Ф.7.02-10

INISTRY OF SCIENCES AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN

M. AUEZOV SOUTH KAZAKHSTAN UNIVERSITY

«APPROVED»
Chairman of the Board-Rector
D. Zh.Ahmed-Zaki
«27» 03 2025y.

Educational program

7M05210 – Ecology

Registration number	7M0520014
Code and classification of education	7M05 – Natural sciences, mathematics and statistics
Code and classification of Areas of training	7M052 – Environment
Group of education programs EP	M087 – Environmental protection technology
Type of EP	Operating
ISCE Level	7
NQF Level	7
IQF Level	7
Language leaning	English
The complexity of EP	120 credits
Distinctive features of EP	-
Partner University (JEP)	-
University Partner (DDEP)	-

Shymkent, 2025

Developers:

FULL NAME.	Position	Signature
Kenzhibaeva G.S.	Candidate of Technical Sciences, associate Professor, of the Department of Ecology	
Abduova Aisulu Alshynbekovna	Candidate of Technical Sciences, Associate Professor, Head of the Ecology Department	
Sagitova G.F.	Candidate of Technical Sciences, associate Professor, of the Department of Ecology	
Bektureyeva Gulzhan Ustemirovna	Candidate of Technical Sciences, Associate Professor of the Department of Ecology	
Ashitova Nurgul	Master, Senior Lecturer, Ecology Department	
Pernebaev Zh.D.	Head of the Research and Development Department of «Centre for Scientific Research and Ecological Expertise «KazEcoHolding»» LLP	
Orman A. O.	Head: LLP "Water resources-Marketing"	
Dostiyarov E.K.	Head of the Shymkent State Arboretum Park named after A.Askarov, Department for the Development of a comfortable Urban Environment in Shymkent	
Bukharbay Z.A.	Master student, MHT-24-4nk	

The EP was considered at a meeting of the Academic Quality Committee of the or the Higher School «Chemical Engineering and Biotechnology»
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 «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 (EP)…….... 4
2. Passport of the Educational program (EP) …….. 7
3. Competencies of a graduate of the OP…… 10
3.1. Matrix of correlation of the learning outcomes of the educational program as a whole with the competences formed..... 11
4. Matrix of influence of modules and disciplines on the formation of learning outcomes and information on labor intensity…….. 12
5. Summary table reflecting the volume of credits mastered by modules of the educational program …… 27
6 Strategies, teaching methods and artificial intelligence, monitoring and assessment..... 28
7 Educational and resource support for EP..... 29

APPROVAL SHEET……. 31
Appendix 1. Review from the employer.....
Appendix 2. Expert opinion.....
Appendix 3. Professional standards.....

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 in rapidly changing conditions. • 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	Uniqueness of the SP 7M05210 – Ecology for training of masters of natural-pedagogical sciences. The SP of the scientific-pedagogical Master's program 7M05210 – Ecology was accredited by independent international agency ASIIN (Germany) in 2019. The SP focuses on the training of professional managers and specialists for the fields of environmental engineering, teachers in the field of environmental engineering; provides graduates with the acquisition of competencies of Master of Natural Sciences, the ability to non-standard thinking and bold original solutions. The study program is aimed to achieve learning outcomes through the organization of the training process using the principles of the Bologna process, student-centered learning, accessibility and inclusion. The learning outcomes of the program are achieved through the following training events: - classroom lessons: lectures, seminars, practical and laboratory lessons – are carried out using innovative technologies of training, the latest achievements of science, technologies and information systems; - extracurricular activities: individual work of a student, including under the guidance of a teacher, individual consultations; - carrying out professional practices, performing master dissertations; - research activities of a master student: individual research activities of a student, including implementation of master dissertations and scientific traineeship.
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/қ
Organization of the educational process	• Implementation of the principles of the Bologna Process • Student-centered learning • Availability • Inclusivity
Quality assurance of SP	• Internal quality assurance system • Involvement of stakeholders in the development of the OP 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	For students with SEN (special educational needs) and persons with disabilities (PSI), tactile PVC tiles, specially equipped toilets, a

educational programs (EP) for persons with disabilities and special educational needs(SSN)	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 SP	Training of highly qualified masters who are able to formulate and solve modern scientific and practical problems at the national and world level in the field of environmental protection and sustainable development of society.
SP tasks	- training specialists for teaching in universities and colleges; - training highly qualified specialists for research activities in the field of ecology; - training specialists for various levels of enterprises and organizations dealing with environmental issues; - ensuring conditions for acquiring high intellectual level of development, mastering logical and critical thinking and skills of scientific organization of labor in scientific-pedagogical activities. - Creating conditions for the formation of in-demand knowledge and skills, a conscious attitude towards improving the well-being of the population and protecting the planet in the context of the SDGs
Harmonization of SP	• **7** th level of the National Qualifications Framework of the Republic of Kazakhstan; • Dublin descriptors of the 7th level of qualification; • 2 cycle of a Framework for Qualification of the European Higher Education Area); • 7^{th} Level of European Qualification Framework for Life long Learning).
Connection of the SP with the professional sphere	The sectoral qualifications framework of "Education" (Approved by Protocol No. 2 of the meeting of the Sectoral Tripartite Commission on Social Partnership and Regulation of social and labor relations in the field of environmental protection dated August 17, 2016). – Environmental Code of the Republic of Kazakhstan dated January 2, 2021 N 400-VI SAM. – International standard ISO 14000 – Environmental management, ISO Professional standard "Teacher (teaching staff of OVPO)" Order of the Ministry of Internal Affairs No. 591 dated 11/20/2023
Name of the degree awarded	After successful completion of this educational program, the graduate is awarded the degree of Master of Natural Sciences in the educational program 7M05210 – "Ecology"
List of qualifications and positions	Graduates of the educational program 7M05210 “Ecology” are eligible to hold the following positions: lecturer or assistant in the field of education; senior lecturer (senior lector) in organizations of higher and postgraduate education; head of a specialized division at an enterprise; specialist or senior specialist; head of a department in relevant government bodies; research officer in design and survey institutes, research institutions, as well as in design and engineering organizations. Appointment to these positions does not require prior work experience in accordance with the qualification requirements of the Qualification Directory of positions of managers, specialists, and other employees. Order of the Minister of Labour and Social Protection of the Population of the Republic of Kazakhstan dated December 30, 2020 No. 553. Registered with the Ministry of Justice of the Republic of Kazakhstan on December 31, 2020 No. 22003.

Sphere of professional activity	The sphere of professional activity according to the SP 7M05210 – Ecology is educational, industrial, managerial, research, environmental monitoring service, quality control of natural environment and human health, geoecological research, forest reproduction and forest breeding, technology of productions.
Objects of professional activity of a graduate	The subjects of professional activity of masters in the SP 7M05210 – Ecology: - planning and implementation of environmental protection measures in the state and non-state organizations; - environmental training and education in universities, colleges, schools, gymnasiums, etc.; - natural and urbanized ecosystems and their components; biosphere and its components; environmental monitoring and marketing; - analysis, inspection and control of the state of the environment; compilation of prognostic models; managerial and consulting functions in the field of environmental protection; - process of creating regulatory and organizational documentation in the field of environmental management, environmental safety, taking measures to protect the environment from negative impacts, environmental management. - technology of production; - geoecological research; - forest reproduction and forest breeding.
Subjects of professional activity	The subjects of professional activity of masters in the SP 7M05210 – Ecology: - planning and implementation of environmental protection measures in the state and non-state organizations; - environmental training and education in universities, colleges, schools, gymnasiums, etc.; - natural and urbanized ecosystems and their components; biosphere and its components; environmental monitoring and marketing; - analysis, inspection and control of the state of the environment; compilation of prognostic models; managerial and consulting functions in the field of environmental protection; - process of creating regulatory and organizational documentation in the field of environmental management, environmental safety, taking measures to protect the environment from negative impacts, environmental management. - technology of production; - geoecological research; - forest reproduction and forest breeding.
Types of professional activity	Master in the SP 7M05210 – Ecology can perform the following types of professional activities: - environmental protection; - pedagogical; - research; - design and production; - control and auditing; - organizational and managerial.
Learning outcomes	**LO1 -** analyze the main worldview and methodological problems, incl. of an interdisciplinary nature that arise in science at the present stage of its

	development, evaluate various facts and phenomena based on the provisions and categories of the philosophy of science
	LO2 - use a foreign language in interpersonal communication, professional activities, writing scientific articles
	LO3 - apply the methodological foundations of management psychology, taking into account psychological management, development of human resource management skills
	LO4 - master the basics of professional and pedagogical culture of teaching, general pedagogical skills, theoretical and methodological foundations of higher education pedagogy
	LO5 - create waste-free production technologies, applying new directions of development and achievements in science and technology in the design of production processes
	LO6 - solve professional problems using modern information and digital technologies, artificial intelligence systems for work and communications.
	LO7 - Analyze and evaluate information during environmental monitoring using artificial intelligence to form informed judgments and further decision-making in professional activities.
	LO8 - Solve scientific and practical problems in the field of ecology and sustainable development through research, interpretation of research data and international cooperation
	LO9 - analyze the costs and effectiveness of the technological process of cleaning and processing liquid, solid and gaseous wastes to assess and reduce environmental risks
	LO 10 -apply the basic principles of rational use of natural resources when developing proposals for improving technological processes and equipment for the treatment and processing of industrial and domestic waste

3. Competencies of a graduate of the EP

GENERAL COMPETENCIES (SOFTSKILLS). Behavioral skills and personal qualities	
GC 1. Competence in managing one's literacy	GC 1.1.The ability of self-learn, self-develop and constantly update their knowledge within the chosen trajectory and in an interdisciplinary environment. GC 1.2. The ability to express thoughts, feelings, facts and opinions in the professional field. GC 1.3. The ability for mobility in the modern world and critical thinking.
GC 2. Language competence	GC 2.1.The ability to build communication programs in the state, Russian and foreign languages. GC 2.2. The ability for interpersonal social and professional communication in the conditions of intercultural communication.
GC 3. Mathematical competence and competence in the field of science	GC 3.1.The ability and willingness to apply the educational potential, experience and personal qualities acquired during the study of mathematical, natural science, technical disciplines at the university to solve professional problems.
GC 4. Digital competence, technological literacy	GC 4.1. 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. GC 4.2. 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	GC 5.1.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. GC 5.2. The ability to social and cultural development based on the manifestation of citizenship and morality. GC 5.3 The ability to build a personal educational trajectory throughout life for self-development, career growth and professional success. GC 5.4. The ability to successfully interact in a variety of socio-cultural contexts during study, work, home and leisure.
GC 6. Entrepreneurialcompetence	GC 6.1. The ability to be creative and entrepreneurial in a variety of environments. GC 6.2. The ability to work in a modeofuncertainty and rapidly changing task conditions, make decisions, allocate resources and manage your time. GC 6.3. The ability to work with consumer requests.
GC 7. Cultural awareness and self-expression	GC 7.1. The ability to show world view, civil and moral positions. GC 7.2. The ability to be tolerant of the traditions and culture of other peoples of the world, to have high spiritual qualities.
Professional competencies (PC)	
Theoretical knowledge and practical skills specific to this field	(PC1) – apply innovative methods for solving engineering problems, use intellectual property protection procedures, analyze the full technological cycle of non-waste and low-waste production;
	(PC2) – Apply the basic principles of rational use of natural resources, develop proposals for improving technological processes and equipment for cleaning and processing industrial and household waste using artificial intelligence to optimize processes, increase their efficiency and sustainability, as well as to develop innovative solutions in the field of ecology and waste management.
	(PC3) – be able to carry out marketing research, develop environmental protection measures of innovative solutions in production and transport,

	conduct economic analysis of costs and effectiveness of technological process of cleaning and processing liquid, solid and gaseous wastes;
	(PC4) – conduct analysis of technological processes to select ways, measures and means of managing product quality, conduct patent search and own technologies for filing applications for inventions.

3.1 Matrix of correlation of learning outcomes in the SP in general with the formed competencies of modules

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
GC 1	+		+							
GC 2	+			+	+	+	+	+		
GC 3			+							
GC 4					+					
GC 5	+	+								
GC 6					+				+	
GC 7							+			
PC1	+	+		+		+	+	+		+
PC2		+	+		+				+	
PC3					+		+		+	+
PC4			+	+		+		+		+

4. Information about the disciplines

Module name	Cycle	Component	Component Name	Brief course description	Number of credits	Formed learning outcomes (codes)									
						LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10
Scientific and pedagogical training module	BD	HsC	History and Philosophy of Science	**The purpose:** Study of the problems of the phenomenon of science as a subject of special philosophical analysis, patterns and trends in the development of special activities for the production of scientific knowledge taken in a socio-cultural context. **Contents:** Identification of the specifics and relationship of the main problems of history and philosophy of science. Study of the laws of the development of science and the structure of scientific knowledge, methods of scientific research. Knowledge of the main concepts and directions of the non-classical and post-classical stage of the development of science. Analysis of the realities of modern theory and practice based on understanding the methodology of natural science, socio-humanitarian and technical knowledge. Critical thinking as a prerequisite for the development and functioning of modern society. Technologies for the development of critical thinking: consideration and study of the logic of arguments. Formation of critical reflexive thinking and metacognitive abilities.	4	**v**									
	BD	HsC	Foreign Language (Professional)	**The purpose:** Systemic deepening of communicative competence within the framework of foreign language education's international standards based on the further skills and abilities' active language proficiency development in the professional activities of the future master's student **Contents:** Levels B2, C1 are presented in the form of	4		v								

				a pragma-professional orientation for professional and academic aims at an advanced level: scientific information base, interpretation of scientific information, argumentation, persuasion, scientific controversy, academic writing. Use of innovative methods and technologies, and attraction of modern means (Internet resources). Demonstration of language material's knowledge in any related discipline											
	BD	HsC	Psychology of Management	Target: Formation of systemic knowledge, skills and abilities of effective personnel management Content:Introduction to the psychology of management. Psychological factors of the effectiveness of managerial activity. Personality in the control system. Motivation and performance of the organization. Leadership in the organization. Stress in the organization and emotional burnout. Psychology of conflict management. personality of the subordinate. Psychological features of the leader"s personality. Psychological influence in managerial activity. Psychological foundations for making managerial decisions. Interpersonal communication in management.	3			**v**							
Methodical Basics of	BD	HsC	Pedagogy and psychology of	**Target:** The aim is to develop undergraduates' skills in planning and organizing the educational and scientific process based on the principles of student–	5				**v**						

Teaching			higher education	oriented learning and assessment, extrapolating innovative (including digital) and practice-oriented teaching methods and technologies into the educational process, preparing them for academic and scientific and methodological activities in the educational educational institution. **Content:** Higher school pedagogy as a science and academic discipline. Methodology of higher education pedagogy. Modern global trends in the development of higher education. History, current state and prospects for the development of higher education in Kazakhstan. Didactics of higher education. Student-centered learning and assessment in higher education, its patterns and principles. Contents of education in higher education institutions. Innovative pedagogical technologies, forms and methods of teaching in higher education institutions. Concepts, strategies, mechanisms for promoting global and national values among students and in society. Department of OHPO. Support and develop the educational environment and organizational culture in accordance with the policies and procedures of the OHPO.												
	ChD	HsC	Teaching Methods of Special Disciplines	**The purpose**: To form undergraduates' comprehensive methodological, research, thinking of teaching specialized disciplines in higher education. **Contents**: Studies the concept of environmental education, goals, objectives and the role of environmental and biological education. Theories and methods of specialized disciplines. Examines the requirements for the professional activity of an environmental educator, the implementation of a competence-based approach in education, multimedia	5				**v**						

				learning technology. Structured domain information that allows a person to solve specific professional tasks. Solving problems by drawing up a group project, conducting a role-playing game.											
	BD	HsC	Pedagogical Practice	**The purpose**: Studying the basics of educational and methodological work in higher educational institutions, mastering the pedagogical skills of conducting certain types of training sessions in the disciplines of the profile of master's programs. **Contents**: Development of professional research culture in the field of ecology as a condition of pedagogical skill and pedagogical creativity, formation of professional pedagogical skills, culture of scientific and pedagogical thinking. Development of educational and methodological documents on the profile discipline. Preparation and conduct of practical and laboratory classes in special disciplines. Development of new active forms of conducting classes with students and their application in practical classes.	4				**v**						
Genecology and Research Creative Activity	ChD		Research Practice	**The purpose**: Consolidation of key competencies, acquisition of practical skills and preparation of undergraduates for independent research, development of original scientific ideas. **Contents**: Practical study of the latest theoretical, methodological and technological achievements of domestic and foreign science in the field of environmental protection; modern methodology of scientific research; analysis of the state of development of ecology and science in the world and Kazakhstan. Technologies of separation of crude oil into fractions of different boiling temperature ranges. Current trends in the development of low waste and	6										**v**	

				waste-free production. Performing theoretical and experimental research on the topic of the dissertation.											
	ChD	EC	Environmental Monitoring of Harmful Chemical Compounds-Superecotoxicants	**The purpose**: The study of methods for monitoring the state of the natural environment and the level of its pollution, as well as information support for the management of environmental activities and environmental safety **Contents**: Considers environmental and analytical monitoring of pollution as part of a unified state system of environmental monitoring. Main tasks and schemes of ecological-analytical monitoring. Normative-technical and methodological support, legal regulation of ecological and analytical monitoring of superecotoxicants. Classification of superecotoxicants: physical and chemical properties and distribution in natural environments. Classification of superecotoxicants according to the degree of danger to the environment. The main sources of superecotoxicants. Methods for the determination of superecotoxicants. The use of artificial intelligence for environmental monitoring of pollutants - superecotoxicants	4							**v**			
	ChD	EC	Digitalization in Ecology and Nature Management	**The purpose**: The study of information support and digital technologies in the field of environmental protection **Contents**: Considers the digital economy in ensuring environmental safety, IT technologies for monitoring natural and anthropogenic systems and digital services in the field of nature management. The strategy of digital transformation of the industry of ecology and nature management structure and content. The use of digital technologies in the field of ecology and nature management. Artificial								**v**			

				intelligence - for analyzing monitoring information, predicting dangerous meteorological phenomena, fire danger in forests, automating decision making in real time. The use of artificial intelligence in natural resource management											
	BD	EC	Actual Problems of Geoecology and Landscape Ecology	**The purpose**: The study and solution of theoretical and applied problems of geoecology and landscape science for the purposes of rational nature management, creation and preservation of the optimal environment for the life of human society with minimal changes in the environment. **Contents**: Explores changes in the Earth's geospheres under the influence of human activities and emerging geoecological problems. Considers the basic concepts, object, tasks, methods, evolution of views, in solving urgent problems of geoecology, reclamation of agricultural land and protective forest plantations. He studies the theoretical and methodological foundations for solving urgent problems of geoecology and landscape ecology. Systemic nature of topical problems of geoecology and landscape ecology.	5								**v**		
	BD	EC	Rational Use of Natural Resources	**The purpose**: The study of methods of using natural resources that ensure sustainable economic development, harmonization of the interaction between society and the natural environment, rationalization of the use of natural resource potential, economic mechanisms for environmentally safe nature management. **Contents**: Considers the concept of nature management. Evaluates nature management and its place in the cycle of natural sciences, an extensive and intensive way of development of nature											**v**

				management. Analyzes rational and irrational nature management, selects research methods used in nature management. Afforestation to combat dry winds, drought and soil erosion. Applies the concept of ecological crisis and ecological catastrophe.											
Audit and Environmental Impact Assessment	ChD	EC	Organization of Environmental Audit	**The purpose**: The study of sets of measures that allow for an accurate assessment of the activities of a business entity in order to confirm its compliance with established standards or identify environmental violations and give recommendations for elimination. **Contents**: Considers the principles of the Environmental Code 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 environmental monitoring.	4									**v**	
	ChD	EC	Environmental management	The purpose: To study ways to manage environmental activities in an organization, develop activities and processes to improve environmental performance to ensure environmental safety and a systematic approach to minimizing harmful effects on the environment. Contents: Examines the system of environmental management. Environmental costs of production and ways to reduce them. Production costs. Damage from environmental pollution. The environmental component of production costs. Types of environmental standards. Maximum permissible norms of environmental load. Norms of sanitary and protective zones. Administrative methods of environmental management. Waste management										**v**	

				system. ISO 14000 standards system.											
	ChD	EC	Environmental Impact Assessment	**The purpose**: Formation of the knowledge base on the assessment of the impact of economic activity on the environment, the study of the procedure and procedure for assessing the impact on the environment in accordance with the current legislation. **Contents**: Considers the assessment and stages of environmental impact of industrial enterprises, the procedure for conducting environmental impact assessment. Compares the classification of environmental impact assessment objects in terms of significance and completeness of the assessment. Examines environmental impact assessment documentation. Develops methodological support for environmental impact assessment.	6								**v**		
	ChD	EC	Environmental Assessment and Mapping of Localities in South Region	**The purpose**: to give a holistic view of environmental mapping as a research method and a means of spatial mapping of environmental problems and situations. **Contents**: Explores the theoretical foundations of environmental mapping and assessment of the South Kazakhstan region, the content and methods of compiling environmental maps, mapping atmospheric problems, mapping land water pollution, mapping physical pollution, mapping pollution of soils and other depositing media, mapping geological and geomorphological pollution, Considers the bioecological aspects of mapping, geographic analysis of pollution.								**v**				
	ChD	EC	Examination and Monitoring of Ecological Nature	**The purpose**: familiarization of undergraduates with the types of environmental activities, the system of norms and rules, regulatory documentation for design,	6							**v**			

			Management Safety	rational use of natural resources, environmental safety. **Contents**: Explores the tasks of environmental monitoring and expertise, environmental safety of nature management, modern methods of environmental expertise, the procedure for conducting state environmental expertise in an interdisciplinary scientific direction, combining research into the composition, structure, properties, processes, physical and geochemical fields of the Earth's geospheres as a habitat for humans and other organisms.											
	ChD	EC	Ecosystem Studies of Biological Resources	**The purpose**: The study of the main methods for predicting biological resources and elements of the mechanism of ecological and economic nature management from the standpoint of system analysis **Contents**: Explores the methodological aspects of ecosystem studies of biological resources, the application of the ecosystem approach in developing a strategy for the development of biological resources, systems and types of ecosystem studies of biological resources, environmental monitoring as one of the main methods for studying the dynamics of ecosystems (biogeocenoses) occurring under the influence of natural and anthropogenic factors, a historical approach as a tool for predicting the state of ecosystems.									**v**		
	ChD	EC	Assessment and Management of Environmental Rrisk	**The purpose**: familiarization of undergraduates with the main factors of environmental risk, assessment and management of environmental risk **Contents**: Considers the main provisions of the theory of risk, the concept, sources of risk and risk factors. He studies the development of risk at industrial facilities, the basics of risk analysis,	5										**v**	

				assessment and management methodology: quantitative risk indicators, acceptable risk, risk comparison, environmental risk management in industry and energy, environmental assessment of projects. Explores the environmental risk assessment and management of major accidents.											
	ChD	EC	Biological Diversity of Ecosystems and Urban Systems of RK	**The purpose**: The study of modern areas of research on the assessment, conservation of the biological diversity of the ecosystem and urban systems of the Republic of Kazakhstan. **Contents**: Methods for the analysis of species diversity at various levels, strategies for the restoration and conservation of the biodiversity of ecosystems and urban systems of the Republic of Kazakhstan, modern areas of research on the assessment, conservation of the biological diversity of the ecosystem and urban systems of the Republic of Kazakhstan. Analyzes international biodiversity research programs. Discusses the National Strategy of Kazakhstan and the action plan for biodiversity conservation, environmental protection, reforestation and afforestation									**v**		
	BD	EC	Integrated Environmental Management System	**Target**: Formation of an understanding of the legal framework and the basic principles of international cooperation, international conventions and agreements in the field of environmental protection and natural resources. **Content:** The biosphere as a human habitat that does not have state borders. International conferences and protocols within the framework of international cooperation in the field of environmental protection and nature management. International organizations and programs for environmental protection and nature management. Participation of the Russian Federation in international conventions and organizations. Legislation of the Russian	4								**v**		

				Federation regarding international cooperation in the field of environmental protection and rational nature management.												
	BD	EC	Modern Methods of Distance Reconnaissance in Environmental Research	**The purpose**: the formation of undergraduates' ideas about the essence and prospects of using remote methods in the study of biological resources and gives practical skills in working with aerospace materials **Contents**: Considers the issues of using remote methods in solving problems of environmental safety related to assessing the level of ecosystem safety. Remote methods used to assess biodiversity, matter and energy flows, and ecosystem productivity. Remote methods for studying new threats to environmental safety. Directions for the development of remote methods for assessing the environmental safety of territories.							**v**				
	BD	EC	Ecological Standardization, Certification and Licensing	**The purpose**: Studying the basics of environmental standardization, certification and licensing in order to ensure environmental safety **Contents**: Considers the activities to establish norms, rules and characteristics in order to ensure product safety, State standards of the Republic of Kazakhstan, international standards, and Kazakhstan classifiers of technical and economic standardization. Researches the standards of industries, enterprises, scientific, technical, engineering societies and other public associations, government bodies that carry out standardization, licensing of certain types of activities.	5								**v**		
	BD	EC	Methodology of Scientific-Creative and Inventive Activity	**The purpose**: study of the methodological foundations of scientific and engineering creativity, modern views on the approaches and methodology for building information resource and knowledge								**v**		

				management systems. **Contents**: Considers the technology of writing an application for inventions. Forms the knowledge, skills and abilities necessary to guide technical creativity and develop creative abilities, conduct patent research and legal protection of inventions based on free possession of all components of inventive activity. Considers methods of collective generation of ideas, methods of logical analysis											
Ecological Safety Technology in Industry	ChD	EC	Study of Latest Achievements in Field of Waste Processing	**The purpose**: formation of knowledge and skills in the field of development, implementation and processing of waste **Contents**: Considers the classification of wastes according to their state of aggregation and the danger of impact on the environment, sources of formation, and volumes of accumulation, morphological and chemical composition, and characteristics of the waste management system, a scheme for sanitary cleaning of cities from domestic and industrial waste. Explores the main methods of industrial processing of solid waste, disposal of solid waste by storing it in landfills and landfills.	6					**v**					
	ChD	EC	Modern Methods and Measuring Instruments in Ecology	**The purpose**: theoretical and practical training of undergraduates in measurement methods, the acquisition of skills in working with instruments for monitoring and measuring parameters, environmental pollution; formation of a system of knowledge, skills and abilities for students to use **Contents**: Considers methods and means of monitoring and controlling the state of the environment, contact methods for monitoring the environment, remote methods for monitoring the environment, biological methods for monitoring the									**v**		

				environment. Analyzes environmental control, modern methods of air pollution control, methods of atomic spectroscopy, reporting on the results of instrumental measurements.											
	ChD	EC	Ecological Safety Tehnology in Industry	Target: To present technical and environmental safety, protection of human life, legal norms and economic problems, development of regulatory documents, including in the state language for declaring the level of safety of chemical production components and their hazard class as a whole Content: 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 devices, the problems of developing highly efficient technological processes, environmental protection processes and technologies. Mathematical modeling of technological processes taking into account the criteria of chemical-technological and environmental factors on performance indicators.	6										**v**	
	ChD	EC	Water management	The purpose: To study the main theories of water resources management and multifactorial analysis of the state and use of water resources of individual territories, states, taking into account the principles of integrated water resources management. Contents: Principles of integrated water resources management. State system of water resources management. Management tools. Classification of water resources and aquatic ecosystems. Ecosystem approach in water resources management. Ecosystem services of water bodies. Types of use of water resources. Regulation of impact on water bodies. Coordination of water resources management activities. Assessment of water resources and								**v**					

				water management calculations. Programs and action plans for water resources management.											
	ChD	EC	Green Technologies in Production and Transport	Target: Formation of knowledge and inculcation of practical skills on reducing environmental pollution and increasing resource efficiency in production and transport and mitigating adverse climate change through the transition to green technologies. Content: Environmental activities in the Republic of Kazakhstan. Monitoring and control of the environment in transport. Study of the organization of state environmental control over emissions of pollutants into the atmosphere at transport enterprises. Management of environmental activities in the system of transport and transportation in the Republic of Kazakhstan. International cooperation in the field of environmental protection in transport, the introduction of green technologies. Principles of sustainable development, features of green information systems and technologies, greening of information systems and technologies.	3											**v**
	ChD	EC	Ecological control and monitoring of natural technogenic ecosystems	Target: Formation of creative thinking, integration of fundamental knowledge of the main methods of monitoring with subsequent processing and analysis of research results for making organizational and managerial decisions. Content: Types of environmental monitoring and ways of its implementation. Environmental monitoring. Definition. Main tasks and goals. FeeBDack and control. Classification. The main tasks of GEMS. National monitoring. Organization and tasks. EGSEM. Regional environmental monitoring. Monitoring of Moscow. Local environmental monitoring. Monitoring the source of pollution. Background monitoring. Main goals. Organization of background monitoring.System of methods of observation and ground support.Ecological and analytical monitoring of the state of environmental components. Mathematical modeling and forecasting of								**v**				

				dynamic processes in ecosystems. Mathematical modeling and forecasting of dynamic processes in ecosystems. Topics for self-study											
Module of scientific-research work and Final Certification			Research work of a master student, including passing an internship and completing a master`s thesis	**The purpose**: Formation of general cultural and professional competencies necessary for conducting both independent research work, the result of which is the writing and successful defense of a master's thesis (project), and research work as part of a research team. **Contents**: Evaluates the analytical review of known methods for obtaining inorganic compounds in accordance with the purpose and objectives of the dissertation research, experimental research work according to the plan of the academic period using the instrumental base of the departmental laboratory. Conducts the selection and justification of the technological scheme of production in accordance with the topic of the master's thesis. Determines the economic efficiency of the developed technology.	24									**v**		
			Execution and Defense of Master's Thesis	**The purpose**: Confirm the level of professional and general education of the graduate in the relevant master's program and the degree of mastery of the methodology of scientific knowledge and compliance of the acquired knowledge, skills, skills and competencies with the requirements of the state compulsory standards of master's education. **Contents**: The final qualifying work of a graduate of the master's program, confirming the competencies acquired in the learning process in accordance with the chosen specialization of study. Defense of a master's thesis at an open meeting of the Attestation Commission with the participation of the chairman of the commission and at least half of its members. The procedure and regulations for defending a master's thesis are established by the chairman.	8									**v**		
Total					**120**											

5. SUMMARY TABLE SHOWING THE AMOUNT OF CREDITS MASTERED BY THE STUDY PROGRAM'S MODULES

Course of Study	Semester	The number of mastered modules	The number of studied disciplines		Number of KZ credits					Total hours	Total KZ credits	The number of	
			VC	EC	Theoretical training	Pedagogical practice	Research practice	SRWM	Final examination			exam	Number of D.Cr. t:
1	1	5	5	2	29			1		900	30	6	1
	2	5		4	27	4		3		900	30	4	1
2	3	5		5	26		6	3		1050	35	5	1
	4	1			-			17	8	750	25	0	1
Total			**5**	**11**	**82**	**4**	**6**	**24**	**8**	**3600**	**120**	**15**	**4**

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 learning:** focusing on the development of practical skills.
Teaching methods	Conducting lectures, seminars, various types of practices: • using 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. 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 OF THE SP

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. The analyzer is "Fluorate 02-3M". Laboratory ionomer 0.001rH-150MI., Biomed microscope. The furnace is tubular SUOL. Distiller DE-10, A set of laboratory bench equipment (7 pieces), Digital microscope 2 pieces, Concentration meter KN-3, Analytical scales 2 pieces, Humidity analyzer, Sterilizer TP-20, Photocolorimeter KFC, Scales VLTE 150, Thermostat TS 1/80, Microscope ucheb, Gas analyzer PHA, Aspirator 822, Scales MK, Electric chamber furnace, Elan CO gas analyzer, Radiometer-dosimeter, Pneumatic tube. constr. Set of hydrometers 2 pcs, Centrifuge, Color printer, Interactive whiteboard HJ-89 complete with mounting system, projector, laptop 2 pcs, Interactive whiteboard included, The material and technical base of the Department of Ecology includes 4 laboratories for undergraduates: 1. Scientific laboratory of undergraduates and doctoral students - 426A, 424A, 422A, 420A. 2. Classrooms equipped with an interactive whiteboard - 421A, 420A, 424A 3. Regional Testing laboratory of engineering profile "Structural and Biochemical materials" (IRLIP "KBM")

COORDINATION SHEET

on the Study program 7M05210 – Ecology

Director of DAA	Sign	Naukenova A. S.
Director of DASc	Sign	Nazarbek U.B.