m^2	**^0C,**	**humidity**
414A	Head of the department	28м^2	20±2	65
416A	Lecture hall	18м^2	20±2	65
418A	Lecture hall	74м^2	20±2	65
419A	Lecture hall	58м^2	20±2	65
420A	Laboratory "Microbiology and biological ecology, soil protection"	72м^2	20±2	65
421A	The classroom for course and diploma designing	72м^2	20±2	65
422A	Study room "Ecological monitoring"	38м^2	20±2	65
423A	Teachers room	68м^2	20±2	65
424A	"Protection of water resources and air basin" laboratory	72м^2	20±2	65
425A	Teachers' room	42м^2	20±2	65
426A	Laboratory of graduate students and doctoral students.	72м^2	20±2	65

APPROVAL SHEET

on the Educational program 6B05210 – Ecology

Director of DAA _____ Naukenova A.S.

Director of DASc _____ Nazarbek U.B.

РЕЦЕНЗИЯ

на образовательную программу «6B05210-Экология», разработанной коллективом преподавателей кафедры «Экология» ЮКУ им. М. Ауэзова

Основные задачи ТОО «Центр научных исследований и экологической экспертизы «KazEcoHolding»» – улучшение качества окружающей среды, обеспечение экологической безопасности и достижение благоприятного уровня экологически устойчивого развития общества и города, обеспечение государственного экологического контроля за соблюдением экологического законодательства, нормативов качества окружающей среды, экологических требований.

Основные функции Центра: проводит государственную экологическую экспертизу объектов I категории в соответствии с критериями, установленными экологическим законодательствам Республики Казахстан; осуществляет выдачу экологических разрешений объектов I категории в соответствии с критериями, установленными экологическим законодательством Республики Казахстан, устанавливает в них лимиты на эмиссии в окружающую среду.

Стратегическая цель образовательной программы «6B05210-Экология» направлена на подготовку специалистов способных понимать, излагать и критически анализировать базовую информацию в области экологии и природопользования, владеющих знаниями основ природопользования, экономики природопользования, устойчивого развития, оценки воздействия на окружающую среду, правовых основ природопользования и экологии.

Образовательная программа полностью отвечает требованиям по развитию и уровню подготовки студентов по междисциплинарному курсу профессионального модуля.

Объектами профессиональной деятельности выпускников по ОП «6B05210-Экология» являются: областные и городские департаменты экологии, территориальные управления охраны окружающей среды, национальные парки, заповедники, заказники, биосферные резерваты, промышленные предприятия, агропромышленные комплексы, полигоны, объекты энергетики, средние специальные учебные заведения, научно-исследовательские институты и экоцентры.

Программа направлена на удовлетворение потребностей государства, региона, работодателей и обучающихся, согласованы с национальными приоритетами развития и стратегией развития вуза, направлены на практическое применение знаний, на самосовершенствование и получение образования в течение всего цикла обучения по специальности экология.

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Формирование профессиональной компетенции осуществляется благодаря содержанию, объему и логике построения индивидуальной траектории обучающихся. В качестве элективных курсов в учебном плане предусмотрены модули «Экологический кадастр природных ресурсов Казахстана», «Управление природопользованием и контроль на предприятии» направленные на применение инновационных технологий в учебном процессе и критического мышление.

Процесс формирования учебных планов прозрачны, к ним привлекаются обучающиеся и работодатели–представители профильных НИИ и предприятии (ТОО «Водные ресурсы маркетинг», ТОО КазНИИХимпроект, ТОО Энергоорталык-3), ППС активно развивает сотрудничество с профильными НИИ, принимает участие в различных семинарах, ведут совместные научные исследования, консультируется по вопросам содержания образовательных программ, что в конечном итоге приводит к эффективному трудоустройству выпускников.

Образовательная программа может быть рекомендована для подготовки студентов по направлению «6В052 Окружающая среда» с присвоением квалификации «Бакалавр естествознания образовательной программы 6В05210 – «Экология»».

Руководитель
«ЦНИ и ЭЭ «KazEcoHolding»» **Байдаулетова Ж.Т.**

ЭКСПЕРТНОЕ ЗАКЛЮЧЕНИЕ

на образовательную программу
«6B05210-Экология»

Стратегическая цель образовательной программы «6B05210-Экология» направлена на подготовку специалистов способных понимать, излагать и критически анализировать базовую информацию в области экологии и природопользования, владеющих знаниями основ природопользования, экономики природопользования, устойчивого развития, оценки воздействия на окружающую среду, правовых основ природопользования и экологии.

К разработке образовательной программы привлечены представители организаций работодателей природоохранной отрасли.

Структура программы представлена в соответствии с требованиями к составлению программы: отражены паспорт образовательной программы; результаты обучения ОП, компетенции ОП, сводная таблица, отражающая объем освоенных кредитов в разрезе модулей образовательной программы, сведения о дисциплинах.

Цель образовательной программы бакалавриата соответствуют 6 уровню Национальной рамки квалификаций Республики Казахстан, они также гармонизированы с Дублинскими дескрипторами, 1 циклом Квалификационной Рамки Европейского Пространства Высшего Образования, а также 6 уровнем Европейской квалификационной рамки для образования в течение всей жизни.

Образовательная программа направлена на подготовку специалистов в соответствии с существующими требованиями нормативных документов в области высшего образования и включает циклы базовых и профессиональных дисциплин способствующих приобретению навыков владения специальной терминологии; использование современных методов исследования при выполнении исследовательской работы; изучение методов математической статистики, особенности инновационных технологий в области охраны окружающей среды, создание инженерных конструкций направленных на рациональное и комплексное использование природных ресурсов; работы с технической и справочной литературой, научно-технической документацией и на приобретение обучающимися необходимых знаний, умений, навыков и компетенций.

В образовательной программе общая трудоемкость составляет 240 кредитов, из них: теоретическое обучение – 210 кредитов, производственная практика – 10 кредитов и итоговая аттестация - 20 кредитов.

В ОП представлены дисциплины, ведущих Европейских Вузов составленных на основе международных программ ECAP. Для бакалавров читаются лекции и проводятся практические занятия по таким дисциплинам, как «Технология утилизации твердых отходов и их вторичное использование», «Экология популяций и сообществ», «Оценка и учет источников загрязнения окружающей среды», «Экологический мониторинг»

и др. Кроме того проводятся дисциплины обеспечивающие знания в области нормирования качества окружающей среды, в вопросах сохранения и рационального использования природных ресурсов, в области очистки сточных вод и атмосферного воздуха, утилизации отходов и т.д.

Объектами профессиональной деятельности выпускников по ОП «6В05210-Экология» являются: областные и городские департаменты экологии, территориальные управления охраны окружающей среды, национальные парки, заповедники, заказники, биосферные резерваты, промышленные предприятия, агропромышленные комплексы, полигоны, объекты энергетики, средние специальные учебные заведения, научно-исследовательские институты и экоцентры.

Образовательная программа ориентирована на результаты обучения, соответствующие требованиям профессиональных стандартов, потребностям отраслевых рынков труда и организаций работодателей.

Из выше изложенного, можно сделать вывод, что образовательная программа «6В05210-Экология» отвечает предъявляемым требованиям и обеспечивает условия для формирования конкурентоспособности выпускников для максимально быстрого трудоустройства по специальности и профессионального роста.

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Члены экспертной комиссии: Абдуова А.А.

Алпамысова Г.Б.

Алтыбаев Ж.М.

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