

MINISTRY OF EDUCATION AND SCIENCE OF THE
REPUBLIC OF KAZAKHSTAN

Al-Farabi Kazakh National University

**THE EDUCATIONAL PROGRAM «ECOLOGY»
ON SPECIALTY
5B060800-ECOLOGY**

Almaty, 2018

THE LIST OF AUTHORS-DEVELOPERS EDUCATIONAL PROGRAM

Foreign universities and organizations - partners:

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3. Reading University, UK – PhD. Professor Martin Lukac.
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High educational institutions in Kazakhstan:

1. Seifullin Kazakh Agro Technical University – Head of the department "Ecology", Candidate of Biology Sciences on the "Ecology" specialty, associate professor Satybaldieva G.K.
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1. The Republican Scientific Production and Information Center "KazEcology" – General Director, Doctor of Geological Sciences Skakov A.A.
2. Scientific Engineering Center of the National Engineering Academy of the Republic of Kazakhstan “Oil and Gas” - Director, Academician, Doctor of Chemical Sciences Nadirov N.K.
3. LLP «Biologiya Morya» – Director, Deputy Chairman of the Board of the Republican Association “KazRybKhoz for Science and Aquaculture”, Laureate of the State Prize in Science and Technology Temirkhanov S.R.
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MINISTRY OF EDUCATION AND SCIENCE OF THE
REPUBLIC OF KAZAKHSTAN

Al-Farabi Kazakh National University

**THE PASSPORT
OF THE EDUCATIONAL PROGRAM
on specialty 5B060800-Ecology**

Almaty, 2018

1. Area of Use

The current educational program "Ecology" is developed on the basis of Model curriculum in the specialty 5B060800-Ecology (from August 16, 2013, № 343 with changes from July 5, 2016, № 425) in accordance with international documents in higher education and the recommendations of the ECTS Users' Guide, and "Tuning Educational Structures in Europe". The program sets the requirements for the content of education through the results of training, the volume of training load and the level of professional training of undergraduate students.

The educational program was developed taking into account the comparison of the intensity of training load in accordance with the requirements of the Bologna Declaration.

2. Normative references

1. The Law of the Republic of Kazakhstan "On Education" (№319-III from July 27, 2007 in the edition of the Law of the Republic of Kazakhstan as of 24.10.11 № 487-IV, with amendments and additions as of July 4, 2018);

2. The state compulsory standard of higher education, approved by the Government of the Republic of Kazakhstan from August 23, 2012 № 1080, with changes from May 13, 2016 № 292;

3. The model curriculum for the specialty 5B060800 - Ecology, approved by order of the Minister of Education and Science of the Republic of Kazakhstan dated August 16, 2013, № 343, with changes from July 5, 2016, № 425;

4. The Rules for the organization of the educational process on the credit technology of education, approved by the Order of the Minister of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152;

5. The National Framework of Qualifications, approved by the Protocol of the Republican tripartite commission on social partnership and regulation of social and labor relations dated March 16, 2016;

6. Model curriculum of the cycle of general education disciplines for organizations of higher and (or) postgraduate education, approved by Order No. 603 of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018;

7. Guidance on the use of the European Credit Transfer and Accumulation System (ECTS), developed as part of the Bologna process and officially published by the European Commission in 2009.

3. Basic terms and abbreviations

In accordance with the Law of the Republic of Kazakhstan "On Education", State Compulsory Educational Standard of the Republic of Kazakhstan "Higher Education. Bachelor's program. Basic Regulations" № 292 (from May 13, 2016) and "The system of coding of higher and post-graduate education", international documents in the field of education, the European system of transfer and accumulation of credits (European Credit Transfer System), the following main terms and definitions were used in this document:

education – a continuous process of upbringing and education, carried out for the purposes of moral, intellectual, cultural, physical development and the formation of professional competence;

bachelor's program – higher education, educational programs of which are aimed at training personnel with the award of a bachelor's degree in the relevant specialty;

bachelor – the degree awarded to persons who have mastered the educational programs of higher education;

educational program (EP) – a single complex of basic characteristics of education, including the goals, results and content of education, the organization of the educational process, the approaches and methods for their implementation, the criteria for assessing the learning outcomes;

student-centered learning – an approach to learning, characterized by innovative teaching methods, with the aim of facilitating learning through communication of the teacher and the student;

competences – the ability of students to the practical application of acquired in the process of learning knowledge, abilities and skills in professional activities;

professional competences – knowledge, abilities and skills necessary for the effective implementation of professional activities;

descriptors – a description of the level and amount of knowledge, abilities, skills and competencies acquired by the students upon completion of the educational program of the appropriate level of higher and postgraduate education; descriptors are based on the learning outcomes, the formed competencies, as well as the total number of credits;

learning outcomes – the confirmed by the assessment amount of knowledge, abilities and skills, acquired and demonstrated by students after mastering of the educational program, and the formed values and attitudes;

credit technology of education – training based on the selection and self-planning by the students of the sequence of studying disciplines with the accumulation of academic credits;

academic credit – a unified unit of measurement of the volume of scientific and (or) educational work (load) of the student and (or) teacher;

standard curriculum (SC) – a training document developed on the basis of the qualifier of specialties of higher and postgraduate education of the Republic of Kazakhstan and SGCES, regulating the structure and volume of the educational program by the cycles of disciplines, indicating the list of the credits minimum amount for the disciplines of obligatory component and all types of practices, the final certification, approved by the authorized body in the field of education;

obligatory component (OC) – a list of academic disciplines and the corresponding minimum amounts of credits established by the standard curriculum and studied by the students on a mandatory basis under the educational program;

elective disciplines – the academic disciplines that are a elective component within the framework of the established credits and introduced by the educational organizations, reflecting the individual training of the student, taking into account the specifics of social and economic development and the needs of a particular region, the

developed scientific schools of the higher educational institution;

curriculum – a document regulating the list, consistency, volume (labor intensity) of academic subjects, academic disciplines and (or) modules, professional practice, other types of educational activities of students of the appropriate level of education and forms of control;

module – a course system in which each course corresponds to an equal number of credits or a multiple of it;

prerequisites – disciplines containing the knowledge, abilities and skills necessary to master the discipline under study;

postrequisites – disciplines for the study of which requires knowledge, abilities and skills acquired at the end of the study of this discipline;

working curriculum (WC) – a training document developed by an educational organization independently on the basis of a standard curriculum of a specialty and individual curricula of students;

intermediate certification of the students – a procedure conducted to assess the quality of students mastering the content of the part or all volume of one academic subject, one academic discipline and (or) module, as well as the professional modules within one qualification after completing their study;

final attestation of the students – a procedure carried out to determine the degree of their mastering the volume of subjects, the educational disciplines and (or) modules stipulated by the state general compulsory standard of the corresponding level of education;

assessment methods – a full range of written, oral and practical tests/exams, projects, presentations, presentations and portfolios, which are used to assess student progress and confirm the achievement of learning outcomes for the educational component (unit/module);

assessment criteria – a description of what a student should be able to do and at what level in order to demonstrate the achievement of the learning outcome;

academic mobility – moving of the students or research teachers to study or conduct research for a specific academic period (semester or academic year) to another organization of higher and (or) postgraduate education (domestically or abroad) with mandatory recalculation of mastered curricula, disciplines in the form of academic credits in their own organization of higher and (or) postgraduate education or for continuing their studies in another organization of higher and (or) postgraduate education;

coding system – a complex of methods and coding rules for classification groups and objects of classification of a given set;

European Credit Transfer and Accumulation System (ECTS) – a student-centered system for the accumulation and transfer of credit based on the principle of transparency in the processes of study, teaching and evaluation.

In addition, the following abbreviations apply:

GED – general educational disciplines;

BD – basic disciplines;

PD – profile disciplines;

OC – obligatory component;
EC – elective component;
EEEEA – external evaluation of educational achievements;
SSS – self-study of students;
SSST – self-study of students under the teacher guidance.

4. Basic Provisions

4.1 Educational activity at the university is carried out by the credit technology of education on the basis of a student-oriented approach, in which the results of training and competence play the main role and become the main result of the educational process for a learner.

4.2 The educational program for the specialty "Ecology" was developed in accordance with the State Compulsory Educational Standard of the Republic of Kazakhstan, the National Qualifications Framework and is coordinated with the Dublin descriptors and the European Qualifications Framework. The educational program is focused on the result of training.

4.3 The main intensive factor in the development of post-industrial society is human capital, the most in-demand and valuable qualities of which are the level of education, professionalism, learnability and creative approach to activities. In this regard, the task of training relevant personnel for an innovative economy is becoming one of the main tasks of Kazakhstan's education. For the successful implementation of the task, an educational technology is proposed using design-oriented (design-targeted) teaching methods. The model of project-oriented learning is aimed at shaping creative thinking, as well as at developing certain work skills.

In the educational program "Ecology", the model of project-oriented learning is considered as a variant of constructing an individual educational trajectory of a student within the framework of the main educational program. Project-oriented learning can be: individual, group, international, interdisciplinary, non-disciplinary. Students choose projects according to their own interests.

The following innovative teaching methods are used in the educational process:

– Small group work (team) is a joint activity of students in a group under the leadership of a leader, aimed at solving a common task by creatively combining the results of individual work of team members with the division of powers and responsibilities.

– Project technology - individual or collective activities for the selection, distribution and systematization of material on a particular topic, as a result of which a project is compiled.

– Case study analysis - analysis of real problem situations that took place in the relevant field of professional activity, and the search for options for the best solutions.

– Role-playing and business games - role-playing imitation of real professional activity by students with the performance of the functions of specialists at various workplaces.

- Modular training - the use of knowledge in the form of: a) individual modules, autonomous parts of the course, integrated with other parts of the course; b) blocks of interrelated courses that can be studied independently of another block of disciplines.
- Contextual learning is the motivation of students to learn by identifying the links between specific knowledge and its application.
- The development of critical thinking is an educational activity aimed at developing in students a rational, reflective thinking capable of advancing new ideas and seeing new opportunities.
- Problem-based learning - encouraging students to independently acquire the knowledge necessary to solve a specific problem.
- Individual training - the student builds his own educational trajectory based on the formation of an individual educational program, taking into account the interest of the student.
- Advance independent work - the study of new material by students before studying it in the classroom.
- Interdisciplinary training - the use of knowledge from different areas, their grouping and concentration in the context of the problem being solved.
- Learning based on experience - enhancing the student's cognitive activity by associating their own experience with the subject of study.
- Information and communication technologies - training in an electronic educational environment in order to expand access to educational resources (theoretically, to unlimited volume and access speed), to increase contact interaction with the teacher, to build individual training trajectories and to objectively monitor and monitor students' knowledge.

4.4 In the process of developing an educational program in the specialty “Ecology”, foreign and domestic specialists and employers were involved.

4.5 Priority directions for developing an educational program in the specialty "Ecology" are:

- programs within the framework of the President's Addresses to the Nation of Kazakhstan, including the Address "The Third Modernization of Kazakhstan: Global Competitiveness";
- interdisciplinary programs;
- educational programs in English;
- joint educational programs with foreign partner universities;
- professional programs by request of employers
- programs that use distance education technologies, including supplementary education programs.

4.6 The educational program is designed to ensure the high quality of professional education in meteorology in accordance with the highest academic standards in the educational world.

The educational program “Ecology” focuses on the global nature and the paramount importance of solving environmental problems for Kazakhstan and the entire world community in the 21st century in accordance with the Sustainable

Development Goals adopted by the Paris Agreement in 2015. Modern environmental education is an interdisciplinary system of knowledge in the field of fundamental and applied environmental problems, aimed at acquiring students of practical skills and competencies to comprehensively address issues of environmental management and sustainable development at the national and global levels.

At the same time, the increasing internationalization of the labor market makes demands for the quickest integration of Kazakhstan's environmental education into the international educational system, contributing to the improvement of the professional competitiveness of graduates, their multilingual and cultural adaptation.

The program has theoretical and practical components. Terms of training: 4 years. Form of training: full-time. During the period of study, a student takes at least 154 credits, of which theoretical training – 131 credits, professional practice – 12 credits, physical training – 8 credits and final examination - 3 credits.

The degree awarded after completion of the program is Bachelor of Science in the specialty "5B060800- Ecology".

5. Code and name of the specialty

The code of the specialty is 5B060800-Ecology. In accordance with the Classifier of specialties of higher and postgraduate education in the Republic of Kazakhstan, this educational program belongs to the section Natural sciences.

In the National Classifier of the Republic of Kazakhstan (NK RK 01-2017 Classifier of occupations), ecologists have the code 5B060800 and refer to specialists-professionals in the field of Natural sciences.

6. The qualification level according to the International Standard Classification of Education

This educational program corresponds to the level of ISCED 6, which do not require preliminary completion of other programs and is classified as first-degree program. The direction of preparation is Bachelor's degree. Duration of training - 4 years.

According to the International Standard Classification of Education (ISCED 2011), this educational program belongs to the following field of education:

05 Natural sciences, mathematics and statistics	052 Environment 0521 Environmental Sciences Chemistry, physics, biology, geography and other related subjects.
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7. Goals of the Educational program

The educational program is focused on the training of highly qualified specialists in the field of meteorology, possessing certain knowledge and competencies that are in demand on the labor market.

The objectives of the educational program are:

- formation of the national model of continuous education integrated into the world educational space by comparison with foreign educational programs that meet the needs of the individual and society in specialty 5B060800 – Ecology
- creating conditions for the development of creative potential, initiative and innovation;
- obtaining knowledge on the basic disciplines of environmental science with the subsequent conscious choice of professional elective disciplines
- acquisition of practical skills required for a bachelor-ecologist during the period of training and internships;
- formation of competitiveness of graduates in the labor market;
- acquisition of a complex of knowledge that is the basis for this profession, skills and abilities to be able navigate in the flow of information and gaining new knowledge for continuing education in the Master's and PhD programs.

8. Sphere of professional activity of a specialty

Bachelor in the field of training in the specialty "5B060800 - Ecology" is preparing for the following types of professional activity:

- scientific and research;
- industrial and technological;
- service and maintenance;
- administrative and management;
- design.

The bachelor's program is formed by the organization depending on the types of educational activity and the requirements for the results of the development of an educational program oriented to research, production and technological types of professional activity.

The sphere of professional activity of the bachelor in the specialty 5B060800 - Ecology is:

- RK bodies for environmental monitoring;
- Divisions of RSE "Kazhydromet";
- Environmental protection and nature management bodies;
- Academic and research institutions related to environmental studies;
- Organizations, institutions and enterprises associated with works in the field of environmental management;
- Academic and scientific research institutes associated with the study of the atmosphere and its interaction with the ocean;
- Organizations, institutions and enterprises associated with changing weather and climate;
- Design, survey, research institutes, offices, firms, etc. various forms of ownership, depending on their activities from the state of the environment;
- Institutions of higher and secondary special education.

9. Directions of professional activity

Types of economic activities for GCEA (General Classifier of Economic Activities), in which Graduates on the specialty 5B060800 - Ecology are demanded.

01 Crop and livestock production, hunting and rendering of services in these spheres

10 Manufacture of food products

36.00.0 Collection, processing and distribution of water

37.00.0 Sewage system

38.1 Waste collection

38.12.0 Collection of hazardous waste

38.2 Waste treatment and disposal

38.21.0 Treatment and disposal of non-hazardous waste

38.22.0 Treatment of hazardous waste

38.3 Waste reduce

38.32 Disposal of sorted materials

38.32.1 Processing of waste and scrap of ferrous metals

38.32.2 Processing of non-ferrous metals scrap and scrap

38.32.3 Processing of non-metallic waste

41.10.0 Development of construction projects

42.91.0 Construction of water structures

65.12 Damage insurance

66.21 Risk and damage assessment

71.20 Technical testing and analysis

71.20.1 Activity of sanitary-epidemiological institutions

84.11.1 Activities of republican government bodies

84.12.0 Regulation of the activities of institutions providing medical care, education, cultural services and other social services, except of social security

85.31.0 Basic and general secondary education

91.04 Activities of Botanical Gardens, Zoos and Reserves

94.11.0 Activities of commercial and business organizations

94.99.0 Activities of other public organizations not included in other groups.

10. Competencies of a specialist

The ecologist should have general cultural (GCC) and professional (PC) competencies

Competence code	Description of the competence
GCC-1	understand of the main stages of the modern history of the progressive development of the statehood of Kazakhstan in the context of the world and Eurasian historical process;
GCC -2	interpret and creatively use scientific, historical and philosophical knowledge to summarize the success factors of the Kazakhstan development model on the way to an established state - the Republic

	of Kazakhstan;
GCC -3	use of linguistic and cultural linguistic knowledge for solving communication problems in a multilingual and multicultural society of the Republic of Kazakhstan and in the international arena;
GCC -4	understand of social and ethical values based on social and legal norms and tolerance to various cultural and confessional traditions;
GCC -5	understand of the basic laws of the functioning and development of nature and society, the ability to adequately navigate in various socio-economic, political and emergency situations;
GCC -6	to be able to perceive, analyze, synthesize information, set goals and choose ways to achieve them;
GCC -7	to willingness to cooperate with colleagues, work in a team;
GCC -8	use information and communication technologies in professional activities;
GCC-9	search for information necessary for the effective performance of professional tasks;
PC -1	understand environmental terminology and nomenclature;
PC -2	apply knowledge of the nature of the main physico-chemical processes occurring in the atmosphere, hydrosphere and lithosphere;
PC -3	describe the main stages of the evolution of the biosphere and its specific features; the main links of the small biological and large geological cycles of substances;
PC -4	applicates of principles and goals of sustainable development to solve situations of global, regional and local levels;
PC -5	understand the basic principles of the system of state regulation in the field of ecology and use legal documents in professional activities;
PC -6	explain ways to reduce human impact, leading to climate change and the destruction of the ozone layer of the Earth;
PC -7	organize a rational ecological observation network and monitor the quality of work of the network of ecoposts;
PC -8	to monitor the biosphere using innovative methods such as: satellite observations, GIS technology, bioindication, biotesting, ecostatistical analysis and others;
PC -9	use the fundamentals of industrial ecology, solve problems in this area, as well as apply the obtained theoretical knowledge in applied ecology;
PC -10	develop practical recommendations for the preservation of the natural environment, taking into account the ecological design of cities, industrial enterprises;
PC -11	analyze environmental and socio-economic problems using the methods of system analysis and mathematical modeling in solving professional problems;
PC -12	to determine the factors of desertification, the optimal parameters of fertility, using studies of the hydrological, physicochemical,

	biological and other properties of the soil for the selection of optimal methods of remediation;
PC -13	apply geosystem analysis and bio-geographic data to assess resource potential, environmental management and biodiversity conservation;
PC -14	to assess the quality of the environment and to own modern methods of waste management, using sanitary and hygienic and production standards;
PC -15	carry out calculations to assess the levels of hazardous environmental factors, develop integrated programs for environmental safety;
PC -16	apply regulatory documents when conducting an environmental impact assessment, environmental impact assessment and auditing, assess the level of preparation of management systems for certification for compliance with the requirements of ISO series standards;
PC -17	identify ways and means of reducing environmental risk to an acceptable level, basic measures to eliminate the consequences of accidents and disasters;
PC -18	to explain the possible ways of contamination of food raw materials and food products with chemical and biological xenobiotics and their influence on the human body;
PC -19	analyze the ecological situation and introduce a “green economy” in the enterprise, using the methods of: resource, energy saving, rational water consumption and the use of alternative energy sources;
PC -20	justify the use of ecosystem services for providing people with material goods and resources, managing diseases and climate, providing recreational, cultural and spiritual benefits;
PC -21	use the methods of organization and planning of scientific research, the search for scientific information, the principles for determining the permissible errors of laboratory experiments;
PC -22	preparation of scientific and technical documentation.

11. Learning outcomes focused on the Dublin descriptors

Upon completion of this educational program, it is expected that students will be able to:

Cognitive competencies:

- A1. Understand the main stages of the modern history of Kazakhstan;
- A2. Interpret the basic concepts and laws of physics, chemistry, mathematics;
- A3. Use basic knowledge in the field of theoretical and applied ecology.

Functional competencies:

- B1. Use linguistic and cultural linguistic knowledge, information and communication technologies in their professional activities;
- B2. Master the methods of collecting and statistical analysis of environmental information; computer literacy;

B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management;

B4. Use the procedures of rationing, certification, auditing, licensing, examination, analysis of calculations of environmental risk and damage when conducting an environmental impact assessment and predicting the consequences of human impact on the ecosystem;

B5. Conduct laboratory and field research, evaluate the accuracy and reliability of experimental results.

System Competencies:

C1. Conduct an experiment using physicochemical methods to assess the state of Environment;

C2. Predict ecosystem adaptation to climate change with the goal of integrated management of natural resources;

C3. To critically evaluate world experience in the field of energy and resource saving and monitor the implementation of established standards for environmental management.

Social (communicative) competence:

D1. To be ready for independent creative activity, cooperation, to use practical skills that ensure the preservation and strengthening of health, the development and improvement of psychophysical abilities and qualities.

12. The ratio of the expected learning outcomes of training methods and assessment in the formation of competence

Learning outcomes for each EP module <i>(in accordance with the Manual on the description of learning outcomes).</i>	
Social and Humanitarian Module	Upon successful completion of this module, students should be able to: 1. understand the main stages of the modern history of economic development of Kazakhstan; 2. form critical judgments in the study of the diverse socio-political and economic phenomena of modernity; 3. analyze the realities of the socio-political and economic life of society; 4. operate with special philosophical terminology and categorical-conceptual apparatus of philosophy; 5. logically express their thoughts on the studied philosophical issues; 6. form their own ideological position on various problems of philosophy; 7. - be able to freely interpret and creatively use scientific, historical and philosophical knowledge to analyze the factors of development of the Kazakhstan

	model of society and economy.
Instrumental Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. competently use linguistic and cultural linguistic knowledge for solving communication problems in a multilingual and multicultural society of the Republic of Kazakhstan and in the international arena; 2. build an oral and written statement in different communicative situations, to understand and analyze the structural and semantic organization of a scientific text; 3. perform various text operations: describe, summarize information; 4. search for information necessary for the effective performance of professional tasks; 5. apply information and communication technologies in professional activities; 6. - use information and communication technologies in scientific and practical activities, self-education and the achievement of other goals.
ELECTIVE COMPONENT	
«Human and Environment» Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. understand the basic ideas and concepts of ecology and sustainable development; 2. explain the basic principles and rules for the safety of human life; 3. interpret the global challenges of our time in order to preserve the ecological balance and ensure the environmental safety of the environment; 4. predict emergencies and their consequences; 5. use information about the main methods, means and methods of individual and collective protection in emergency situations; 6. organize rescue operations in emergency situations of various kinds.
Geography Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. understand the economy of Kazakhstan, the state system, the economy of Kazakhstan from antiquity to sovereignty;

	<ol style="list-style-type: none"> 2. explain the demographic policy, labor resources and the main problems of the population of the Republic of Kazakhstan; 3. analyze economic and geographical information, use theoretical knowledge in practice; 4. economic valuation of natural resources; 5. apply the cartographic method in geographic research; 6. anticipate the environmental consequences of the influence of anthropogenesis on geosystems.
Social and Political Knowledge Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. distinguish between the terminological apparatus and the main provisions of theoretical and applied political science; 2. apply acquired knowledge and skills in the study of professional disciplines, in practical professional activities, in conducting sociological research; 3. develop a program of sociological (marketing) research, tools, analyze the results obtained; 4. perform analytical and organizational work in the preparation of concepts, plans, schedules and implementation of advertising campaigns; 5. use the technology of sociological research; 6. apply the technology of marketing research.
Cultural heritage and interpersonal Communication Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. be able to speak publicly in various genres of modern oratory, correctly use the normative potential of the language, own the culture of the dispute; 2. understand the basic interrelations of the culture of speech and language communication, ideas and positions in this area; 3. relying on samples of speeches given by various dictionaries, mass media, to be able to reproduce expressive speech, using knowledge of the laws of logic, rules of conduct of polemicists, to be able to defend their position correctly and convincingly 4. understand the basics of interpersonal communication, barriers of interpersonal communication and ways to overcome them, the specifics of business communication in various groups and situations, the rules and modern technologies of

	<p>effective communication, their capabilities and limitations in the field of communication;</p> <p>5. recognize the non-verbal behavior of the communication partners; analyze communication processes, navigate in a variety of communication technologies, adapt to different sociocultural realities, show tolerance for national, cultural and religious differences;</p> <p>6. operate with the basic technologies of effective communication, methods of discussion and controversy, the skills of building constructive communication and the ability to develop themselves in the field of communication.</p>
CORE DISCIPLINES	
OBLIGATORY COMPONENT (OC)	
Environmental and Natural Sciences Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. understand the conditions and mechanisms of biogeochemical cycles; 2. analyze the causes of global environmental problems and the impact of harmful environmental factors on human health; 3. be able to explain the chemical composition of the atmosphere, hydrosphere, lithosphere; 4. conduct an ecological-chemical experiment to determine some normalized components of the environment; 5. possess modern methods of physicochemical analysis: thin layer and gas chromatography, electrophotocolorimetry, spectrophotometer, and etc. 6. predict environmental quality changes based on experimental data.
Biosphere Ecology Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. describe the structure of the biota components according to the characteristics of the biogeographical classification; 2. determine the systematic affiliation of representatives of taxa of the largest ranks of plants and animals; 3. to justify the impact of environmental factors on soil formation processes and the formation of fertility in natural and climatic zones; 4. determine the optimal parameters of fertility,

	<p>using data from research methods of physical, hydrological, chemical, physicochemical, biological and other properties of various types of soil;</p> <p>5. explain the causes of soil degradation associated with natural and anthropogenic impacts and describe the measures applied for their restoration and protection.</p>
Professional Language Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. use language knowledge to solve professional problems; 2. use scientific terminology in the specialty; 3. write scientific articles and participate in scientific discussions in Kazakh / Russian / foreign language; 4. adequately build communication in professionally significant situations; 5. understand authentic oral texts of a monological and dialogical nature in the form of a message, lecture, interview, conversation, discussion; 6. deliver reports, presentations, presentations, reviews on various professional topics.
ELECTIVE COMPONENT (EC)	
Core disciplines of the educational program	
STEM Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. understand the physical phenomena and laws of the physics of open systems to explain the processes of matter and energy exchange in ecosystems; 2. explain mathematical methods for processing information (data) and be able to apply them in practice; 3. analyze socio-economic problems and processes using the methods of system analysis and mathematical modeling in solving professional problems; 4. use databases for working with spatial data and GIS; 5. apply GIS - technology to solve problems in the field of ecology.
Sustainable Development and Environmental Security Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. interpret natural and anthropogenic environmental processes in the environment and

	<p>possible ways to regulate them;</p> <ol style="list-style-type: none"> 2. use the conceptual apparatus on environmental safety in practice; 3. to assess rehabilitation measures in the areas of ecological disaster, in the regions of water resources pollution and in the air basin; 4. evaluate activities to reduce the accumulation of industrial and household waste in order to prevent natural and man-made emergencies; 5. demonstrate the knowledge gained about the principles and methods of organizing and planning research; various search systems for scientific information; principles for determining the permissible errors of laboratory research results and their understanding.
Applied Ecology Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. reveal the general laws of production processes; 2. assess the main industrial methods of processing and use of industrial and consumer waste, the disposal and disposal of hazardous industrial waste; 3. carry out calculations to assess the levels of hazardous and harmful factors of the habitat, to develop comprehensive programs of environmental protection; 4. interpret the toxicological significance of various industrial and domestic wastes, as well as explain the mechanisms of action of the main types of poisons and their classification; 5. be able to identify toxic substances in biological materials, water, air, food, drugs.
Environmental Management Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. interpret the organizational and methodological basis of the procedure for environmental impact assessment; 2. have information on major pollutants and quality indicators of environmental components; 3. determine the nature, principles and procedures of environmental impact assessment and auditing; 4. differentiate and apply methods for environmental impact assessment and environmental auditing using regulatory documentation; 5. to assess the level of preparation of management

	systems for certification for compliance with the requirements of ISO series standards.
Environmental Regulation Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. develop the environmental policy of the enterprise in accordance with the requirements of international and national regulatory documents (standards ISO 14001, EMAS, EU Directives, national standards); 2. understand the mechanism of environmental regulation and environmental quality management system in the context of the transition of Kazakhstan to sustainable development; 3. use environmental management techniques, such as: administrative, economic and market; 4. calculate payments for the use of natural resources; 5. calculate the economic damage from environmental pollution.
Human Ecology Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. understand the ecology of public health and nutrition, the impact of natural and man-made environment on human health; 2. to explain the ways of contamination of food raw materials and food products with chemical and biological xenobiotics and their influence on the human body; 3. own standard methods of food safety control; 4. predict the environmental consequences of human activities on the environment and human health; 5. identify ways and means of reducing environmental risk to an acceptable level, basic measures to eliminate the consequences of accidents and disasters.
Environmental Policy Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. understand the basic principles of the system of state regulation in the field of ecology; 2. use the environmental code, legislative documents in their professional activities; 3. analyze the situation associated with the impact of industrial enterprises on the environment in order to

	<p>improve its condition.</p> <p>4. understand the main problems of anthropogenic pollution of the environment and depletion of traditional energy resources, analyze the tasks and measures to ensure the "green economy";</p> <p>5. apply methods of resource saving and energy efficiency, such as low-waste technologies, recycling, recycling, economical, reuse, replacement of some energy sources with other (diode, luminescent, sensor technologies), bio-and nanomaterials, biogas production, biodiesel and others.</p>
MAJOR DISCIPLINES (MD)	
OBLIGATORY COMPONENT (OC)	
Ecology of Geosystems Module	<p>Upon successful completion of this module, students should be able to:</p> <p>1. apply an integrated landscape approach to studying the effects of natural and man-made disasters;</p> <p>2. to characterize priority pollutants, chemical mutagenic, carcinogenic factors of the environment, to interpret the rationing of discharges and emissions of pollutants;</p> <p>3. apply the methods of organizing a network of observations of air pollution, natural waters, soil cover and the principles of their implementation;</p> <p>4. perform monitoring using innovative methods such as: satellite observations, GIS technology, bioindication, bioassay, acoustic control, ecostatistical analysis and others;</p> <p>5. carry out processing of environmental monitoring data by methods of computational and mathematical biology, mathematical modeling, information technologies.</p>
ELECTIVE COMPONENT (EC)	
Integrated Ecosystem Management Module	<p>Upon successful completion of this module, students should be able to:</p> <p>1. to explain the causes of global environmental problems, the effects of climate change and its impact on the land and water resources of the planet;</p> <p>2. assess water resources, calculate the water balance of the water basins of the Republic of Kazakhstan;</p> <p>3. systematize information in the field of conservation of water, land and biosphere resources;</p>

	<ol style="list-style-type: none"> 4. carry out environmental and economic expertise of investment programs, schemes and land management projects based on cadastre and land management data; 5. use the methods and methods of reclamation and rehabilitation of technologically polluted territories; 6. carry out an environmental impact assessment of land-use projects.
Applied Green Economy Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. interpret the main technological processes of energy production from alternative sources; 2. describe the characteristics of production and consumption wastes; 3. apply modern methods of waste disposal, depending on their nature, such as: disposal, thermal processing, pyrolysis, etc .; 4. be able to simulate technological processes for the processing, disposal and disposal of solid and liquid waste; 5. summarize the global experience in the creation and use of green technologies in Kazakhstan such as: fuel cells, lithium-air batteries, smart power grids of the first generation, tidal turbines, space solar power.
Sustainable Land Use Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. explain the main signs of disturbed land, changes in the properties and modes of soil processes; 2. in practice, apply the provisions of legislation regulating environmental activities; 3. choose measures for the restoration of disturbed lands using a set of technical and land reclamation works; 4. understand the basics of urbanization processes, apply the methods of urban design, urban (urban planning) policy and district planning; 5. use research methods of hydrological, physicochemical, biological and other soil properties.
Sustainable Nature Use Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. assess the environmental risks of enterprises, determine ways and means of reducing environmental

	<p>risks to an acceptable level;</p> <ol style="list-style-type: none"> 2. calculate payments for the use of natural resources and the negative impact on the environment; 3. assess the resource availability and natural resource potential of the territory; 4. conduct a quantitative and qualitative assessment of natural and man-made risks; 5. apply geosystem analysis to assess environmental management and biodiversity conservation.
Adaptation to climate change Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. identify uncertainties associated with the complexity of the climate system; 2. understand the manifestations of the anthropogenic factor in heat, electric, magnetic and light phenomena; 3. assess the effects of climate change in climate-dependent industries and argue their view on measures to reduce the vulnerability of ecosystems; 4. process and analyze experimental data when creating an EIA using mathematical programs, 5. analyze the physical processes in the atmosphere, hydrosphere and lithosphere and the influence of human activity on them.
Environmental protection Module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. understand the mechanisms for creating natural biosphere reserves in accordance with the principles of the UNESCO program “Man and the Biosphere”, UN conventions. 2. argue the current state and trends in biological and socio-economic mechanisms for the conservation of biodiversity based on the principles of sustainable development 3. apply the Millennium Assessment method in determining the value of ecosystem services; 4. apply mathematical modeling methods for solving design problems with various types of environmental design; 5. make an environmental assessment and develop environmental projects of industrial enterprises, cities, specially protected natural territories.
Physical Training	<p>Upon successful completion of this module, students</p>

Module	<p>should be able to:</p> <ol style="list-style-type: none"> 1. use in life practical skills and abilities ensuring the preservation and strengthening of health, development and improvement of psychophysical abilities and qualities; 2. independently maintain and develop basic physical qualities in the process of exercising; 3. use methods and means of physical culture to ensure full social and professional activities; 4. assess the current state of physical culture and sports in the world; 5. adhere to a healthy lifestyle.
Professional practice module	<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> 1. apply methods of field gathering (samples for chemical analysis, samples of soil and soils, herbariums, etc.) for processing, analysis and synthesis of field and laboratory (cameral) sources of environmental information; 2. perform work on the description, diagnosis of soils, phytocenoses, determine in the field the mechanical composition of the soil; 3. collect statistical material, use technological information in the work, compile cartographic material, build soil, profile, draw up a report; 4. conduct independent research based on the use of analytical information obtained at a particular enterprise; 5. use the skills of collecting, organizing and synthesizing the collected material to perform the thesis; 6. formulate conclusions on the work that determine the scientific novelty and practical value; 7. perform labor operations in the framework of the functional duties of employees of the enterprise.

Matrix of the competencies formation in the modules of the educational program

Module Title	Training outcomes											
	A1	A2	A3	B1	B2	B3	B4	B5	C1	C2	C3	Д1
GENERAL EDUCATION DISCIPLINES (GED)												
OBLIGATORY COMPONENT (OC)												
Social and Humanitarian												
Instrumental												
ELECTIVE COMPONENT												
Human and Environment												
Geography												
Social and Political Knowledge												
Cultural heritage and interpersonal Communication												
CORE DISCIPLINES												
OBLIGATORY COMPONENT (OC)												
Environmental and Natural Sciences												
Biosphere Ecology												
Professional Language												
ELECTIVE COMPONENT (EC)												
Core disciplines of the educational program												
STEM												

Sustainable Development and Environmental Security												
Applied Ecology												
Environmental Management												
Environmental Regulation												
Human Ecology												
Environmental Policy												
MAJOR DISCIPLINES (MD)												
OBLIGATORY COMPONENT (OC)												
Ecology of Geosystems												
ELECTIVE COMPONENT (EC)												
Integrated Ecosystem Management												
Applied Green Economy												
Sustainable Land Use												
Sustainable Nature Use												
Environmental Protection												
ADDITIONAL TYPES OF TRAINING (ATT)												
OBLIGATORY COMPONENT (OC)												
Physical Training												
Professional Practice												

13. Working curriculum

CORE (WORKING) CURRICULUM ON SPECIALTY 5B060800 – ECOLOGY

Duration of study - 4 years

Form of study – full time

Degree to award: **Bachelor of Natural Sciences on specialty «5B060800 - Ecology»**

Code	Names of disciplines/other educational activities	Credits	Semesters							
			I	II	III	IV	V	VI	VII	VIII
			lec+ practice+ lab							
GENERAL EDUCATION DISCIPLINES (GED)		29								
OBLIGATORY COMPONENT (OC)		21								
Social and humanitarian module		6								
SIK1101	Modern history of Kazakhstan (State Examination)	3	2+1+0							
Fil2102	Philosophy	3		2+1+0						
Instrumental module		15								
IYa1103	Foreign Language	6	0+3+0	0+3+0						
K(R)Ya1104	Kazakh (Russian) Language	6	0+3+0	0+3+0						
IKT1105	Information and Communication Technologies	3		2+0+1						
Total of obligatory component		21	9	12	0	0	0	0	0	0
ELECTIVE COMPONENT (EC)		8								
Human and Environment		4								
GVChYR2106	Global environmental challenges and Sustainable Development Goals (SDGs)	2			1+1+0					
BGChYES2	Human Life Safety and Management of extreme	2			1+1+0					

Code	Names of disciplines/other educational activities	Credits	Semesters							
			I	II	III	IV	V	VI	VII	VIII
			lec+ practice+ lab							
107	situations									
	Geographical module	4								
ESGK2108	Economic and social geography of Kazakhstan	2			1+1+0					
EGK2109	Environmental geosystems of Kazakhstan	2			1+1+0					
	Module of social and political knowledge	4								
Soc2110	Sociology				1+1+0					
Pol2111	Political science				1+1+0					
	Cultural heritage and interpersonal communication module	4								
Cul2114	Cultural science				1+1+0					
Psy2115	Psychology				1+1+0					
	Total of elective component	8	0	0	8	0	0	0	0	0
CORE DISCIPLINES (CD)		69								
OBLIGATORY COMPONENT (OC)		20								
	Environmental and natural sciences	5								
EAE1203	Environmental aspects of natural science	2	1+1+0							
EH2204	Environmental chemistry	3				1+1+1				
	Biosphere Ecology	11								
EB2205	Environmental biogeography	3				1+2+0				
P3206	Soil science	4					2+1+1			
EZhR2207	Ecology of animals and plants (systems ecology)	4			2+2+0					
	Professional Language	4								
PK (R) Ya2201	Professional Kazakh (Russian) Language	2			0+2+0					

Code	Names of disciplines/other educational activities	Credits	Semesters							
			I	II	III	IV	V	VI	VII	VIII
			lec+ practice+ lab							
POIYa2202	Professionally Oriented Foreign Language	2			0+2+0					
	Total of compulsory component	20	2	0	8	6	4	0	0	0
ELECTIVE COMPONENT (EC)		49								
Core disciplines of the educational program										
	STEM Module	9								
VM1208	Advanced Mathematics	3	1+2+0							
GIS1208	Environmental GIS	3		1+2+0						
Phys1210	Physics	3	1+1+1							
	Sustainable development and environmental security	7								
OSYR1211	Environment and Sustainable Development (introduction to the specialty)	3	1+2+0							
EB2212	Environmental Security	2			1+1+0					
SW2213	Scientific writing (Eng)	2				0+2+0				
	Applied Ecology	6								
OPE2214	Environmental impact of Industrial processes	3				1+1+1				
BE2215	Introduction to ecotoxicology	3				1+1+1				
	Environmental Management	9								
OVOC2216	Environmental impact assessment (EIA)	3				1+2+0				
OEA4217	Fundamentals of environmental auditing	3							1+2+0	
SME3218	Statistical methods in ecology	3					1+2+0			
	Environmental regulation	6								
ERY3219	Environmental regulation and governance	3						1+2+0		
SMOS3220	Environmental management system	3						1+2+0		
	Human ecology	6								
OSCh2221	Environment and Humans	3		1+2+0						

Code	Names of disciplines/other educational activities	Credits	Semesters							
			I	II	III	IV	V	VI	VII	VIII
			lec+ practice+ lab							
EP2222	Food science	3				1+1+1				
	Environmental Policy	6								
ZE4223	Green Economy	3							1+2+0	
OEP4524	Fundamentals of environmental law	3							1+2+0	
	Total on the core disciplines of the educational program	49	9	6	2	14	3	6	9	0
MAJOR DISCIPLINES (MD)		33								
OBLIGATORY COMPONENT (OC)		6								
	Ecology of Geosystems									
Geo3301	Geocology	3					2+1+0			
EM3302	Environmental monitoring	3						2+1+0		
	Total of obligatory component	6	0	0	0	0	3	3	0	0
ELECTIVE COMPONENT (EC)		27								
	Integrated Ecosystem Management	9								
YZR3303	Land management	3							1+2+0	
YVR3304	Water resources management	3							1+2+0	
YN3305	Sustainable Resource extraction	3							1+2+0	
	Applied Green Economy	9								
ZT3303	Green technologies	3							1+1+1	
BE3304	Renewable energy	3							1+2+0	
MMYO3305	Methods and models in waste management	3							1+2+0	
	Sustainable land use	9								
ORZ3306	Desertification and Reclamation of lands	3					1+2+0			
Agr3307	Agroecology	3					1+2+0			

Code	Names of disciplines/other educational activities	Credits	Semesters							
			I	II	III	IV	V	VI	VII	VIII
			lec+ practice+ lab							
Yrb3308	Urbanistics	3					1+2+0			
	Sustainable Nature Use	9								
Res3306	Resource Management	3					1+2+0			
EP3307	Environmental economics	3					1+2+0			
OER3308	Environmental Risk Assessment	3					1+2+0			
	Adaptation to climate change	9								
MME4309	Mathematical modeling in ecology	3						1+2+0		
IK4310	Climate change	3						1+2+0		
PhOC4311	Environmental physics	3						1+2+0		
	Environmental protection	9								
CBZL4309	Biodiversity conservation	3						1+2+0		
EY4310	Ecosystem services	3						1+2+0		
EP4311	Environmental Project	3						1+2+0		
	Total of elective component	27	0	0	0	0	9	9	9	0
	Total of theoretical studies	131	20	18	18	20	19	18	18	0
ADDITIONAL TYPES OF TRAINING (ATT)		23								
OBLIGATORY COMPONENT (OC)										
	Physical Training Module									
FK	Physical Training	8	0+0+2	0+0+2	0+0+2	0+0+2				
	Professional practice module	12								
UP	Educational Internship (Introductory)	3		3 (1,5 weeks)						
PrP	Practice Training (field practice)	1				1 (2,5 weeks)				
PrP	Practice Training	6						2 (5		4 (10

Code	Names of disciplines/other educational activities	Credits	Semesters							
			I	II	III	IV	V	VI	VII	VIII
			lec+ practice+ lab							
									weeks)	weeks)
PdP	Pre-Graduation Internship	2								2 (5 weeks)
	Total on additional types of training	20	2	5	2	3	0	2	0	6
	FINAL ATTESTATION	3								
GES	State exam in the specialty	1								1 (2 weeks)
NZDR	Writing and Presentation of Diploma Work (Project)	2								2 (4 weeks)
	TOTAL	154								9

CORE (WORKING) CURRICULUM ON SPECIALTY 5B060800 – ECOLOGY

Duration of study - **4 years**

Form of study – **full time**

Degree to award: **Bachelor of Natural Sciences on specialty «5B060800 - Ecology»**

Code	Names of disciplines/other educational activities	Credits	Semesters							
			I	II	III	IV	V	VI	VII	VIII
GENERAL EDUCATION DISCIPLINES (GED)			lec+ practice+ lab							
OBLIGATORY COMPONENT (OC)		29								
	Social and humanitarian module	6								
SIK1101	Modern history of Kazakhstan (State Examination)	3	2+1+0							
Fil2102	Philosophy	3		2+1+0						
	Instrumental module	15								
IYa1103	Foreign Language	6	0+3+0	0+3+0						
K(R)Ya1104	Kazakh (Russian) Language	6	0+3+0	0+3+0						
IKT1105	Information and Communication Technologies	3		2+0+1						
	Total of obligatory component	21	9	12	0	0	0	0	0	0
ELECTIVE COMPONENT (EC)		8								
	Human and Environment	4								
GVChYR2106	Global environmental challenges and Sustainable Development Goals (SDGs)	2			1+1+0					
BGChYES2107	Human Life Safety and Management of extreme situations	2			1+1+0					
	Geographical module	4								
ESGK2108	Economic and social geography of Kazakhstan	2			1+1+0					

Code	Names of disciplines/other educational activities	Credits	Semesters							
			I	II	III	IV	V	VI	VII	VIII
			lec+ practice+ lab							
EGK2109	Environmental geosystems of Kazakhstan	2			1+1+0					
	Module of social and political knowledge	4								
Soc2110	Sociology				1+1+0					
Pol2111	Political science				1+1+0					
	Cultural heritage and interpersonal communication module	4								
Cul2114	Cultural science				1+1+0					
Psy2115	Psychology				1+1+0					
	Total of elective component	8	0	0	8	0	0	0	0	0
CORE DISCIPLINES (CD)		69								
OBLIGATORY COMPONENT (OC)		20								
	Environmental and natural sciences	5								
EAE1203	Environmental aspects of natural science	2	1+1+0							
EH2204	Environmental chemistry	3				1+1+1				
	Biosphere Ecology	11								
EB2205	Environmental biogeography	3				1+2+0				
P3206	Soil science	4					2+1+1			
EZhR2207	Ecology of animals and plants (systems ecology)	4			2+2+0					
	Professional Language	4								
PK (R) Ya2201	Professional Kazakh (Russian) Language	2			0+2+0					
POIYa2202	Professionally Oriented Foreign Language	2			0+2+0					
	Total of compulsory component	20	2	0	8	6	4	0	0	0

Code	Names of disciplines/other educational activities	Credits	Semesters								
			I	II	III	IV	V	VI	VII	VIII	
ELECTIVE COMPONENT (EC)			lec+ practice+ lab								
ELECTIVE COMPONENT (EC)			49								
Core disciplines of the educational program											
	STEM Module	9									
VM1208	Advanced Mathematics	3	1+2+0								
GIS1208	Environmental GIS	3		1+2+0							
Phys1210	Physics	3	1+1+1								
	Sustainable development and environmental security	7									
OSYR1211	Environment and Sustainable Development (introduction to the specialty)	3	1+2+0								
EB2212	Environmental Security	2			1+1+0						
SW2213	Scientific writing (Eng)	2				0+2+0					
	Applied Ecology	6									
OPE2214	Environmental impact of Industrial processes	3				1+1+1					
BE2215	Introduction to ecotoxicology	3				1+1+1					
	Environmental Management	9									
OVOC2216	Environmental impact assessment (EIA)	3				1+2+0					
OEA4217	Fundamentals of environmental auditing	3							1+2+0		
SME3218	Statistical methods in ecology	3						1+2+0			
	Environmental regulation	6									
ERY3219	Environmental regulation and governance	3							1+2+0		
SMOS3220	Environmental management system	3							1+2+0		
	Human ecology	6									
OSCh2221	Environment and Humans	3		1+2+0							
EP2222	Food science	3				1+1+1					
	Environmental Policy	6									
ZE4223	Green Economy	3								1+2+0	

Code	Names of disciplines/other educational activities	Credits	Semesters							
			I	II	III	IV	V	VI	VII	VIII
OEP4524	Fundamentals of environmental law	3							1+2+0	
	Total on the core disciplines of the educational program	49	9	6	2	14	3	6	9	0
MAJOR DISCIPLINES (MD)		33								
OBLIGATORY COMPONENT (OC)		6								
	Ecology of Geosystems									
Geo3301	Geocology	3					2+1+0			
EM3302	Environmental monitoring	3						2+1+0		
	Total of obligatory component	6	0	0	0	0	3	3	0	0
ELECTIVE COMPONENT (EC)		27								
	Integrated Ecosystem Management	9								
YZR3303	Land management	3							1+2+0	
YVR3304	Water resources management	3							1+2+0	
YN3305	Sustainable Resource extraction	3							1+2+0	
	Applied Green Economy	9								
ZT3303	Green technologies	3							1+1+1	
BE3304	Renewable energy	3							1+2+0	
MMYO3305	Methods and models in waste management	3							1+2+0	
	Sustainable land use	9								
ORZ3306	Desertification and Reclamation of lands	3					1+2+0			
Agr3307	Agroecology	3					1+2+0			
Yrb3308	Urbanistics	3					1+2+0			
	Sustainable Nature Use	9								
Res3306	Resource Management	3					1+2+0			

Code	Names of disciplines/other educational activities	Credits	Semesters							
			I	II	III	IV	V	VI	VII	VIII
			lec+ practice+ lab							
EP3307	Environmental economics	3					1+2+0			
OER3308	Environmental Risk Assessment	3					1+2+0			
	Adaptation to climate change	9								
MME4309	Mathematical modeling in ecology	3						1+2+0		
IK4310	Climate change	3						1+2+0		
PhOC4311	Environmental physics	3						1+2+0		
	Environmental protection	9								
CBZL4309	Biodiversity conservation	3						1+2+0		
EY4310	Ecosystem services	3						1+2+0		
EP4311	Environmental Project	3						1+2+0		
	Total of elective component	27	0	0	0	0	9	9	9	0
	Total of theoretical studies	131	20	18	18	20	19	18	18	0
ADDITIONAL TYPES OF TRAINING (ATT)		23								
OBLIGATORY COMPONENT (OC)										
	Physical Training Module									
FK	Physical Training	8	0+0+2	0+0+2	0+0+2	0+0+2				
	Professional practice module	12								
UP	Educational Internship (Introductory)	3		3 (1,5 weeks)						
PrP	Practice Training (field practice)	1				1 (2,5 weeks)				
PrP	Practice Training	6						2 (5 weeks)		4 (10 weeks)
PdP	Pre-Graduation Internship	2								2 (5 weeks)

Code	Names of disciplines/other educational activities	Credits	Semesters							
			I	II	III	IV	V	VI	VII	VIII
			lec+ practice+ lab							
										weeks)
	Total on additional types of training	20	2	5	2	3	0	2	0	6
FINAL ATTESTATION		3								
GES	State exam in the specialty	1								1 (2 weeks)
NZDR	Writing and Presentation of Diploma Work (Project)	2								2 (4 weeks)
TOTAL		154								9

CONTENT OF EDUCATIONAL MODULES OF DISCIPLINES

GENERAL EDUCATION DISCIPLINES (GED) - 29 credits

OBLIGATORY COMPONENT (OC) – 21 credits

Social and humanitarian module – 6 credits

General cultural competences:

- knowledge of the main stages of the modern history of the progressive development of the statehood of Kazakhstan in the context of the world and Eurasian historical process;
- the ability to freely interpret and creatively use scientific, historical and philosophical knowledge to summarize the success factors of the Kazakhstan development model on the way to an established state - the Republic of Kazakhstan;
- willingness to cooperate with colleagues, work in a team;

The learning outcomes focused on the Dublin descriptors:

Learning outcomes focused on the Dublin descriptors:

A1. Understand the main stages of the modern history of Kazakhstan.

D1. To be ready for independent creative activity, cooperation, to use practical skills that ensure the preservation and strengthening of health, the development and improvement of psychophysical abilities and qualities.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, State exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

SIK1101 Modern history of Kazakhstan – 3 credits

Prerequisites: No.

Postrequisites: Economic and social geography of Kazakhstan; Political science; Sociology; Cultural studies; Psychology.

The purpose of the discipline is to form a system of scientific views on the history of modern Kazakhstan society in the context of the world historical process.

As a result of studying the discipline, the student is able to:

- systematize the conceptual foundations of the study of modern history of Kazakhstan;
- to compare the ideas of continuity and continuity of historical and cultural development, the deep roots of the spiritual heritage of Kazakhstan;
- to reveal the significance of the formation of historical consciousness and ideological principles in accordance with national priorities;
- to classify historical sources reflecting the features of the modern history of Kazakhstan;
- to identify the historical patterns of the development of society, paying attention to the study of historical originality;
- master the techniques of historical description and analysis of the causes and consequences of the events of the modern history of Kazakhstan;
- predict possible solutions to contemporary problems based on an analysis of the historical past and reasoned information;
- argue the features and significance of the modern Kazakhstan model of development;
- to explain the importance of education of patriotism, in the spirit of democratic values of modern society on the example of the vital activity of historical personalities.

Topics covered:

1. Conceptual framework for the study of national history.

2. Prerequisites for the formation of independence in Kazakhstan: national liberation uprisings and the formation of the idea of a national state.
3. The process of polarization of political forces.
4. Civil and political confrontation.
5. Implementation of the Soviet model of Nation-building.
6. Contradictions and consequences of Soviet reforms in Kazakhstan in the second half of the twentieth century.
7. The policy of "restructuring" of Kazakhstan.
8. Formation of the state structure of the Republic of Kazakhstan.
9. Kazakhstan model of economic development.
10. Social modernization - the basis of the welfare of society.
11. Ethno-demographic processes and the strengthening of interethnic harmony.
12. Socio-political development prospects and spiritual modernization.
13. The policy of forming a new historical consciousness and worldview of the people of the Great Steppe.
14. Kazakhstan is a state recognized by the modern world.
15. N.A. Nazarbayev - a Person in history. Formation of a united nation of the future.

Fil2102 Philosophy – 3 credits

Prerequisites: Modern history of Kazakhstan.

Postrequisites: Environment and Humans.

The purpose of the discipline is formation of students' holistic system understanding of philosophy as a special form of knowledge of the world, its main sections, problems and methods of studying them in the context of future professional activity.

As a result of studying the discipline, the student is able to:

- explain the specifics of the philosophical understanding of reality;
- justify the worldview as a product of philosophical reflection and study of the natural and social world;
- Classify the methods of scientific and philosophical knowledge of the world;
- Interpret the content and specific features of the mythological, religious and scientific worldview;

- substantiate the role and importance of key ideological concepts as values of the social and personal being of a person in the modern world;
- analyze the philosophical aspect of media texts, socio-cultural and personal situations to substantiate and make ethical decisions;
- to formulate and correctly argue their own moral position in relation to the actual problems of modern global society;
- conduct research that is relevant to identify the philosophical content of problems in the professional field and present the results for discussion.

Topics covered:

1. The emergence and development of philosophy. The subject and method of philosophy.
2. Historical types of philosophy.
3. Basic philosophical understanding of the world.
4. The problem of being. Ontology and metaphysics.
5. Consciousness and language.
6. Cognition and creativity.
7. Scientific and extra-scientific knowledge. Science and technology.
8. Philosophy of man and value world.
9. Man. Life and death. Meaning of life.
10. Ethics. The philosophy of values.
11. Freedom.
12. Aesthetics. Perception and creation of beauty.
13. Society and culture.
14. Philosophy of history.
15. “Mangilik Yel” and “Ruhani Zhangyru” - the philosophy of the new Kazakhstan.

Instrumental module – 15 credits

General cultural competences:

- competent use of linguistic and cultural linguistic knowledge for solving communication problems in a multilingual and multicultural society of the Republic of Kazakhstan and in the international arena;
- use information and communication technologies in professional activities;
- search for information necessary for the effective performance of professional tasks.

Learning outcomes focused on the Dublin descriptors:

B1. Use linguistic and cultural linguistic knowledge, information and communication technologies in their professional activities.

D1. To be ready for independent creative activity, cooperation, to use practical skills that ensure the preservation and strengthening of health, the development and improvement of psychophysical abilities and qualities.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

IYa1103 Foreign Language – 6 credits

Prerequisites: No.

Postrequisites: Professionally Oriented Foreign Language; Scientific writing.

The purpose of the discipline is teaching a foreign language as a subject of a general education unit is learning practical knowledge of everyday language and specialty language for the active use of a foreign language both in everyday and in professional communication.

As a result of studying the discipline, the student is able to:

- reproduce orthoepic, spelling, stylistic norms of Russian / Kazakh / foreign languages;
- use the features of professional oral and written scientific speech;
- apply the technology of interpretation and analysis of texts of scientific literature in the specialty;
- explain the role and meaning of information and information technology in the development of modern society and the economy of knowledge in the English language;
- practice the main methods, methods and means of obtaining, storing, processing information;
- have computer skills as an information management tool;
- to build work with information in the global computer networks and corporate computer systems in English;
- competently use linguistic and cultural linguistic knowledge for communication in a multilingual and multicultural society of the Republic of Kazakhstan and in the international arena.

Topics covered:

1. Ways and methods of learning a foreign language.
2. The main features of pronunciation and types of word formation.
3. Parts of speech and their formal characteristics, functions of parts of speech. Pronouns, numbers, main forms of the verb and their functions. Regular and irregular verbs. Overview of temporary forms.
4. Colloquial topic "Social issues / Society and different life situations / Communication situations - speech etiquette."
5. Oral theme "Important fundamental principles / important discoveries of life, the first experience."
6. Syntactic structures and practical use of all parts of speech.
7. Future time. Modal verbs. Adjective. Adverb.
8. Types of reading and ways of presenting information in texts.
9. Dictionaries.

10. Grammar: infinitive, gerund, participle I, participle II.
11. Types of reading and ways of presenting information in texts.
12. Sociocultural portrait of the country of the language being studied.
13. Grammar: if condition (type 1, type 2, if condition (type 3), indirect speech, article.
14. Economic, political and cultural characteristics of the countries of the studied language.
15. Features of the climate of the countries of the studied language.

K(R)Ya 1104 Kazakh (Russian) Language – 6 credits

Prerequisites: No.

Postrequisites: Professional Kazakh (Russian) Language.

The purpose of the discipline is to provide high-quality knowledge of Russian in the context of Kazakh national culture as an instrument of social, intercultural, professional and personal communication through the formation of communicative competence in all types of speech activity in accordance with the levels of proficiency in a foreign language on a scale of the Council of Europe (A1, A2 + LSP; B1, B2 + LSP; C1 + LSP).

As a result of studying the discipline, the student is able to:

- to make the right choice and use of language and speech means on the basis of knowledge of a sufficient volume of vocabulary, system of grammatical knowledge, pragmatic means of expressing intentions;
- transfer the factual content of texts, formulate their conceptual information, describe output knowledge (pragmatic focus) of the entire text;
- interpret the information of the text, explain in the volume of certification requirements the style and genre specificity of the texts of the socio-cultural, socio-political, official business and professional areas of communication;
- request and report information in accordance with the situation of communication, evaluate actions and actions of participants, use information as a tool to influence an interlocutor in situations of knowledge and communication in accordance with certification requirements;
- to build programs of speech behavior in situations of personal, social and professional communication in accordance with the norms of language, culture, the specifics of the sphere of communication, certification requirements;

- to discuss ethical, cultural, socially significant problems in the discussions, to express their point of view, to defend it reasonably, to critically evaluate the opinion of interlocutors;
- participate in communication in various situations of different areas of communication in order to realize their own intentions and needs (everyday, educational, social, cultural), declaring about them ethically correctly, meaningfully complete, lexico-grammatically and pragmatically adequate to the situation;
- compile household, socio-cultural, and official business texts in accordance with generally accepted standards and functional orientation, using adequate lexical-grammatical and pragmatic material of a certain certification level.

Topics covered:

1. The content of the educational program level A1.
2. The content of the educational program level A2.
3. The content of the educational program level B1.
4. The content of the educational program level B2 + LSP.
5. The content of the educational program of level C1.
6. The content of the educational program of the level - CALP –cognitive academic proficiency in the language.

KT1105 Information and Communication Technologies – 3 credits

Prerequisites: Advanced Mathematics; Physics.

Postrequisites: Statistical methods in ecology; Mathematical modeling in ecology.

The purpose of the discipline - Forming the ability to critically evaluate and analyze the processes, methods of searching, storing and processing information, methods of collecting and transmitting information through digital technologies.

As a result of studying the discipline, the student is able to:

- explain the purpose, content and development trends of information and communication technologies (ICT), justify the choice of the most appropriate technology to solve specific problems;
- explain the methods of collecting, storing and processing information, how to implement information and communication processes;
- describe the architecture of computer systems and networks, the purpose and functions of the main components;

- use information internet resources, cloud and mobile services for searching, storing, processing and distributing information;
- use software and hardware of computer systems and networks for collecting, transmitting, processing and storing data;
- analyze and justify the choice of methods and means of protecting information;
- using digital technologies to develop data analysis and data management tools for various activities;
- carry out project activities in the specialty with the use of modern ICT.

Topics covered:

1. The role of ICT in key sectors of social development. ICT standards.
2. Introduction to computer systems. Computer systems architecture.
3. Software. Operating Systems.
4. Human-computer interaction.
5. Database systems.
6. Data analysis. Data management.
7. Networks and telecommunications.
8. Cybersecurity.
9. Internet technology.
10. Cloud and mobile technologies.
11. Multimedia technology.
12. Smart technology.
13. E-technology. E-business. E-learning. E-government.
14. Information technology in the professional field. Industrial ICT.
15. Prospects for ICT development.

ELECTIVE COMPONENT (EC) – 8 credits

Module of social and political knowledge – 4 credits

General cultural competences:

- knowledge of social and ethical values based on social and legal norms and tolerance to various cultural and confessional traditions;
- knowledge of the basic laws of the functioning and development of nature and society, the ability to adequately navigate in various socio-economic, political and emergency situations;
- ability to perceive, analyze, summarize information, set goals and choose ways to achieve it.

Learning outcomes focused on the Dublin descriptors:

A1. Understand the main stages of the modern history of Kazakhstan.

D1. To be ready for independent creative activity, cooperation, to use practical skills that ensure the preservation and strengthening of health, the development and improvement of psychophysical abilities and qualities.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

Soc2110 Sociology – 2 credits

Prerequisites: Modern history of Kazakhstan; Philosophy.

Postrequisites: Urbanistics; Environmental economics.

The purpose of the discipline is formation of sociological thinking and imagination of the dynamic social world in which we live, as well as in the formation of critical thinking and analysis of modern societies, their social structures, systems and institutions.

As a result of studying the discipline, the student is able to:

- to determine the objects of the study of sociology (society, social organizations, social groups, individuals, etc.) to explain the social reality;
- explain key sociological ideas and theories;
- describe the social structure and stratification of society, distinguish and analyze the degree of social inequality;
- to reveal the mechanism of formation of public opinion and consciousness in society;
- analyze the characteristics of social institutions in the modernization of kazakhstani society;
- understand the interaction of social processes at the micro and macro levels, taking advantage of the sociological perspective;
- justify the strategy of sociological research and methods of collecting and analyzing information in the professional sphere;
- apply a sociological methodology to the study of contemporary problems of society, including environmental.

Topics covered:

1. Sociology in understanding the social world.
2. Introduction to sociological theory.
3. Social structure and stratification.
4. Socialization and identity.
5. Mass media, technology and society.
6. Sociology of ethnicity and nation.

7. Religion, culture and society.
8. Education and social inequality.
9. Family and modernity.
10. Deviation, crime and social control.
11. Economy, globalization and labor.
12. Health, medicine and ecology.
13. Population, urbanization and social movements.
14. Sociological studies, incl. in ecology.
15. Social change: the latest sociological debate.

Pol2111 Political science – 2 credits

Prerequisites: Modern history of Kazakhstan; Philosophy.

Postrequisites: Urbanistics; Environmental economics; Fundamentals of environmental law.

The purpose of the discipline - The study of the laws of formation and functioning of politics, preparing students for participation in the political life of the country, the formation of an active citizenship.

As a result of studying the discipline, the student is able to:

- describe the features of the organization and functioning of political institutions (institutions of representation and coordination of interests);
- demonstrate an understanding of the mechanisms and principles of the functioning of political power, political institutions, domestic, foreign, world politics and international relations;
- understand the patterns of functioning and development of the policy, its role in various spheres of society, including environmental policy;
- justify the relationship of political systems and political regimes;
- to assess the degree of objectivity of political information from various sources, to argue with conviction to express their citizenship, to evaluate facts, events, phenomena based on the analysis of the political strategy and national interests of modern states;

- justify the leading role of identity (national, civil) as a factor in ensuring the national security of the Republic of Kazakhstan;
- identify the nature of sociopolitical conflicts and assess their legitimacy;
- generate new ideas and apply to a changing political reality.

Topics covered:

1. Politics in the structure of public life.
2. Power as a political institution.
3. Subjects of policy.
4. The rule of law and civil society.
5. The specificity of political parties, party systems and socio-political movements and organizations.
6. Political systems of the present.
7. Political regimes in modern political science.
8. Political culture and behavior.
9. Political ideology and national consciousness.
10. National interests and national security, incl. environmental Safety.
11. Political development and modernization, the formation of environmental policy.
12. Conflict and crisis situations in politics.
13. World politics and modern international relations.
14. Sovereign Kazakhstan in the system of international relations.
15. The third modernization in the Republic of Kazakhstan.

Cultural heritage and interpersonal communication module – 4 credits

General cultural competences:

- knowledge of social and ethical values based on social and legal norms and tolerance to various cultural and confessional traditions;
- knowledge of the basic laws of the functioning and development of nature and society, the ability to adequately navigate in various socio-economic, political and emergency situations;
- the ability to perceive, analyze, summarize information, set goals and choose ways to achieve it.

Learning outcomes focused on the Dublin descriptors:

A1. Understand the main stages of the modern history of Kazakhstan.

D1. To be ready for independent creative activity, cooperation, to use practical skills that ensure the preservation and strengthening of health, the development and improvement of psychophysical abilities and qualities.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

Cul2114 Cultural science – 2 credits

Prerequisites: Modern history of Kazakhstan; Sociology; Political science.

Postrequisites: Urbanistics.

The purpose of the discipline is to form undergraduate students an understanding of the specifics of the development of domestic culture in the context of world culture and civilization, the need to preserve the cultural code of the Kazakh people, and

the ability to pursue the cultural heritage of the Kazakh people in a dynamically changing multicultural world and society in independent professional activity.

As a result of studying the discipline, the student is able to:

- describe the morphology and anatomy of culture as a system of parameters and forms in contexts: nature, man, society;
- explain the origin and essence of signs, values, archetypes, symbols as a system of cultural code through correlation with the type of material culture, a certain way of being;
- streamline information about the cultural heritage of the inhabitants of Kazakhstan and determine the channels of their influence on the development of the culture of the Kazakh people;
- to classify the cultural capital of the Turks, to streamline the forms and channels of cultural interaction with the peoples of Western Europe, the Middle East, to identify their contribution to the intellectual and cultural history of humanity and the Kazakh people;
- reasonably and reasonably provide information about the various stages of development of Kazakh culture as a factor in the preservation of cultural heritage and the Kazakh language, including modern state programs for its development and modernization;
- give an objective assessment of the national cultural heritage from the standpoint of maintaining the status of the Kazakh culture, the Kazakh language and their role in shaping the cultural and national identity;
- assess the state of modern Kazakh culture, identify and substantiate the prospects for its development and the direction of modernization; to build programs of professional activities with regard to cultural specificities;
- to objectively evaluate the cultural policy of Kazakhstan and, on its basis, build inter-ethnic and intercultural communications taking into account cultural specifics, enter into a discussion on cultural issues, reasonably defend one's opinion, including on environmental culture.

Topics covered:

1. Morphology of culture. The concept and essence of culture.
2. Semiotics culture.
3. The language of culture.
4. Anatomy of culture.

5. Space and forms of culture.
6. Cultural heritage of the inhabitants of Kazakhstan.
7. Culture of nomads of Kazakhstan.
8. Cultural heritage of the Turks of Kazakhstan.
9. Medieval culture of Central Asia.
10. Cultural heritage of the Kazakh people.
11. The formation of the Kazakh culture.
12. Kazakh culture at the turn of the XVIII - the end of the nineteenth centuries.
13. Kazakh culture of the twentieth century.
14. Kazakh culture in the context of modern world processes.
15. Cultural policy of Kazakhstan, including environmental.

Psy2115 Psychology – 2 credits

Prerequisites: Modern history of Kazakhstan.

Postrequisites: Ecosystem services.

The purpose of the discipline is to form the students' social, personal, and instrumental competence in the field of psychological theory and practice of interpersonal communication, necessary in professional activities.

As a result of studying the discipline, the student is able to:

- understand the role and place of psychological knowledge in the system of human sciences, its relationship with nature;
- describe the concepts of personality and interpersonal communication in the context of the formation and modernization of the national consciousness;
- analyze the value-semantic structure of the individual and highlight the main priorities for the purpose of self-determination and personal growth in the framework of the modernization of consciousness;
- use psychological knowledge for career planning and building a professional path;
- Assess their own psychological qualities, resources and capabilities;
- justify the value and place of interpersonal communication as a factor in the development of a harmonious personality;

- develop your own strategies for effective interpersonal communication, use the skills of stress management and time management, self-presentation skills to improve personal and professional effectiveness;
- apply different strategies for resolving conflict situations in personal and professional interaction.

Topics covered:

1. Psychology of personality and its role in the system of human sciences, its interrelation with nature.
2. Motivational-need sphere of personality.
3. Emotions and emotional intelligence.
4. Volitional processes and the psychology of self-regulation.
5. Temperament and character.
6. Values, interests, norms as the spiritual basis of personality.
7. Psychology of the meaning of life and professional self-determination.
8. Psychology of career growth.
9. Psychology of communication.
10. Perceptual side of communication.
11. Interactive side of communication.
12. The communicative side of communication.
13. The concept and structure of the socio-psychological conflict.
14. Models of individual behavior in conflict.
15. Techniques and techniques for effective communication.

Human and environment Module- 4 credits

Professional competencies:

- understand the ecological terminology and nomenclature;
- application of the principles and objectives of sustainable development to address situations of global, regional and local levels;

- identify ways and means of reducing environmental risk to an acceptable level, basic measures to eliminate the consequences of accidents and disasters;
- use the methods of organization and planning of scientific research, search for scientific information, principles for determining the permissible errors of laboratory experiments.

Learning outcomes focused on the Dublin descriptors:

A3. Use basic knowledge in the field of theoretical and applied ecology.

B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management.

C3. To critically evaluate world experience in the field of energy and resource conservation and monitor the implementation of established environmental management standards.

D1. To be ready for independent creative activity, cooperation, to use practical skills that ensure the preservation and strengthening of health, the development and improvement of psychophysical abilities and qualities.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

GVChYR2106 Global environmental challenges and Sustainable Development Goals (SDGs) – 2 credits

Prerequisites: Environmental aspects of natural science.

Postrequisites: Environmental chemistry, Environmental biogeography, Environmental Impact Assessment (EIA), Environmental monitoring.

The purpose of the discipline is formation of students' knowledge about the essence of the global problems of modernity and the goals of sustainable development.

As a result of studying the discipline, the student is able to:

- discuss the important issues facing sustainable development from the perspective of the UN Sustainable Development Goals (SDGs);
- link SDGs with a range of global environmental issues;
- demonstrate a deep understanding of the challenges associated with achieving sustainable development;
- analyze the complex interrelationships between human well-being, poverty and the environment, including the causes of investigative relationships at various scales from local to global and the resolution of issues within the broader debate around sustainability;
- understand, evaluate and critically analyze various approaches related to various disciplines and prospects for the development of social and natural sciences, to the question of human needs and ecology.

Topics covered:

1. Introduction to the module: understanding sustainability - an introduction to a new and challenged idea.
2. SDGs: Poverty and hunger. Link to resource management, climate resilience, agricultural productivity.
3. SDGs: Health, well-being and education. Reference to water quality and pollution control.
4. SDGs: Gender Equality. Link to resource usage and access rights.
5. SDGs: Water and sanitation. Relationship to water quality, pollution of aquatic ecosystems.
6. SDGs: Energy.
7. SDGs: Work and Economic Growth.
8. SDGs Industry, Innovation and Infrastructure.
9. Reducing inequality.
10. SDGs: Sustainable cities.
11. SDGs: Responsible consumption and production.

12. SDGs: Climate Action.
13. SDGs: Life Under Water.
14. SDGs: Life on Earth.
15. SDGs: Peace, justice and partnership.

BGChYES2107 Human Life Safety and Management of extreme situations – 2 credits

Prerequisites: Environmental aspects of natural science; Environment and Sustainable Development (introduction to the specialty).

Postrequisites: Environmental security; Introduction to ecotoxicology; Environmental risk assessment.

The purpose of the discipline is formation of students' knowledge of the theoretical and practical foundations of human security from dangerous, harmful environmental factors.

As a result of studying the discipline, the student is able to:

- demonstrate the knowledge gained about the legal and regulatory and technical foundations of life safety, how to provide first aid to victims;
- to identify and analyze dangerous, harmful factors of the human environment;
- apply methods of forecasting emergency situations and liquidation of their consequences, as well as various means of individual and collective protection;
- to analyze the results of the study course, summarize them in the form of a presentation of an individual case study;
- assess legally relevant circumstances and classify legal facts of environmental legislation;
- logically competently express and prove their point of view on environmental legal issues;
- assess the anthropogenic impact of production on the environment;
- use this knowledge to form a conscious and responsible attitude towards personal safety and the safety of others.

Topics covered:

1. Introduction. The subject and objectives of the discipline.
2. Legislative and legal acts in the field of life safety.

3. Objectives, principles of construction and functioning of civil defense (CD) in the Republic of Kazakhstan.
4. Classification of dangerous and harmful factors.
5. Radiation hazard.
6. Basic principles of radiation safety.
7. Classification of chemically hazardous objects.
8. Protection of humans and the environment from harmful and dangerous factors of natural and man-made origin.
9. Classification of emergency situations of a different nature.
10. The stability of the functioning of objects of economy in emergency situations.
11. Basic principles and methods of protection of the population in emergency situations.
12. Protection against weapons of mass destruction.
13. Organizational - practical security measures for earthquakes.
14. Protection of the population during natural disasters, fires, accidents and explosions at production facilities.
15. Fundamentals of the organization and conduct of rescue.

Geographical module – 4 credits

General cultural competencies:

- describe the main stages of the evolution of the biosphere and its specific features; the main links of the small biological and large geological cycles of substances;
- application of the principles and objectives of sustainable development to address situations of global, regional and local levels;
- use geosystem analysis and bio-geographic data to assess resource potential, environmental management and biodiversity conservation.

Learning outcomes focused on the Dublin descriptors:

- A3. Use basic knowledge in the field of theoretical and applied ecology.
- B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management.

C2. Predict ecosystem adaptation to climate change for the purpose of integrated management of natural resources.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

ESGK2108 Economic and social geography of Kazakhstan – 2 credits

Prerequisites: Modern history of Kazakhstan.

Postrequisites: Land management; Water resources management; Sustainable Resource extraction; Resource Management; Environmental economics.

The purpose of the discipline is formation of students' knowledge about the socio-economic potential of modern Kazakhstan, the state system, the economy of Kazakhstan from antiquity to sovereignty, size and natural population growth, demographic policy, labor resources of the Republic of Kazakhstan.

As a result of studying the discipline, the student is able to:

- understand the economy of Kazakhstan: past, present, future, economic potential of modern Kazakhstan, the state system, the economy of Kazakhstan from antiquity to sovereignty.
- refer number and natural increase of the population, natural movement of the population, demographic policy, labor resources and the main problems of the population of the Republic of Kazakhstan;
- explain and analyze economic and geographic information, use theoretical knowledge in practice;

- conduct an economic assessment of natural resources;
- apply the cartographic method in geographic research.

Topics covered:

1. Introduction. General information about the Republic of Kazakhstan.
2. Brief description of the economy and geography of the population of the Republic of Kazakhstan.
3. The development of the mining industry of Kazakhstan.
4. Water resources of the Republic of Kazakhstan.
5. Geography of ferrous metallurgy of Kazakhstan.
6. Geography of non-ferrous metallurgy of Kazakhstan.
7. Geography of the oil and gas industry.
8. Geography of the chemical industry.
9. Geography of mechanical engineering of the Republic of Kazakhstan.
10. Geography of light industry.
11. Geography of the food industry.
12. Geography of the agricultural industry of the Republic of Kazakhstan.
13. Geography of transport of the Republic of Kazakhstan.
14. Geography of transport of the Republic of Kazakhstan.
15. Foreign economic activity of Kazakhstan.

EGK2109 Environmental geosystems of Kazakhstan – 2 credits

Prerequisites: Modern history of Kazakhstan.

Postrequisites: Land management; Water resources management; Sustainable Resource extraction; Resource Management; Environmental economics.

The purpose of the discipline is formation of students' knowledge about the nature and fundamental principles of the ecology of geosystems, the scientific foundations of scientific concepts and components of environmental protection.

As a result of studying the discipline, the student is able to:

- calculate the conditions of human adaptation to the background of disturbed geosystems;
- justify the environmental consequences of the influence of anthropogenesis on geosystems;
- possess information about the current geo-ecological situation in the country;
- acquire skills in the organization of geo-environmental monitoring.

Topics covered:

1. Introduction. The subject and tasks of the discipline “Ecology of geosystems”.
2. Fundamentals of general ecology.
3. Theoretical and methodological foundations of the ecology of geosystems.
4. Environmental factors and their interaction in geosystems.
5. Anthropogenesis and the environment of Kazakhstan.
6. Ecological consequences of anthropogenesis in Kazakhstan.
7. Ecological properties of the natural environment of Kazakhstan.
8. Landscape-geographical bases of ecological stabilization of the environment.
9. Geoecological forecasting and expertise.
10. Geoecological mapping.
11. Geoecological zoning of Kazakhstan.
12. Geoecological problems of Kazakhstan.
13. Geoecological education and upbringing.
14. Specially Protected Natural Territories of Kazakhstan.
15. International cooperation in solving problems of nature conservation.

CORE DISCIPLINES – 69 credits

OBLIGATORY COMPONENT (OC) – 20 credits

Environmental and natural sciences Module – 5 credits

Professional competencies:

- understand the ecological terminology and nomenclature;
- apply knowledge of the nature of the main physico-chemical processes occurring in the atmosphere, hydrosphere and lithosphere;
- explain ways to reduce anthropogenic impact leading to climate change and the destruction of the ozone layer of the Earth;
- use the methods of organization and planning of scientific research, search for scientific information, principles for determining the permissible errors of laboratory experiments.

Learning outcomes focused on the Dublin descriptors:

A2. Interpret the basic concepts and laws of physics, chemistry, mathematics.

B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management;

C1. Conduct an experiment using physico-chemical methods to assess the state of the Environment.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

EAE1203 Environmental aspects of natural science – 2 credits

Prerequisites: on the basis of school education

Postrequisites: Environmental impact of Industrial processes; Introduction to ecotoxicology; Environment and Humans.

The purpose of the discipline is formation of basic environmental thinking among students, ensuring a systematic approach to the study of the biological, chemical and physical environment, the definition and control of the state of the biosphere (its ecosystems) and the prevention of negative environmental situations.

As a result of studying the discipline, the student will be able to:

- justify theoretical approaches to the study of ecological and economic systems;
- understand the conditions and mechanisms of global biotic regulation (cycle) of the environment;
- explain the mechanisms of the impact of harmful and dangerous factors of production and the environment on human health;
- interpret and evaluate the results of learning in the context of the discipline "Environmental Aspects of Natural Science"
- summarize and be able to conduct a logical discussion on topics related to the solution of environmental problems.

Topics covered:

1. Biogeochemical processes in the biosphere.
2. Ecological aspects of biology.
3. Biological ecology.
4. Ecological aspects of chemistry.
5. Chemical ecology.
6. Chemistry of pollutants in the environment.
7. Ecological aspects of physics.
8. Physical ecology.
9. Energy Flows in the Biosphere.
10. Fuel and energy resources of the Earth.
11. Electromagnetic fields, sources and biological action.

12. Radiation ecology.
13. Global Energy-Ecological Strategy for Sustainable Development of the XXIth Century.
14. Low carbon development and green economy.
15. Global Partnership for Sustainable Development.

Eh2204 Environmental chemistry – 3 credits

Prerequisites: Environment and Sustainable Development (introduction to the specialty); Environmental aspects of natural science.

Postrequisites: Soil Science; Environmental monitoring ; Методы и модели управления отходами.

The purpose of the discipline is formation of the student's knowledge about the patterns of accumulations, distributions and sources of release into the environment; about the features of physical and chemical transformations in the lithosphere, atmosphere and hydrosphere with compounds of anthropogenic origin, leading to modern environmental problems and the chemistry of global processes in the biosphere.

As a result of studying the discipline, the student is able to:

- have knowledge of the physicochemical processes occurring in the atmosphere, hydrosphere and soil layer, about the features of the distribution, transformation and accumulation of pollutants in the environment;
- explain the main cycles of migration of chemical elements, the anthropogenic impact on equilibrium in nature and the chemistry of global processes in the biosphere;
- identify the causes and sources of global environmental problems (the formation of acid rain, photochemical smog, causes of water blooming, the destruction of the ozone layer) based on the quality indicators of environmental objects;
- determine the nature of the interaction of the human body with the hazards of the environment, taking into account the specific mechanism of the toxic action of harmful substances;
- carry out statistical and settlement-graphic processing of the results of qualitative and quantitative analysis.

Topics covered:

1. Introduction: The subject and tasks of environmental chemistry. Basic concepts and definitions.

2. Chemical basis of environmental interactions.
3. The chemical stage of the evolution of the biosphere.
4. Chemical elements in the biosphere.
5. Toxicants of the environment. Toxicity.
6. Inorganic toxicants.
7. Chemical processes in the atmosphere. Transformations of pollutants in the troposphere.
8. Nitrogen compounds in the troposphere.
9. Photochemical smog in an urban atmosphere. Methane.
10. Transformation of sulfur compounds in the troposphere.
11. Dispersed systems in the atmosphere. Aerosols.
12. Photochemical processes in the ionosphere. The problem of ozone holes.
13. Ecological chemistry of the hydrosphere.
14. Chemistry of the lithosphere. Hypergenesis and soil formation.
15. Environmental chemistry of the lithosphere.

Biosphere Ecology Module – 11 credits

Professional competencies:

- understand the environmental terminology and nomenclature;
- to determine the factors of desertification, the optimal parameters of fertility, using studies of the hydrological, physicochemical, biological and other properties of the soil to select the best methods of recultivation;
- apply geosystem analysis and bio-geographic data to assess resource potential, environmental management and biodiversity conservation;
- use the methods of organizing and planning research, searching for scientific information, the principles for determining the permissible errors of laboratory experiments.

Learning outcomes focused on the Dublin descriptors:

A3. Use basic knowledge in the field of theoretical and applied ecology.

B5. Conduct laboratory and field research, evaluate the accuracy and reliability of the results of experiments.

C1. Conduct an experiment using physico-chemical methods to assess the state of the Environment.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

EB2205 Environmental biogeography – 3 credits

Prerequisites: Ecology of animals and plants; Global environmental challenges and Sustainable Development Goals.

Postrequisites: Soil science; Land management; Water resources management Sustainable Resource extraction.

The purpose of the discipline is formation of students' knowledge of the factors that determine the patterns of formation of biocenoses, the basic patterns of distribution of the plant and animal world of the planet and the structure of the spatial distribution of biota components.

As a result of studying the discipline, the student is able to:

- remember biogeographic zones;
- justify the allocation of these zones;
- analyze the similarities and differences between the fauna and flora of a given territory;
- explain the causes of endemism of certain species;

– evaluate biodiversity in specific geographic landscapes.

Topics covered:

1. Characteristics of biogeography as a special branch of knowledge, theoretical and practical application of biogeographic knowledge. Goals, objectives, achievements and problems of biogeography. The history of the study of the flora and fauna of Kazakhstan.
2. General idea of the biosphere - the living shell of the Earth. The history of the development of life on Earth, continental drift and orogenesis. Geochronological scale.
3. The main environmental laws that limit the spread of organisms. Adaptation and tolerance of organisms to various biotic and abiotic environmental factors.
4. The distribution of organisms in the oceans. The main environment factors that determine the patterns of distribution of organisms in the aquatic environment.
5. Vertical zonality of the distribution of organisms in the oceans and on land.
6. Characteristics and location of the Earth's biomes.
7. Floristic and faunistic territories. “Hot spots” of biological diversity.
8. Botanical and zoological zoning. Zoogeographical map.
9. Biogeographical characteristics of North America: zoogeographic kingdoms, regions and districts.
10. Biogeographical characteristics of South America: zoogeographic kingdoms, regions and districts.
11. Biogeographical characteristics of Africa: zoogeographic kingdoms, regions and districts.
12. Biogeographical characteristics of Europe: zoogeographic kingdoms, regions and districts.
13. Biogeographical characteristics of Asia: zoogeographic kingdoms, regions and districts.
14. Biogeographical characteristics of Australia: zoogeographic kingdoms, regions and districts.
15. Biogeographical characteristics of islands: similarities and differences with continental biodiversity.

P3206 Soil science – 4 credits

Prerequisites: Environmental aspects of natural science; Environmental chemistry; Ecology of animals and plants (systems ecology); Environment and Humans.

Postrequisites: Environmental regulation and governance; Environmental management system; Land management.

The purpose of the discipline is formation of fundamental knowledge among students about a special envelope of the Earth - the soil, as a natural body, its formation, properties and modes, evolution; the study of environmental factors of soil formation, the role of soil in nature and human activities, ways of rational use of soil resources.

As a result of studying the discipline, the student is able to:

- determine the optimal parameters of fertility, using data from research methods of physical, hydrological, chemical, physicochemical, biological and other properties of various types of soil;
- explain the causes of soil degradation associated with natural and anthropogenic impacts and describe the measures applied for their restoration and protection;
- describe the morphological structure of the soil profile and the structure of the soil cover with the definition of soil types according to diagnostic features and accepted classification and nomenclature;
- identify the features of the soil cover in the regions of Kazakhstan, using the mechanism of soil formation depending on the interaction of soil formation factors;
- substantiate the mutual influence of environmental factors on the processes of soil formation and the formation of fertility in natural and climatic zones;
- develop and substantiate the choice of a strategy of land reclamation, protection and rational use of soil resources in the national economy (rural, forest, water, etc.), using the methods of cameral, cartographic, field, remote, laboratory, stationary and other studies;
- analyze the characteristics of the ecological state of the soil cover of one of the regions of Kazakhstan (at the student's choice).

Topics covered:

1. Rocks and minerals, weathering and soil formation.
2. Soil formation process and environmental factors of soil formation, their influence on soil formation.
3. The granulometric and mineralogical composition of the soil.
4. The chemical composition of soil and soil-forming rocks.
5. Organic soil.

6. Soil Absorption and Soil Colloids.
7. Physical properties of the soil.
8. Soil moisture, water properties and soil water regime.
9. Soil air and soil air regime.
10. Thermal properties and thermal regime of soils. Power of soil formation.
11. Soil solution, pH and redox processes in the soil, their influence on the food regime.
12. Soil fertility.
13. Morphological features and diagnostic indicators, classification and systematics of soils. Geographical patterns of distribution of soil cover.
14. The main laws of the geographical distribution of soils and soil-geographical zoning of the territory of the CIS and the world.
15. Soils of the plain territory and mountain areas of Kazakhstan, ecological conditions of their formation and use.

EZhR2207 Ecology of animals and plants (systems ecology) – 4 credits

Prerequisites: Environment and Sustainable Development (introduction to the specialty); Educational Internship (Introductory).

Postrequisites: Environmental biogeography; Soil science; Biodiversity conservation; Practice Training (field practice).

The purpose of the discipline is to form a student's holistic view of the unity of living matter and the peculiarities of interaction with the environment of organisms of various groups, dietary habits, self-reproduction (reproduction) and resettlement of pre-cellular and cellular organisms, evolution principles that determine the diversity of the animal and plant world and lead to biocenoses.

As a result of studying the discipline, the student is able to:

- according to the most common characteristics, to determine the systematic affiliation of representatives of taxa of the largest ranks of plants and animals;
- classify samples of plants or animals in order to keep them suitable for further scientific processing;
- analyze the features of the external structure in connection with the habitat conditions;

- apply the knowledge gained to explain the interactions of organisms;
- assess the total diversity of organisms in a particular locality;
- determine the scope of application of own data in the field of plant and animal ecology.

Topics covered:

1. Levels of organization of living matter. General patterns of interaction between the organism and the environment. View as a form of animal and plant existence.
2. Geochronological scale. The origin and evolution of biological diversity. General characteristics of prokaryotes. The main taxonomic groups.
3. A variety of photo producers. The kingdom of plants as a polyphilic group. The study of the simplest as objects of botany and zoology. General characteristics of the simplest types.
4. Diversity and environmental groups of algae.
5. Features of existence in the terrestrial environment. Adaptation of plants to life on land: the emergence of specialized tissues, alternation of generations. General characteristics and evolution of land plants.
6. General characteristics and systematics of gymnosperms.
7. General characteristics and systematics of angiosperms.
8. General characteristics and systematics of animals (up to types). Features of the structure and variety of animal cells. The general characteristics and conditions of existence of multicellular animals are sponges, intestinal cavities.
9. Classification, diversity and ecological groups of worms.
10. General characteristics, variety and structure of echinoderms and mollusks.
11. General characteristics, diversity and structure of arthropods.
12. The origin, evolution and systematics of chordates.
13. Features of the structure of primary animals. General characteristics and diversity of amphibians.
14. Features of the structure and diversity of reptiles and birds.
15. Features of the structure and diversity of mammals.

Professional Language Module – 4 credits

General cultural competencies:

- competent use of linguistic and cultural linguistic knowledge for solving communication problems in a multilingual and multicultural society of the Republic of Kazakhstan and in the international arena;
- willingness to cooperate with colleagues, work in a team;

Professional competencies:

- preparation of scientific and technical documentation

Learning outcomes focused on the Dublin descriptors:

A2. Interpret the basic concepts and laws of physics, chemistry, mathematics.

A3. Use basic knowledge in the field of theoretical and applied ecology.

B 2. Master the methods of collecting and statistical analysis of environmental information; computer literacy.

C1. Conduct an experiment using physico-chemical methods to assess the state of the Environment.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

PK (R) Ya2201 Professional Kazakh (Russian) Language – 2 credits

Prerequisites: Kazakh (Russian) Language.

Postrequisites: Core and Major disciplines.

The purpose of the discipline is to form Foreign Language students' skills and techniques of effective speech interaction in various situations of communication, the formation of grammatical skills and knowledge. Implementation of the main tasks of speech models and relative types at various levels of learning the state language.

As a result of studying the discipline, the student is able to:

- know the orthoepic, orthographic, stylistic norms of the Russian / Kazakh language;
- understand the features of professional oral scientific speech;
- determine the features of professional written scientific speech;
- justify the strategy and tactics of speech communication in the field of professional interaction;
- be able to speak with an oral message;
- to build oral and written statements in different communicative situations;
- understand and analyze the structural and semantic organization of a scientific text;
- perform various operations with the text: describe, summarize information;
- master the technology of interpretation and analysis of the texts of scientific literature in the specialty.

Topics covered:

1. Professional written speech as the basis for the formation of subject-language material.
2. Professional language in ecology and its components.
3. Teaching the scientific style of speech as an ecology specialty language. Biosphere and man.
4. Communication professional Russian language with the disciplines of the specialty ecology. About scientific research methods in ecology. Ecology of ecosystems.
5. Professional terminology as the main feature of the scientific style. The main sections of ecology. Organism and environment. Basic terms, nomenclature names and professionalism.

6. Definition of the term. The structure of the dictionary entry. Characteristics of terminology dictionaries specialty ecology.
7. The role of terms in the definition of "special language". The main ways of forming terms.
8. Work with scientific texts in the specialty ecology. Definition of meta-information. Types of information in a text document on the content, in function, in form.
9. The structure of research work in the specialty profile. Natural resources and environmental management. The composition of the scientific text.
10. Legislation of the Republic of Kazakhstan in the field of environmental protection. Official business texts and their varieties: legislative, administrative and clerical. Environmental problems of Kazakhstan.
11. Communication as a mechanism of interaction and speech influence in the business sphere. Prospects for sustainable development of the Republic of Kazakhstan.
12. The main types of communication skills of people in the professional field. The current state of energy in Kazakhstan. Analysis of the energy development strategy in the Republic of Kazakhstan.
13. Communicative space of speech personality in the professional picture of the world. Ecological and economic strategy to overcome the environmental crisis. Language (speech) portrait of the scientist - ecologist.
14. Rules for the presentation and presentations. Environmental problems of the environment of Kazakhstan. Secondary genres of scientific speech as presentation genres.
15. Protective word as a form of presentation of communication projects, term papers and final qualifying (theses) works.

POIYa2202 Professionally Oriented Foreign Language – 2 credits

Prerequisites: Foreign Language.

Postrequisites: Core and Major disciplines.

The purpose of the discipline is formation of a foreign language professionally oriented communicative competence of students, allowing them to integrate into the international professional environment and use the professional oriental language as a means of intercultural and professional communication.

As a result of studying the discipline, the student is able to:

- master the functional features of oral and written professional-oriented texts;

- possess strategies of communicative behavior in situations of international professional communication;
- understand oral (monologue, dialogical) speech within professional topics;
- participate in the discussion of topics related to the specialty;
- independently prepare and make oral reports on professional topics, including those using multimedia technologies;
- extract the necessary information from sources in a foreign language created in different sign systems (text, table, graph, diagram, audiovisual series, etc.) in typical situations of professional and business communication.

Topics covered:

1. Introduction to ecology. Ways of term formation.
2. The interaction of the organism and the environment. Populations and communities. The times of the group Indefinite, Perfect, Continuous. (Present / Past Perfect Continuous; Future Perfect).
3. Ecological systems. The structure of a simple sentence.
4. Biosphere and its evolution. Noosphere. Structure of complex sentence.
5. Social ecology. Direct and indirect speech.
6. Problems of environmental pollution. Passive voice.
7. Environmental protection and rational environmental management. Agreeing the times.
8. Basics of environmental law.
9. Ecology and economy.
10. International cooperation to address global and regional environmental issues.

STEM- Module – 9 credits

Professional competencies:

- apply knowledge of the nature of the main physico-chemical processes occurring in the atmosphere, hydrosphere and lithosphere;
- to carry out monitoring of the biosphere using innovative methods, such as: satellite observations, GIS technology, bioindication, biotesting, ecostatistical analysis and others;

- analyze environmental and socio-economic problems using the methods of system analysis and mathematical modeling in solving professional problems.

Learning outcomes focused on the Dublin descriptors:

A2. Interpret the basic concepts and laws of physics, chemistry, mathematics.

B2. Master the methods of collecting and statistical analysis of environmental information; computer literacy.

C1. Conduct an experiment using physico-chemical methods to assess the state of the Environment.

Methods for evaluating the results achieved:

– Oral survey: interview, colloquium, exam;

– Written works: test, test, essay, MidTerm, exam;

– Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;

– Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

– Criterion assessment is used to determine the degree of formation of competencies;

– Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

VM1208 Advanced Mathematics – 3 credits

Prerequisites: Skills acquired in the volume of the school curriculum.

Postrequisites: Environmental GIS; Statistical methods in ecology.

The purpose of the discipline is to form the basis for students of mathematical analysis, analytical geometry and linear algebra, which are necessary for the study of special disciplines.

As a result of studying the discipline, the student is able to:

– apply the mathematical apparatus to the solution of typical problems of ecology;

- explain the basic fundamental concepts of higher mathematics, namely: basic definitions, theorems, rules, methods and formulas of linear algebra; analytical geometry and vector algebra, the theory of limits and the basis of calculus; integral theory; theory of functions of several variables; ordinary differential equations;
- assert and prove the main theorems related to the above concepts; analyze the application of mathematical theory in different situations and compare the results obtained;
- provide written explanations of the ideas underlying the key concepts of this course;
- clearly present and explain the solution of tasks both in writing and orally;
- apply a mathematical apparatus for solving theoretical and applied problems;
- evaluate the correctness of the application of a particular approach to solving the problem;
- work with special literature.

Topics covered:

1. Matrices and operations on them. Determinants of the 2nd and 3rd order.
2. The concept of the rank of the matrix. Elementary transformations over matrices. Inverse matrix. Calculation of the inverse matrix.
3. The system of linear equations. Cramer's rule. Gauss-Jordan method. Matrix method for solving systems of equations.
4. The concept of vector linear operations with vectors. Linear dependence of vectors. Coordinates of the vector.
5. The simplest problems of analytic geometry. Equation of a curve on a plane. Finding the angle between two lines. The condition of parallelism and perpendicularity of two lines. The distance from the point to the line.
6. The concept of the function and classification of the function. Limit function. Infinitely small value, theorem. 1st and 2nd wonderful limits.
7. Definition of continuity at a point. Properties of continuous functions. The main theorems on continuous functions.
8. The derivative of the function at a point. Derivatives of inverse functions, some rules of differentiation.
9. The use of the differential in approximate calculations. Rule l'Hôpital A necessary and sufficient condition for the extremum of a function. Convexity, concavity of the curve.
10. Definition and properties of indefinite integrals. Integral table. Integration methods: substitution method and integration in parts.

11. A definite integral as the limit of a sum. Properties of a definite integral. Newton-Leibniz formula. Integration methods.
12. The function of several variables. The concept of a partial derivative. Total differential.
13. Extremum function of two variables. Necessary and sufficient conditions of extremum.
14. Differential equations. Basic definitions. Initial state 1st order differential equations. Elements of the qualitative analysis of differential equations of the 1st order. Equations with separated variables.
15. Differential equations of the 2nd order. Homogeneous linear equations of the 2nd order, definitions and some properties.

GIS1208 Environmental GIS – 3 credits

Prerequisites: Advanced Mathematics; Foreign Language; Environment and Sustainable Development (introduction to the specialty).

Postrequisites: Economic and social geography of Kazakhstan; Environmental geosystems of Kazakhstan; Statistical methods in ecology; Environmental management system; Environmental monitoring; Mathematical modeling in ecology.

The purpose of the discipline is to form a holistic view of the students in the field of application of modern geographic information systems in ecology, in assessing, modeling and forecasting the ecological state, mastering modern GIS technologies, their acquisition of practical skills.

As a result of studying the discipline, the student is able to:

- streamline the conceptual concepts of geographic information systems;
- explain the theoretical foundations of modeling in ecology;
- practice basic skills necessary for working with spatial data;
- apply GIS technology to solve problems in the field of ecology;
- make environmental maps.

Topics covered:

1. Introduction to GIS.
2. Fundamentals of geoinformatics and the use of geographic information systems in ecology.
3. Coordinate systems and cartography.

4. Raster and vector geo-information systems in ecology.
5. Creation and editing of the main, thematic layers and working sets of GIS.
6. Create a personal geodatabase in ArcGIS.
7. Analysis of environmental information in GIS.
8. Comparative evaluation of topographic maps of medium and large scale and their nomenclature.
9. Data of remote sensing and their use in the ecology of geographic information systems.
10. Search global databases and solve environmental problems.
11. Geoinformational support for landscape taxation, environmental monitoring of the state of state and main components of ecosystems.
12. Geo-information support in developing solutions to environmental problems.
13. Introduction to the spatial analysis of environmental data: geostatistics.
14. Spatial analysis functions of environmental data.
15. Solving environmental problems using GIS.

Phys1210 Physics – 3 credits

Prerequisites: No.

Postrequisites: Environment and Sustainable Development; Environmental physics; Climate change; Renewable energy; Green technology.

The purpose of the discipline is to form students' understanding of physical phenomena and the laws of physics, the limits of their applicability in the most important practical applications.

As a result of studying the discipline, the student is able to:

- understand various physical models of the world, the limits of applicability of various physical theories, to apply of the laws of physics to explain the phenomena of nature and the processes occurring on Earth, in the depths and in the surrounding space;
- understand the physical phenomena and laws of physics,
- know the basic physical quantities, their definitions, their units of measurement;

- explain the logical links between the sections of the physics course based on the use of innovative educational technologies;
- apply the acquired knowledge and skills to solve practical problems of everyday life, to ensure the safety of their own lives, environmental management and environmental protection.
- independently conduct experimental physical research, processing of results modern technical means.

Topics covered:

1. Elements of kinematics. The reference system. The dynamics of the material point and the translational motion of a solid body.
2. Work and energy. Solid mechanics.
3. Elements of fluid mechanics. Viscosity. The movement of bodies in liquids and gases.
4. Mechanical vibrations and waves. Harmonic vibrations.
5. Molecular-kinetic theory of ideal gases, Statistical and thermodynamic methods.
6. Basics of thermodynamics. Heat capacity. Reversible and irreversible processes. Heat engines and chillers.
7. Real gases and liquids. Van-der-Waals equation. Joule - Thomson effect. Evaporation, sublimation, melting and crystallization.
8. Electrostatics. Gauss theorem.
9. Constant electric current. Power and current density. Emf. Electric current in gases. Types of discharges in gases in the atmosphere. Aurora Borealis.
10. Magnetic field. Ampere's law. The law of Bio-Savara-Laplace. Faraday law of electromagnetic induction.
11. Magnetic properties of matter. Fundamentals of the theory of Maxwell for the electromagnetic field.
12. Geometrical optics. Refraction and reflection of light. Lenses. Interaction of light with matter, Interference and diffraction of light. Rainbow.
13. Solid State Physics. The crystalline structure of solids. Amorphous bodies.
14. Photons and their properties. The structure of the atom. Thomson and Rutherford atoms models.
15. The structure of the atomic nucleus. Mass defect, binding energy and stability of atomic nuclei. Nuclear reactions.

Sustainable development and environmental security Module – 7 credits

Professional competencies:

- describe the main stages of the evolution of the biosphere and its specific features; the main links of the small biological and large geological cycles of substances;
- application of the principles and objectives of sustainable development to address situations of global, regional and local levels;
- carry out calculations to assess the levels of hazardous environmental factors, develop integrated programs for environmental safety;
- use the methods of organization and planning of scientific research, search for scientific information, principles for determining the permissible errors of laboratory experiments.

Learning outcomes focused on the Dublin descriptors:

A2. Interpret the basic concepts and laws of physics, chemistry, mathematics.

A3. Use basic knowledge in the field of theoretical and applied ecology.

B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management.

C1. Conduct an experiment using physico-chemical methods to assess the condition of the Environment.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;

- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

OSYR1211 Environment and Sustainable Development (introduction to the specialty) – 3 credits

Prerequisites: It is based on school education.

Postrequisites: Core and major disciplines.

The purpose of the discipline is to develop in students deep system knowledge about the fundamentals of the sustainable development of society and nature, theoretical and practical knowledge about modern approaches to the rational use of natural resources and environmental protection.

A student should be able to:

- demonstrate the knowledge gained about the basic laws governing the interaction of living organisms with the environment; features of the distribution and dynamics of the number of organisms, community structure and their dynamics; patterns of energy flow through living systems and the circulation of substances, the functioning of ecological systems and the biosphere as a whole;
- justify the basic principles of sustainable development;
- to interpret natural and anthropogenic ecological processes in the environment and possible ways of their regulation;
- analyze current concepts and strategies for sustainable human development;
- summarize and evaluate the results of learning in the context of the discipline "Environment and Sustainable Development", the training module, the content of the MidTerm exam.

Topics covered:

1. Introduction. The subject and objectives of the discipline.
2. Ecology of organisms.
3. Ecology of populations.
4. Ecology of communities.
5. Biosphere and its stability. The evolution of the biosphere. Biosphere and its sustainability. The evolution of the biosphere.

6. The concept of living matter. Modern biosphere.
7. Global biogeochemical cycles.
8. Ecological crisis and problems of modern civilization.
9. Strategy, principles and goals of sustainable development.
10. Ecological principles of sustainable development.
11. Economic aspects of sustainable development. Water management.
12. The global energy-ecological strategy for sustainable development of the twenty-first century.
13. Environmental policy of the Republic of Kazakhstan.
14. Social aspects of sustainable development.
15. Global Partnership for Sustainable Development.

EB2212 Environmental Security – 2 credits

Prerequisites: Environmental aspects of natural science; Environment and Sustainable Development (introduction to the specialty).

Postrequisites: Core and major disciplines.

The purpose of the course is to provide students with knowledge in the field of environmental security of the state as a system of measures to ensure the protection of natural systems, the vital interests of society and individual rights against threats arising from anthropogenic and natural impacts on the environment.

As a result of studying the discipline, the student will be able to:

- use the conceptual apparatus on environmental security in practice;
- identify the current problems of ensuring the environmental security of the environment;
- describe the conditions for preserving the ecological balance with a view to the sustainable development of the country;
- explain ways to reduce anthropogenic impact, leading to climate change and the destruction of the ozone layer of the Earth;
- synthesize knowledge on the conservation of biodiversity and the prevention of desertification and land degradation;

- describe the tasks and measures to ensure the environmental security of the local, regional and global levels;
- assess rehabilitation measures in the areas of ecological disaster, in the regions of water resources pollution and in the air basin;
- evaluate activities to reduce the volume of accumulation of industrial and household waste in order to prevent emergency situations of natural and man-made character;
- carry out activities for the environmental education and development of environmental awareness, the provision of legislation in the field of environmental security.

Topics covered:

1. Introduction. Subject, objectives of the discipline "Environmental Security". Basic concepts and definitions.
2. Environmental risks. Ecological hazard.
3. Global, national, regional levels of implementation of environmental security.
4. Environmental security is part of the national security of the state.
5. Ways of solving problems of environmental security on the example of the Republic of Kazakhstan. Greenhouse effect. A possible climate change scenario from the greenhouse effect. The Montreal and Kyoto protocols.
6. Conservation of biodiversity in the world and Kazakhstan. National strategies and action plans for the conservation and balanced use of biological diversity. Combating Desertification.
7. Development and placement of specially protected natural areas: reserves, national parks, bioservants. Red Book.
8. Sustainable development - the paradigm of the development of the twenty-first century. RIO92 and RIO + 20 on an environmentally sound future.
9. Radiation, chemical, biological and food security of the state. The Cartagena Protocol and the Basel Convention.
10. Access to information and environmental security. Aarhus Convention.
11. Energy and resource saving for environmentally friendly development.
12. Environmental Code in solving problems of environmental security.
13. Ecological safety and rational nature management. Water security and the implementation of the Helsinki Convention in Kazakhstan.
14. Management of environmental protection of the enterprise to achieve environmental security of production.

15. Basics of "green" development and scientific support of environmental security.

SW2213 Scientific writing – 2 credits

Prerequisites: Environmental aspects of natural science; Environment and Sustainable Development (introduction to the specialty); Environment and Humans.

Postrequisites: Core and major disciplines.

The purpose of the discipline is formation of the student knowledge about the principles and methods of organizing and planning research.

As a result of studying the discipline, the student will be able to:

- demonstrate the knowledge gained about the principles and methods of organization and planning of scientific research; various systems of searching for scientific information; principles for determining the permissible errors of laboratory research results and their understanding;
- apply the skills of writing abstracts and scientific articles;
- use the knowledge gained on the principles, subject and methods of conducting experiments, processing and analyzing the data obtained;
- choose the best way to search for scientific information;
- analyze the dynamics of solving scientific problems of the course (scientific reviews of the research of a specific problem).

Topics covered:

1. The concept of science. Goals and objectives of research. Classification of Sciences.
2. Stages of research work and its planning.
3. The concept of the method and methodology of scientific research.
4. Methods of empirical research.
5. The choice of research topics.
6. Methods of research planning.

7. The main sources of scientific information.
8. Preparation of experimental studies.
9. Strategy and tactics of the experiment.
10. Methods and methods of measurement.
11. Scientific results and their publication.
12. Scheme of creating a scientific publication.
13. Work on the scientific paper.
14. Basic principles of ethics of the scientific community.
15. Violations of scientific ethics.

Applied Ecology Module – 6 credits

Professional competencies:

- apply knowledge of the nature of the main physico-chemical processes occurring in the atmosphere, hydrosphere and lithosphere;
- using the fundamentals of industrial ecology, solving problems in this area, as well as applying the obtained theoretical knowledge in applied ecology;
- explain ways to reduce anthropogenic impact, leading to climate change and the destruction of the ozone layer of the Earth.

Learning outcomes focused on the Dublin descriptors:

- A2. Interpret the basic concepts and laws of physics, chemistry, mathematics.
- A3. Use basic knowledge in the field of theoretical and applied ecology.
- B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management.
- C1. Conduct an experiment using physico-chemical methods to assess the condition of the Environment.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;

- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

OPE2214 Environmental impact of Industrial processes – 3 credits

Prerequisites: Advanced Mathematic; Physics; Environmental GIS; Environment and Sustainable Development (introduction to the specialty).

Postrequisites: Core and major disciplines.

The purpose of the discipline is to form students' knowledge of the composition and structure of industrial production, methods and techniques for analyzing technological systems, rational development of industry, resource and energy saving, the fundamentals of technology and technology for protecting production and the environment from harmful emissions.

A student should be able to:

- demonstrate knowledge of the main content, objectives and methods of industrial ecology;
- reveal the general laws of production processes; basic techniques of environmental management and environmental protection;
- evaluate the main industrial methods of processing and use of industrial and consumer waste, methods of disposal and disposal of hazardous industrial waste;
- apply and design separate stages and systems for the protection of production and the environment;
- provide scientific and technical support for the organization of environmental protection systems;
- carry out calculations to assess the levels of hazardous and harmful environmental factors, develop comprehensive programs for environmental protection.

Topics covered:

1. Industrial ecology - the scientific basis for environmental management.
2. Intensification of economic activities of the company and the extent of the negative impact of industrial production on the environment.
3. Waste-free production. Territorial production complexes and ecological industrial parks.
4. The main types of technology. Environmental Technologists.
5. Classification of the main technological processes.
6. The structure of industrial and technological systems, their hierarchy and functioning.
7. Classification, causes and mechanism of production waste.
8. The main areas of work to reduce air pollution.
9. Protection of the atmosphere from process waste gases.
10. Technologies and facilities for urban wastewater treatment plants.
11. General information about the petrochemical industry.
12. General information about the chemical industry.
13. Fundamentals of the technology of production and processing of polymeric materials.
14. Ecological characteristics of ferrous metallurgy enterprises.
15. Ecological problems in the energy sector.

BE2215 Introduction to ecotoxicology – 3 credits

Prerequisites: Environment and Humans; Environmental Security.

Postrequisites: Core and major disciplines.

The purpose of the discipline is provide future environmental specialists with knowledge of the study of chemical toxicity factors, forms and manifestations of the toxic process.

The student should be able to:

- interpret the toxicological significance of various industrial and domestic wastes;

- evaluate the mechanisms of action of the main types of poisons and their classification;
- understand the behavior of chemical pollutants in the natural environment, resulting from the influence of natural and anthropogenic factors;
- assess the effects of xenobiotics on living organisms and their populations;
- learn to identify toxic substances in biological materials, water, air, food, drugs;
- describe the principles and standards of radiation safety;
- use the knowledge gained to reduce the adverse effects of pollution, to develop the necessary measures aimed at improving the state of the biosphere and public health.

Topics covered:

1. Introduction "Basic concepts of ecotoxicology." The goals and objectives of the discipline.
2. Classification of toxic substances. Properties of various groups of toxicants.
3. Priority pollutants.
4. Criteria for environmental toxicological assessment.
5. Mechanisms of development and forms of the toxic process caused by the action of ecotoxicants on the biocenosis and / or individual species, its components.
6. Biochemical bases of toxic action of chemicals.
7. Intake, delivery, distribution, transformation and excretion of poisons from the organisms.
8. The combined effect of xenobiotics.
9. Factors affecting the toxicity of chemical compounds.
10. Methodological techniques to assess the ecotoxicity of xenobiotics.
11. Biological methods of control.
12. Features of population ecotoxicology.
13. Ecological rationing of anthropogenic pollution of natural systems.
14. Basic principles, criteria and standards of radioactive safety.
15. Poisonous plants and animals.

Environmental Management Module – 9 credits

Professional competencies:

- understand the basic principles of the system of state regulation in the field of ecology and use legal documents in professional activities;
- to assess the quality of the environment and to own modern methods of waste management, using sanitary and hygienic and production standards;
- apply regulatory documents when conducting an environmental impact assessment, environmental impact assessment and auditing, assess the level of preparation of management systems for certification for compliance with the requirements of ISO series standards.

Learning outcomes focused on the Dublin descriptors:

- A3. Use basic knowledge in the field of theoretical and applied ecology.
- B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management.
- B4. Use the procedures of rationing, certification, auditing, licensing, examination, analysis of calculations of environmental risk and damage when conducting an environmental impact assessment and predicting the consequences of human impact on the ecosystem.
- C1. Conduct an experiment using physico-chemical methods to assess the state of the Environment.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

OVOC2216 Environmental impact assessment (EIA) – 3 credits

Prerequisites: Environmental Security; Environmental GIS; Environmental and Humans.

Postrequisites: Core and major disciplines.

The purpose of the discipline is to acquaint students with a general knowledge of the theory and practice of applying the methodology of environmental impact assessment as a tool for studying and eliminating the environmental consequences of production activities and engineering works.

As a result of studying the discipline, the student will be able to:

- describe the history of the EIA and its development in international law;
- identify sustainable development as a key aspect of the EIA procedure;
- explain the administrative process of the EIA;
- understand the environment on a more general and complex scale;
- to master the tools in order to be able to conduct a full EIA study;
- determine the environmental consequences of an engineering project or activity;
- describe the environmental actions as part of the development of the Environmental Project;
- determine and quantify the impact on the environment;
- propose a set of measures for mitigation and correction to minimize the impact on the environment;
- develop a plan for the review of environmental aspects..

Topics covered:

1. The history of the study of the issue "Environmental Impact Assessment (EIA)".
2. Law, policy and institutional arrangements.
3. Public participation.
4. Screening (selection) in the framework of the EIA.

5. Review in the framework of the EIA.
6. Theory of impact analysis. Simple interaction matrix method for preliminary identification of exposure.
7. Theory of impact analysis. Leopold Matrix.
8. Mitigation and Impact Controls.
9. EIA reporting.
10. Review of the quality of the EIA.
11. Decision making.
12. Implementation and control.
13. Analysis of the impact of roads and trains on the environment.
14. Analysis of the impact of hydraulic works on the environment: dams and canals.
15. Analysis of the environmental impact of mining and landfill.

OEA4217 Fundamentals of environmental auditing – 3 credits

Prerequisites: Environmental Impact Assessment (EIA); Environmental monitoring; Environmental management system

Postrequisites: Core and major disciplines.

The purpose of the discipline is to develop students' knowledge of environmental audit and the system of environmental management, including corporate social responsibility and the use of standards for the environmental management of companies.

As a result of studying the discipline, the student is able to:

- determine the nature and content of the environmental audit;
- describe the environmental audit procedures;
- differentiate and select methods of environmental audit;
- apply the methods of environmental audit in educational and practical activities;
- organize environmental audits using regulations and regulatory documents.

Topics covered:

1. Introduction. The purpose and objectives of environmental auditing.
2. First steps in the audit. Preliminary audit.
3. Environmental Management Audit.
4. Audit of compliance with environmental requirements.
5. Environmental Assessment Audit.
6. Waste Audit.
7. Compliance with environmental audit.
8. Auditing suppliers.
9. Use of checklists (checklists) and questionnaires.
10. Sampling mechanisms.
11. Psychology of audit.
12. Policy and continuous improvement of audit.
13. Distribution of environmental audit.
14. Follow-up audit.
15. Audit and formal systems. ISO 14000 series.

SME3217 Statistical methods in ecology– 3 credits

Prerequisites: Advanced mathematics; Environmental GIS.

Postrequisites: Core and major disciplines.

The purpose of the discipline is the formation of students' knowledge of modern methods of collecting, processing and analyzing statistical information in the field of environmental protection, adopted in the domestic and international practice of accounting and statistics.

As a result of studying the discipline, the student is able to:

- own a complex of statistical methods of observation, summary and grouping of mass data;
- master the system of statistical quantities characterizing the state of the environment;
- analyze the results of statistical observation;

- calculate statistical values and make reasoned conclusions;
- apply the theoretical principles of statistics at a practical level.

Topics covered:

1. The subject, purpose and object of the study of environmental statistics, its relationship with other sciences.
2. The general concept of statistics. History of Statistics Development in Kazakhstan.
3. The concept of environmental information. Environmental collection systems in Kazakhstan.
4. Three groups of statistical methods. Statistical observation as the first stage of statistical research.
5. Statistical summaries and groupings as the second stage of statistical research.
6. Forms of presentation of statistical data.
7. Absolute and relative values.
8. Ecological statistics of the state of the environment.
9. Ecological statistics of the state of the atmospheric air.
10. Ecological statistics of the state of water resources.
11. Ecological statistics of land resources.
12. Statistical accounting of waste generation and disposal.
13. Impact of energy facilities on the biosphere.
14. Statistical transport accounting.
15. Socio-demographic statistics.

Environmental regulation Module – 6 credits

Professional competencies:

- application of the principles and objectives of sustainable development to address situations of global, regional and local levels;
- understand the basic principles of the system of state regulation in the field of ecology and use legal documents in professional activities;

- to assess the quality of the environment and own modern methods of waste management, using sanitary and hygienic and production standards.

Learning outcomes focused on the Dublin descriptors:

A3. Use basic knowledge in the field of theoretical and applied ecology.

B4. Use the procedures of rationing, certification, auditing, licensing, examination, analysis of calculations of environmental risk and damage when conducting an environmental impact assessment and predicting the consequences of human impact on the ecosystem.

C3. To critically evaluate world experience in the field of energy and resource saving and monitor the implementation of established standards for environmental management.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

ERY3219 Environmental regulation and governance – 3 credits

Prerequisites: Environmental Security; Environmental impact of Industrial processes; Introduction to ecotoxicology; Environmental impact assessment (EIA).

Postrequisites: Core and major disciplines.

The purpose of the discipline is formation of students' knowledge and basic competencies of modern management and regulatory mechanisms aimed at reducing environmental pollution from the government and economic entities.

As a result of studying the discipline, the student is able to:

- characterize the procedures of state regulation and management in the field of ecology;
- describe the system of environmental monitoring, expertise, control and accounting for environmental management;
- describe the system of environmental regulation and technical regulation in the field of environmental protection;
- analyze the requirements of environmental regulation and management of EMAS;
- put into practice the procedures for environmental auditing and certification;
- organize work on the restoration and reproduction of natural resources, the introduction of resource-saving technologies.

Topics covered:

1. Introduction to the basis of state regulation in the field of ecology.
2. The organization of environmental monitoring, expertise, control and accounting for environmental management and environmental pollution.
3. The system of environmental regulation and technical regulation in the field of environmental protection.
4. The system of economic regulation of environmental protection, incentives and financing of environmental projects.
5. Environmental Code of the Republic of Kazakhstan and issues of regulation and management in ecology.
6. Environmental audit and certification.
7. EMAS environmental regulation and management requirements.
8. Organization of state planning and control over ecology and nature management.
9. Methods of market regulation of environmental management and environmental services.
10. The system of issuing licenses, permits for the use of natural resources.
11. Modern problems of ecology and environmental management in the Republic of Kazakhstan.
12. Organization of work on the restoration and reproduction of natural resources, the introduction of resource-saving technologies.
13. The system of state administration in the field of environmental management and ecology.
14. Environmental management issues in final international documents.

15. Target indicators of environmental regulation and management in the transition of Kazakhstan to a green economy.

SMOS3220 Environmental management system– 3 credits

Prerequisites: Environmental Security; Environmental impact of Industrial processes; Introduction to ecotoxicology; Environmental impact assessment (EIA).

Postrequisites: Core and major disciplines.

The purpose of the discipline is formation of students' holistic system understanding of the environmental management system and the skills of their application in various fields of production and economics.

As a result of studying the discipline, the student is able to:

- understand the problems of practical implementation of environmental management tools and how to solve them, taking into account Russian specifics;
- explain the principles and features of environmental management; the content of the activity of the manager in the field of environmental protection; mechanisms for the functioning of standardized environmental management systems, including the requirements of the international standard ISO 14001;
- conduct an analysis of the organization's living environment, SWOT analysis taking into account the environmental factor; determine the direction of the strategic development of the enterprise from the standpoint of the environmental factor; to assess the appropriate level of detail of the elements of the environmental management system, taking into account the characteristics of a particular organization;
- work with texts of international standards ISO 14000;
- design elements of environmental management systems in accordance with international standard ISO 14001;
- analyze and compare various problems in this area, summarize the results and draw the necessary conclusions for practical application.

Topics covered:

1. Introduction to environmental management.

2. The concept and benefits of standardized environmental management systems.
3. Environmental management in organizations and enterprises of the Republic of Kazakhstan.
4. Theoretical foundations of corporate environmental management.
5. Practical tools of corporate environmental management.
6. Environmental audit and certification.
7. Environmental management systems in accordance with the requirements of international standard ISO 14001.
8. Management, its essence and value in market conditions.
9. Market methods of environmental management.
10. Legislation of the Republic of Kazakhstan on the rational use and protection of natural resources.
11. Problems of environmental protection and rational use of natural resources of the Republic of Kazakhstan.
12. The process of organizing and conducting marketing research.
13. Fundamentals of the organization and implementation of environmental management.
14. UN Conference "RIO + 20" (2012) and the final document.
15. The concept of the transition of Kazakhstan to a green economy.

Human ecology Module – 6 credits

Professional competencies:

- describe the main stages of the evolution of the biosphere and its specific features; the main links of the small biological and large geological cycles of substances;
- to assess the quality of the environment and to own modern methods of waste management, using sanitary and hygienic and production standards;
- to explain the possible ways of contamination of food raw materials and food products with xenobiotics of chemical and biological origin and their influence on the human organism.

Learning outcomes focused on the Dublin descriptors:

- A3. Use basic knowledge in the field of theoretical and applied ecology.
- B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management.

B4. Use the procedures of rationing, certification, auditing, licensing, examination, analysis of calculations of environmental risk and damage when conducting an environmental impact assessment and predicting the consequences of human impact on the ecosystem.

C2. Predict ecosystem adaptation to climate change for the purpose of integrated management of natural resources.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

OSCh2221 Environment and Humans – 3 credits

Prerequisites: Environmental aspects of natural science; Environment and Sustainable Development.

Postrequisites: Core and major disciplines.

The purpose of the discipline is to provide the learner with an understanding of each of the three main components of the natural environment: soil; climate and weather, and the role of environmental determinants and ecological niches. The course also aims to develop an understanding of human influence on the functionality of the ecosystem. Major environmental issues are studied through individual research aimed at developing research skills and reporting. The course also explores the theory of complex systems and its implications for environmental change and the future of people.

As a result of studying the discipline, the student is able to:

- describe and explain the main components of the natural environment;

- discuss the impact of human activity on the natural environment and explain how it can be managed;
- describe how natural conditions and resources can affect living organisms and their interaction;
- explain the importance of ecosystem goods and services and give their assessment;
- assess the management of a wide range of wildlife populations in different countries of the world;
- summarize relevant information on the main problems of the countryside and the environment;
- carry out research, analysis and reporting on major environmental issues.

Topics covered:

1. Introduction to discipline, focus on climate change and people's activities.
2. Biotic component: conditions and resources.
3. Biotic component: populations and interactions.
4. Abiotic component: soil composition and properties.
5. Abiotic component: soil processes and human influence.
6. The structure and function of the ecosystem.
7. Ecosystem services.
8. Flows of energy and materials in biological systems.
9. Non-linear variability of the world and systems.
10. Socio-ecological systems.
11. Ecological monitoring.
12. Forecasting the future.
13. Global environmental change.
14. Local environmental change.
15. Future of people and their environment.

EP2222 Food science – 3 credits

Prerequisites: Environment and Sustainable Development (introduction to the specialty), Environmental Security, Environment and Humans.

Postrequisites: Green Economy, Fundamentals of environmental law, Environmental regulation and governance, Environmental management system

The purpose of the discipline is formation of the student: theoretical knowledge and practical skills according to the criteria of risks caused by the use of food, hygienic and environmental characteristics of the main components of food, their importance to the human body, current trends in rationalization of nutrition of the population.

As a result of studying the discipline, the student is able to:

- describe the ecology of public health and nutrition, the impact of the natural and man-made environment on human health;
- interpret possible ways of contamination of food raw materials and food products with chemical and biological xenobiotics and their influence on the human body;
- use reference materials, determine the nutritional value and calculate the energy value of food;
- apply possible ways to protect food from foreign substances;
- conduct experiments using standard methods standard methods of food safety control.

Topics covered:

1. The historical unity of the environment and human health. Human nutrition in the process of evolution.
2. Nutrition Science - Nutriciology, its current state and development prospects. Food substances or nutrients, their types.
3. Determination of nutrients. Hygienic characteristics of the main components of food: proteins, fats, carbohydrates, their biological role for the human body.
4. Definition of nutrients. Hygienic characteristics of the main components of food: organic acids, vitamins, minerals, their biological role for the human body.
5. Contamination of food raw materials and food products by xenobiotics.
6. Food supplements and their effects on human health. Toxicological and hygienic assessment of food additives.

7. Structure and classification of additives. Technological functions and objectives of the introduction.
8. Food quality and safety. Contamination of food raw materials and food products by microorganisms and their metabolites. Food intoxication of various etiologies.
9. Nutrition ecology and genetically modified organisms. Risks associated with genetically modified foods.
10. Antibiotic resistance as a problem in the ecology of nutrition and its negative impact on the human body through livestock products.
11. Certification in the food industry. Quality management system and food safety.
12. The need and recommended consumption of nutrients, energy and food. Characteristics and analysis of modern power systems. Classic nutrition theory.
13. Principles of rational nutrition. Theory of adequate nutrition.
14. Features and ecology of nutrition of representatives of various adaptive types.
15. Human nutrition in the modern world. The impact of the urban environment on public health.

Environmental policy Module – 6 credits

Professional competencies:

- application of the principles and objectives of sustainable development to address situations of global, regional and local levels;
- understand the basic principles of the system of state regulation in the field of ecology and use legal documents in professional activities;
- explain ways to reduce anthropogenic impact leading to climate change and the destruction of the ozone layer of the Earth;
- analyze the ecological situation and introduce a “green economy” in the enterprise, using the methods of resource, energy saving, rational water consumption and to use of alternative energy sources.

Learning outcomes focused on the Dublin descriptors:

- A1. Understand the main stages of the modern history of Kazakhstan;
- B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management;

B4. Use the procedures of rationing, certification, auditing, licensing, examination, analysis of calculations of environmental risk and damage when conducting an environmental impact assessment and predicting the consequences of human impact on the ecosystem;

C3. To critically evaluate world experience in the field of energy and resource saving and monitor the implementation of established standards for environmental management.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

ZE4223 Green Economy – 3 credits

Prerequisites: Economic and social geography of Kazakhstan; Environmental aspects of natural science; Environmental monitoring.

Postrequisites: Core and major disciplines.

The purpose of the discipline is formation of students' knowledge in the field of "Green economy", as the basis for environmental management and sustainable development on a global and national scale; development concepts and mechanisms for its implementation as the main tool for combating climate change through the introduction of alternative energy, sustainable use of water resources and transport, “green” bio-chemical technologies, agriculture, methods and techniques of waste management, resource and energy saving.

As a result of studying the discipline, the student will be able to:

- understand the current problems of depletion of traditional resources and the need to introduce the principles of "Green economy" and environmentally friendly technologies to reduce anthropogenic impact on the environment;
- analyze the tasks and measures to ensure the "Green economy" with environmentally friendly technologies to reduce air pollution based on alternative energy sources, sustainable use of water resources and transport;
- evaluate ways to improve resource conservation and energy efficiency, waste management methods, as well as the technology of "green" chemistry and biology, agriculture;
- to possess methods and technologies for analyzing the effectiveness of environmentally friendly energy production for the formation of priorities and setting specific objectives of the "Green economy" in order to ensure sustainable development;
- to systematize international experience and describe modern concepts of a “Green economy”;
- explain the role of the “green economy” in combating climate change in the world and the Republic of Kazakhstan, describe the mechanisms for reducing greenhouse gas emissions;
- use the knowledge gained to solve specific professional problems in the introduction of environmentally friendly technologies, in particular, the principles of the "green office" for the implementation of the mechanisms of the "Green economy".

Topics covered:

1. Introduction. Subject, objectives of the discipline "Green economy". Basic concepts and definitions.
2. "Green economy" in the modern world. The principles of "green growth" and trends to ensure the sustainable development of the world.
3. "Green economy" and climate change.
4. Concept for the transition of the Republic of Kazakhstan to a "green economy". Goals and objectives, the main directions.
5. Sustainable use of water resources.
6. Waste management system, as a mechanism of "Green economy".
7. Conservation and effective management of ecosystems.
8. Alternative energy sources.

9. "Green" chemistry and biotechnology.
10. Green economy and sustainable agriculture.
11. Sustainable transport and pollution reduction.
12. Energy distribution in natural ecosystems is the basis for the creation of industrial-ecological systems.
13. Sustainable cities and agglomerations.
14. Energy and resource saving in enterprises and organizations as a mechanism of "Green economy".
15. "Green office" - an environmental management program of the organization.

OEP4524 Fundamentals of environmental law - 3 credits

Prerequisites: Economic and social geography of Kazakhstan; Environmental aspects of natural science; Environmental monitoring.

Postrequisites: Core and major disciplines.

The purpose of the discipline is to form a student's legally competent approach to solving problems of environmental protection and rational use of natural resources.

As a result of studying the discipline, the student is able to:

- interpret the basic concepts used in environmental legal relations, about the system of environmental legislation of the Republic of Kazakhstan, its principles and structure;
- reproduce the general structure of the environmental legislation of the Republic of Kazakhstan and the relations between its elements;
- apply environmental legislation on practical examples;
- analyze problem situations in the field of environmental management from a legal point of view;
- evaluate legally significant circumstances and classify legal facts of environmental legislation.

Topics covered:

1. Definition and content of the environmental legislation of the Republic of Kazakhstan in accordance with the Environmental Code of the Republic of Kazakhstan.

2. The basic concepts used in the Environmental Code and the Law on regulatory legal acts. Rules for maintaining the State register of regulatory legal acts.
3. The main provisions of state regulation and management in the use of natural resources.
4. International legal protection of the environment.
5. The concept and general characteristics of the right of state ownership of objects of nature.
6. The concept, types, objects and subjects of environmental rights.
7. Organizational and legal forms of management in the field of environmental management and environmental protection.
8. State accounting and state inventories of natural resources.
9. Types of environmental liability for violation of environmental legislation.
10. Legal basis of the economic mechanism of environmental protection and environmental management.
11. Legal liability for violation of environmental legislation.
12. The legal regime of land and their protection.
13. The legal regime of subsoil and their protection.
14. Legal regime of use and protection of waters.
15. Legal regime of specially protected objects of nature.

Ecology of geosystems Module – 6 credits

Professional competencies:

apply knowledge of the nature of the main physical and chemical processes occurring in the atmosphere, hydrosphere and lithosphere;

- describe the main stages of the evolution of the biosphere and its specific features; the main links of the small biological and large geological cycles of substances;

- to organize a rational ecological network of observations and monitor the quality of the network of eco-posts;

- to monitor the biosphere using innovative methods such as: satellite observations, GIS technology, bioindication, biotesting, ecostatistical analysis and others.

Learning outcomes focused on the Dublin descriptors:

A2. Interpret the basic concepts and laws of physics, chemistry, mathematics.

B5. Conduct laboratory and field research, evaluate the accuracy and reliability of the results of experiments.

C1. Conduct an experiment using physico-chemical methods to assess the state of the Environment.

C2. Predict ecosystem adaptation to climate change for the purpose of integrated management of natural resources.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

Geo3301 Geoecology – 3 credits

Prerequisites: Environmental geosystems of Kazakhstan; Economic and social geography of Kazakhstan; Environmental biogeography; Environmental GIS; Environment and Sustainable Development.

Postrequisites: Core and major disciplines.

The purpose of the discipline is to form students' fundamental knowledge about the essence of geo-ecology, the scientific foundations of the theory of nature conservation, the fundamental principles of geo-ecology, as a science of the ecological background of the natural-anthropogenic systems of the Earth for practical application of the revealed patterns to the theory and practice of applied ecology.

As a result of studying the discipline, the student is able to:

- interpret the definition of the geosystem, the basic concepts, its elements, the connections between them;
- understand the difference between the ecosystem and the geosystem and the main geographical difference between them;
- analyze the technogenic effects on the atmosphere, lithosphere, hydrosphere, pedosphere;
- determine the dynamics of transformation of natural ecosystems under the influence of existing anthropogenic pressures;
- to assess the relationship of climatic factors and indicators of the development of social production and the state of natural-economic systems;
- calculate the main parameters of pollution of water bodies, atmosphere and soil;
- formulate and substantiate geo-ecological problems and tasks, to draw convincing conclusions and expert conclusions;
- substantiate and build their point of view on issues of changing the quality of the natural environment and taking into account the geoecological properties of the region when designing the activities of enterprises;
- justify the program of environmental monitoring of the territory, taking into account the specifics of the geoecological state of the region.

Topics covered:

1. Geoecology in the system of earth sciences. Terminological aspects, subject and tasks of geoecology.
2. Theoretical and methodological foundations of geo-ecology. Socio-economic processes that determine global environmental change
3. Geographical zonality of the world's landscapes and its evolution. Modern landscapes, problems of deforestation, desertification.
4. Environmental factors and general patterns of their impact on geosystems.
5. Natural factors of the ecosphere. The ecosphere, its features and interdependence with society.
6. Scientific and technical revolution, its role in shaping the global environmental crisis.
7. Geoecological aspects of adverse natural and anthropogenic processes and phenomena. The systemic nature of the problems of geoecology.
8. Energy and material features of the ecosphere. The role of biota in the functioning of the ecosphere.
9. Geoecological role of technical progress. Geoecological aspects of natural and man-made systems.

10. Atmosphere, its role in the dynamic system of the ecosphere. Anthropogenic changes in the state of the atmosphere and their consequences.
11. Hydrosphere. The global water cycle, its role in the functioning of the ecosphere. Water resources. The central role of water in many natural processes and environmental problems.
12. Pedosphere, its importance in the functioning of the Earth system. Land fund of the world and its use. The main features of soil pollution.
13. Lithosphere. Anthropogenic geological processes. The main types of anthropogenic impacts on the lithosphere.
14. Biosphere. The impact of human activity. The main features of the pollution of the biosphere.
15. Geocological aspects of energy. Environmental problems of various types of energy production and consumption.

EM3302 Environmental monitoring – 3 credits

Prerequisites: Environmental Security; Environmental chemistry; Environmental GIS; Physics; Advanced Mathematics.

Postrequisites: Core and major disciplines.

The purpose of the discipline is formation of students' theoretical knowledge, practical skills, methodological and theoretical foundations of monitoring research.

A student should be able to:

- describe various approaches to the classification of environmental monitoring; classification of monitoring types according to objects and methods of tracking, pollutants, spatial scale of observations;
- explain the causes of environmental destabilization of the natural environment, associated with natural and anthropogenic impacts and justify the choice of measures for their prevention and protection;
- characterize the priority pollutants, chemical mutagens, carcinogenic factors of the environment, to interpret the rationing of discharges and emissions of pollutants;
- justify the choice of methods for organizing a network of observations of air pollution, natural waters, soil cover and principles for their implementation;
- use the system of environmental legislation of Kazakhstan to justify environmental measures in order to prevent environmental pollution;

- analyze global environmental problems and measures aimed at preventing disruption of the ecological balance.
- analyze the characteristics of the ecological state of the environmental components of different regions of Kazakhstan (as chosen by the student) in the form of models, essays, presentations.

Topics covered:

1. Introduction to environmental monitoring. History of environmental monitoring.
2. Content and structure of environmental monitoring. Functions, goals and objectives of environmental monitoring.
3. Different approaches to the classification of environmental monitoring.
4. Classification of types of monitoring according to objects and methods of tracking, pollutants, spatial scale of observations.
5. Global Environmental Monitoring (GEM).
6. Acoustic control as a physical method for diagnosing biological objects and the environment.
7. Rationing of discharges and emissions of pollutants.
8. Principles of monitoring observations.
9. Unified state information system for monitoring the environment and natural resources (USISM).
10. Monitoring of atmosphere.
11. Observations on the pollution of natural waters.
12. Monitoring the state and anthropogenic changes in the soil and its implementation principles.
13. Principles of the organization of biological monitoring.
14. Monitoring of environmental contamination.
15. International cooperation and Principles for the organization of environmental monitoring.

Integrated ecosystem management Module – 9 credits

Professional competencies:

- apply knowledge of the nature of the main physical and chemical processes occurring in the atmosphere, hydrosphere and lithosphere;

- application of the principles and objectives of sustainable development to address situations of global, regional and local levels;
- analyze the environmental situation and implement the "green economy" in the enterprise, using the methods: resource, energy conservation, rational water consumption and the use of alternative energy sources.
- analyze environmental and socio-economic problems using the methods of system analysis and mathematical modeling in solving professional problems.

Learning outcomes focused on the Dublin descriptors:

A3. Use basic knowledge in the field of theoretical and applied ecology.

B4. Use the procedures of rationing, certification, auditing, licensing, examination, analysis of calculations of environmental risk and damage when conducting an environmental impact assessment and predicting the consequences of human impact on the ecosystem.

C2. Predict ecosystem adaptation to climate change for the purpose of integrated management of natural resources.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

YZR3303 Land management– 3 credits

Prerequisites: Environmental GIS; Environmental monitoring; Desertification and Reclamation of lands; Agroecology; Environmental economics.

Postrequisites: Core and major disciplines.

The purpose of the discipline of land management, to form a system of knowledge and methodological basis of land management, mastering practical knowledge to analyze and calculate land payments.

A student should be able to:

- explain the specifics of the ideological and methodological basis of the natural sciences;
- classify zones with special conditions of use of territories; land use and land depending on the purpose and permitted use;
- apply this knowledge when studying educational and scientific works to analyze and synthesize the existing extensive scientific data on land management; correctly evaluate modern theoretical concepts and directions in land management; plan and carry out land management work, process and analyze the results of work;
- analyze tasks, plan and justify the necessary research methods, conduct environmental and economic expertise of investment programs, schemes and land management projects based on cadastre and land management data;
- discuss the applied GIS in scientific research and scientific-industrial activity for the purposes of land management, cadastre and land management, as tools for implementing information technologies in the land resource management system.

Topics covered:

1. The basic theoretical position of the control system. Theoretical aspects of management. The basic concepts of the control system.
2. Theoretical foundations of land management. Land as a condition and means of production.
3. Land Fund of the Republic of Kazakhstan as an object of management. Features of the development of land relations in Kazakhstan in the modern period.
4. The main methods of land management.
5. The institutional and legal mechanism of land management. Land legislation for the protection and use of land.
6. The economic mechanism of land management. State and non-state users and land owners. Ways of further development of land reform.
7. Information support for land management.

8. Land control as a function of land management.
9. Land management of the regions of the Republic of Kazakhstan in the regional management system.
10. Features of land management of municipalities.
11. Features of land management in cities and other settlements. Regulation of agricultural land turnover.
12. Land monitoring as a tool for information management of land resources.
13. Use of GIS-technologies in land management.
14. The state cadastre of real estate as a function of land management.
15. Land management in foreign countries.

YVR3304 Water resources management – 3 credits

Prerequisites: Environmental monitoring; Environmental economics; Environmental economics.

Postrequisites: Core and major disciplines.

The purpose of the discipline to form students' ideas about the current problems of the water sector and prepare them to participate in the development and implementation of comprehensive water management plans in accordance with the requirements of the Water Code of the Republic of Kazakhstan.

A student should be able to:

- to demonstrate the knowledge gained about the territorial distribution of the water management complex of the Republic of Kazakhstan; Normative Legislation Acts (NLA) and modern international principles in the practical planning and use of water resources; conceptual framework for the protection of water resources;
- interpret an understanding of the prospects and objectives of integrated use of water resources;
- analyze problem situations in the field of water resources protection;
- apply environmental legislation on practical examples;
- use the methods (research, analysis, etc.) characteristic of the field of water management in individual or group teaching and research activities;
- evaluate the types of anthropogenic impact on water resources and ways to prevent and reduce it;
- justify statistical material from the obtained experimental scientific data;

- analyze the dynamics of solving scientific problems of the course (scientific reviews on a specific basin, studies of a specific problem);
- make an analysis of the results of the study course; summarize them in the form of a presentation of an individual case study;
- evaluate to explain the basic principles, elements and procedures adopted in the planning of water resources management.

Topics covered:

1. Introduction. Water in nature and human life. Features of the structure and properties of water. Effect of water on the human body. The problem of pollution of natural waters.
2. Water resources and the state water fund of Kazakhstan.
3. The global situation and the situation in Kazakhstan in the water sector.
4. Water complex (WC) and its systems.
5. Management of water complex.
6. Water balance.
7. Methods of compiling the water balance of the water complex.
8. Monitoring of water resources.
9. Rationing of water quality. Rules of control, monitoring and assessment of water quality.
10. Zones of sanitary protection of water supply sources .
11. Implementation of Integrated Water Resource Management (IWRM) in Kazakhstan.
12. Water management according to the basin principle.
13. Information management in the field of use and protection of water resources.
14. Development of a water management plan at the local level.
15. Improving the institutional, regulatory and financial-economic mechanism of water use.

YN3305 Sustainable Resource extraction– 3 credits

Prerequisites: Environmental GIS; Environmental monitoring; Environmental economics; Resource Management.

Postrequisites: Core and major disciplines.

The purpose of the discipline is the formation of systematic knowledge in a student about sustainable subsoil use, ecological functions of the lithosphere, requirements in the field of rational and complex use of subsoil, legal and economic mechanisms for managing subsoil use.

As a result of studying the discipline, the student is able to:

- explain the basic concepts and principles of subsoil use in accordance with the legislation of the Republic of Kazakhstan;
- analyze the system of state regulation of the subsoil use of the Republic of Kazakhstan and the system of payments for the use of the subsoil of the Republic of Kazakhstan;
- apply the regulatory framework in the field of sustainable subsoil use;
- develop environmental protection measures for sustainable subsoil use;
- justify the principles of sustainable subsoil use in the economy of Kazakhstan and the world.

Topics covered:

1. Basic information about the subsoil.
2. Mineral resources and features of their use.
3. Classification of mineral deposits.
4. Characteristics of the extraction of mineral resources from the depths.
5. Ecological functions of the lithosphere.
6. Rational use of mineral resources and the protection of the subsoil.
7. Rational use and protection of land resources in the extraction and processing of minerals.
8. The rational use and protection of water resources in the extraction and processing of minerals.
9. Protection of atmospheric air in the extraction and processing of minerals.
10. Legal and regulatory framework for sustainable subsoil use.
11. State management of sustainable subsoil use.
12. Economic aspects of sustainable subsoil use.
13. Subsoil use of foreign countries.
14. Features of the regulation of subsoil use in foreign countries.

15. Subsoil use in the global economy.

Applied Green economy Module – 9 credits

Professional competencies:

- application of the principles and objectives of sustainable development to address situations of global, regional and local levels;
- explain ways to reduce anthropogenic impact leading to climate change and the destruction of the ozone layer of the Earth;
- to assess the quality of the environment and to own modern methods of waste management, using sanitary and hygienic and production standards;
- analyze the environmental situation and implement the "green economy" in the enterprise, using the methods: resource, energy conservation, rational water consumption and the use of alternative energy sources.

Learning outcomes focused on the Dublin descriptors:

- A3. Use basic knowledge in the field of theoretical and applied ecology.
- B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management.
- B5. Conduct laboratory and field research, evaluate the accuracy and reliability of the results of experiments.
- C3. To critically evaluate world experience in the field of energy and resource saving and monitor the implementation of established standards for environmental management.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

ZT3303 Green technologies – 3 credits

Prerequisites: Environmental economics; Resource Management; Agroecology; Urbanistics.

Postrequisites: Fundamentals of environmental auditing, Fundamentals of environmental law, Green technologies, Land management, Water resources management, Sustainable Resource extraction, Renewable energy, Methods and models in waste management.

The purpose of the discipline is formation of students' knowledge in the field of "Green technology", aimed at the development of "green" technologies, the acquisition of skills and methods of sustainable development.

A student should be able to:

- explain the basic concepts, definitions and terms necessary for the development of green technologies and low-carbon development;
- analyze the goals and objectives of the Concept of the transition of Kazakhstan to a green economy;
- discuss the laws of the Republic of Kazakhstan and other regulatory documents in the field of green economy, ecology, environmental protection and renewable energy sources (RES);
- characterize the development of new industries and "green clusters";
- solve practical problems in the design of installations of renewable and alternative energy sources, to develop and correctly draw up technical and design documentation for renewable energy installations;
- analyze data on the economic efficiency of applying green technologies in various regions of Kazakhstan.

Topics covered:

1. Introduction. State policy of the Republic of Kazakhstan in the field of “Green economy”.
2. General concepts and information about new trends in the development of green technologies in the country.
3. The current state of energy production and the country's energy supply.

4. Modern development of the “Green economy” in the Republic of Kazakhstan.
5. General characteristics of photoelectric converters (photovoltaic cells).
6. Wind power plants, as the object of the source of electrical energy.
7. Advantages and disadvantages of wind power.
8. Application of solar power plants in rural and difficult-to-reach tourist regions of the country.
9. Analysis of the development trend of renewable energy sources in foreign countries in the energy system.
10. Studying the physical basis of solar energy conversion processes.
11. Use of geothermal energy to generate heat and electricity.
12. Biogas energy and agro-industrial complex.
13. Technology of biogas production.
14. Concepts of sustainable and low carbon economic development of Kazakhstan.
15. Heritage EXPO-2017-Green technologies.

BE3304 Renewable energy – 3 credits

Prerequisites: Environmental economics; Resource Management; Environment and Humans.

Postrequisites: Core and major disciplines.

The purpose of studying the “Renewable energy” discipline is to develop students' knowledge in the field of development prospects and existing world and domestic experience in developing energy sources that are alternative to traditional ones used in thermal and atomic energy.

A student should be able to:

- name the main goals, objectives, methods of using alternative energy in the field of environmental management and environmental protection;
- substantiate the main directions of alternative energy: solar energy, hydropower, geothermal and hydrogen energy, marine and tidal energy, bioenergy;
- choose the technologies of the future and know the prospects for the use of alternative energy sources on Earth;
- analyze and systematize information on the main sources of alternative energy;

– planning the rational use of the received energy in industry and agriculture.

Topics covered:

1. The current state of energy resources.
2. Problems of using traditional energy sources.
3. Problems of the use of alternative energy sources.
4. Conversion of solar energy into heat.
5. Solar collectors and concentrates.
6. Solar power.
7. Theory of the use of wind energy.
8. Wind power installations. Types and principles of work.
9. The thermal regime of the earth's crust.
10. Using the energy of the hydrosphere.
11. Power plants that convert ocean energy, wave motion and currents.
12. Combined use of renewable energy.
13. Energy potential of secondary energy resources.
14. Production of gaseous and liquid biofuels.
15. Hydrogen energy.

MMYO3305 Methods and models in waste management – 3 credits

Prerequisites: Environmental management system, Environmental impact assessment (EIA); Environmental impact of Industrial processes; Environmental monitoring

Postrequisites: Green economy, Environmental management system, Sustainable Resource extraction, Renewable energy.

The purpose of the discipline is to study the issues and problems associated with municipal solid waste management and to create a basis for understanding specific technologies and options for management of solid waste. Human activity generates waste, which is often discarded because it is considered useless. This waste is usually solid, and the word "waste" suggests that the material is useless and undesirable. However, many of these wastes can be recycled and, thus, they can become a resource for

industrial production or energy production if they are properly managed. Waste management has become one of the most significant problems of our time, as the modern lifestyle produces a huge amount of waste, and most people want to preserve their lifestyle, as well as protect the environment and public health. In recent years, state legislatures have enacted more solid waste management laws than any other topic in their legislative programs.

As a result of studying the discipline, the student is able to:

- demonstrate knowledge of sources and classify types and properties of solid wastes;
- explain the process of solid waste production;
- describe solid waste collection systems;
- differentiate special and domestic hazardous waste, construction and waste of road transport;
- understand the composting process;
- assess the production of biogas from waste;
- determine the composition of the waste during fuel combustion;
- master the tools for identifying waste disposal sites, criteria for the formation of solid waste landfills;
- propose a set of measures for landfill management;
- develop a plan for the closure and maintenance of the landfill.

Topics covered:

1. Sources and types of solid waste.
2. Physical, chemical and biological properties of waste.
3. Evaluation of solid waste production.
4. Solid waste collection systems.
5. Special waste. Household hazardous waste. Car tires and household batteries. Used oil. Construction waste.
6. Composting.
7. Biomechanization.
8. Waste from energy combustion (energy waste). Burning.
9. Criteria for determining waste disposal sites. The basic design of solid waste landfills.
10. Composition, formation and control of leaching.

11. Composition, formation and control of biogas.
12. Surface water management.
13. Basic concepts of the stability of waste disposal (angle of the slope of waste).
14. Management of polygons. Economic aspects.
15. Works on the closure and maintenance of the landfill.

Sustainable land use Module – 9 credits

Professional competencies:

- understand the ecological terminology and nomenclature;
- describe the main stages of the evolution of the biosphere and its specific features; the main links of the small biological and large geological cycles of substances;
 - to determine the factors of desertification, the optimal parameters of fertility, using studies of the hydrological, physicochemical, biological and other properties of the soil to select the best methods of recultivation;
 - identify ways and means of reducing environmental risk to an acceptable level, basic measures to eliminate the consequences of accidents and disasters;
 - to explain the possible ways of contamination of food raw materials and food products with xenobiotics of chemical and biological origin and their influence on the human organism.

Learning outcomes focused on the Dublin descriptors:

- A3. Use basic knowledge in the field of theoretical and applied ecology.
- B2. Master the methods of collecting and statistical analysis of environmental information; computer literacy.
- B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management.
- B5. Conduct laboratory and field research, evaluate the accuracy and reliability of the results of experiments.
- C2. Predict ecosystem adaptation to climate change for the purpose of integrated management of natural resources.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
 - Written works: test, test, essay, MidTerm, exam;
 - Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
 - Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.
- Evaluation policy:
- Criterion assessment is used to determine the degree of formation of competencies;
 - Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

ORZ3306 Desertification and Reclamation of lands – 3 credits

Prerequisites: Desertification and Reclamation of lands; Environmental impact assessment (EIA); Environmental monitoring; Economic and social geography of Kazakhstan.

Postrequisites: Land management; Sustainable Resource extraction; Green technologies; Climate change; Biodiversity conservation.

The purpose of the discipline is forming students about the current state of the problem of desertification, factors of desertification, methods of combating desertification and rational use of natural resources, a complex of modern measures to combat desertification, desertification in Kazakhstan, which allow rational use of natural resources and limit the anthropogenic load on the environment.

A student should be able to:

- determine the factors causing desertification, regional features of the problem of desertification, criteria for desertification;
- apply this knowledge to solve the problems of desertification and to develop measures to combat the negative processes that make up the phenomenon of desertification; to independently assess the climatic and geomorphological features of the region in order to prevent the development of desertification;
- possess skills to determine the factors of desertification and rational planning of agricultural production;

- understand the main directions of reclamation of disturbed lands;
- use the basic techniques of technical and biological reclamation of disturbed lands;
- use the methods of choosing environmental protection technologies for the development of mineral deposits.

Topics covered:

1. The essence of the process of desertification. The current state of desertification.
2. Arid territories - hotbeds of desertification.
3. Natural and anthropogenic factors of desertification.
4. Natural and ecological characteristics of arid, semi-arid territories.
5. The problem of desertification in the countries of Central Asia
6. Modern technologies to combat desertification.
7. International cooperation in the field of combating desertification.
8. The subject and tasks of land reclamation.
9. Regulatory and legal base in the field of land reclamation.
10. The main directions of reclamation of damaged lands.
11. Stages of reclamation of disturbed lands. Technical stage of reclamation.
12. Biological stage of recultivation.
13. Classification of disturbed areas and industrial sites.
14. Soils, flora and fauna of reclaimed lands.
15. Ways to reduce the objects of reclamation. Reclamation projects. Land Protection.

Agr3307 Agroecology – 3 credits

Prerequisites: Почвоведение; Environmental impact assessment (EIA); Environmental monitoring; Economic and social geography of Kazakhstan.

Postrequisites: Land management; Sustainable Resource extraction; Green technologies; Climate change; Biodiversity conservation.

The purpose of the discipline is formation of students' theoretical knowledge and practical skills for the rational use of the potential of the soil, plants and animals in the production of agricultural products.

A student should be able to:

- explain of the formation of biogeochemical cycles in natural ecosystems and agroecosystems;
- use the methods and techniques of recultivation and rehabilitation of technologically polluted territories in order to return them to agricultural use for the production of environmentally safe products;
- carry out an environmental impact assessment of agricultural land use projects;
- assess the level of fertility, to justify the direction of use of the soil in the adaptive-landscape system of agriculture.

Topics covered:

1. Agroecology as a science. Types, structures and functions of agroecosystems.
 2. Natural resource potential of agricultural production. Resource cycles.
 3. The functioning of agroecosystems under the conditions of technogenesis.
 4. Soil-biotic complex as the basis of agroecosystem.
 5. Ecological bases of conservation and reproduction of soil fertility and biodiversity.
 6. Agro-environmental assessment of land. Estimation of soil losses due to water and wind erosion.
 7. Agroecological assessment of land based on GIS - technologies.
 8. Production of environmentally friendly products. The concept of formation of sustainable nuclear power plants.
- Landscape-ecological basis for the formation of systems of agricultural production.
9. Ecological problems of livestock.
 10. Ecological aspects of the use of agricultural machinery.
 11. Arable land as agrobiocenosis and agricultural land.
 12. Pasture as agricultural land and ecosystem.
 13. AgroEnvironmental monitoring. Methodological and organizational basis of its implementation.
 14. Sustainable development of agriculture and rural areas.
 15. Environmental activities in agriculture.

Yrb3308 Urbanistics – 3 credits

Prerequisites: Environment and Humans; Economic and social geography of Kazakhstan; Human Life Safety and Management of extreme situations ; Environment and Sustainable Development.

Postrequisites: Land management; Green technologies; Climate change; Biodiversity conservation; Ecosystem services.

The purpose of the discipline is formation of students' knowledge about the processes of formation, formation and development of large cities in different countries, the dynamics and prospects for the development of global urbanization.

A student should be able to:

- interpret the historical aspects of the emergence and development of cities, the main stages of development of urban systems;
- define the basic concepts of urbanism and theoretical concepts for studying the problems of global urbanization;
- understand the main problems of the development of global urbanization;
- express the spatial patterns of urbanization through the main stages of the evolution of urban systems (city - agglomeration - urbanized area - urbanized zone - megalopolis);
- apply the theoretical and methodological foundations of the processes of urbanization, methods of designing cities, urban (town planning) policy and district planning;
- identify the main environmental problems in the urban environment;
- streamline the methodological approaches to the study of the socio-economic and environmental complex of the city;
- evaluate the role of cities in the organization of space, their structure and dynamics of development;
- explain the complex, globalized processes of urbanization, to draw convincing conclusions and expert conclusions;
- develop practical recommendations for the preservation of the natural environment, taking into account the specific features of the city;
- substantiate and build their point of view on the issues of changing the quality of the natural environment and taking into account the geoecological properties of the region when designing the district planning.

Topics covered:

1. The subject, objectives and history of urbanism from the standpoint of interdisciplinarity: the socio-political background.
2. The subject, objectives and history of urbanism from the standpoint of interdisciplinarity: the content and importance of geographical approaches in studying the problems of the development of cities and urban systems.
3. The main historical stages of urban development - pre-capitalist period.
4. The development of cities and urban planning in the XIX and XX centuries. Future cities.
5. Foundations of urban theory. The influence of postcolonialism on urban theory.
6. The concept and criteria of the city. Classification and typology of cities.
7. Economic and geographical position of the city. Hierarchical Subordination and Interaction of cities.
8. The city as a place of economic activity. City and Globalization.
9. City and nature. Environmental, demographic, economic and social problems of cities.
10. Social and cultural differences in the city.
11. Urban politics and city management.
12. Scientific and methodological foundations of urban policy. Basics of urban design.
13. Territorial organization of the city - Functional planning structure Classical concept of the framework of the territory.
14. Main features of modern urbanization in developed and developing countries.
15. The main features of the geography of cities of the CIS and its regional features.

Sustainable Nature Use Module – 9 credits

Professional competencies:

- understand the basic principles of the system of state regulation in the field of ecology and use legal documents in professional activities;
- carry out calculations to assess the levels of hazardous environmental factors, develop comprehensive programs for environmental safety.
- identify ways and means of reducing environmental risk to an acceptable level, basic measures to eliminate the consequences of accidents and disasters;

- to assess the quality of the environment and own modern methods of waste management, using sanitary and hygienic and production standards.

Learning outcomes focused on the Dublin descriptors:

A3. Use basic knowledge in the field of theoretical and applied ecology.

B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management.

C2. Predict ecosystem adaptation to climate change for the purpose of integrated management of natural resources.

C3. To critically evaluate world experience in the field of energy and resource saving and monitor the implementation of established standards for environmental management.

Methods for evaluating the results achieved:

– Oral survey: interview, colloquium, exam;

– Written works: test, test, essay, MidTerm, exam;

– Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;

– Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

– Criterion assessment is used to determine the degree of formation of competencies;

– Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

Res3306 Resource Management – 3 credits

Prerequisites: Economic and social geography of Kazakhstan; Environmental geosystems of Kazakhstan; Environment and Sustainable Development.

Postrequisites: Land management; Water resources management; Sustainable Resource extraction; Green technologies; Renewable energy; Climate change.

The purpose of the discipline is to form the student's theoretical and applied ideas about various types of natural, integral and socio-economic resources, about the interrelation of all the natural factors of social life with the socio-economic development of humanity.

As a result of studying the discipline, the student is able to:

- classify different types of resources;
- describe the current state and patterns of distribution of the natural resources of the world and Kazakhstan;
- analyze the reserves of natural resources and make a forecast on their use;
- assess the resource availability and natural resource potential of the territory;
- develop activities and programs for the rational use of natural resources.

Topics covered:

1. Resource Management in the system of established scientific disciplines.
2. Resources, their classifications, resource cycles, natural resource potential (PDP) as the basis for the development of the resource base.
3. Earth as a natural resource and spatial basis.
4. Mineral and energy resources.
5. Water resources and water supply of Kazakhstan.
6. Atmospheric and climate resources.
7. Biological resources.
8. Recreational, tourist and medical resources.
9. Ecological resources.
10. Secondary resources - man-made resources.
11. Labor and demographic resources as a structural element of resource management.
12. Financial and business resources.
13. Intellectual information resources.
14. The main contradictions in the system “resources - use - resource and environmental crises”.
15. Resource block in the concept of sustainable development.

EP3307 Environmental economics – 3 credits

Prerequisites: Economic and social geography of Kazakhstan; Environmental geosystems of Kazakhstan; Environment and Sustainable Development.

Postrequisites: Land management; Water resources management; Sustainable Resource extraction; Green technologies; Renewable energy; Climate change; Green economy.

The purpose of the discipline is to form students' experience in using the most effective ways of rational use of natural conditions and resources and environmental protection, taking into account environmental, social and economic consequences as a result of the interaction of nature and society.

As a result of studying the discipline, the student will be able to:

- understand the relationship of the main aspects of environmental management: technical, economic and socio-political;
- explain the features of the manifestation of the basic economic laws in environmental management;
- analyze the economic problems of the creation and functioning of natural and man-made complexes;
- assess the effectiveness of measures for greening the economy;
- define the tasks and measures of economic support for environmental management at the local, regional and global levels;
- own methods and technologies for analyzing environmental processes and protecting the environment in order to set priorities and set specific objectives in environmental protection activities;
- put into practice the provisions of legislation governing environmental activities in Kazakhstan;
- possess an integrated approach to improve the economic mechanisms of environmental management, develop research in the field of environmental protection, expand international cooperation in the field of environmental economics.

Topics covered:

1. Goals, objectives and methods of "Environmental economics".
2. The concept and types of environmental management.
3. Classification of natural resources.

4. The theory of economic assessment of natural resources and environmental quality. Approaches to the assessment of natural resources.
5. Economic problems of rational use of land and other resources. Inventories.
6. Nature as a process of social reproduction.
7. Types of nature management as a process of continuous interaction between the economy and nature.
8. External effects in environmental economics.
9. The main directions of greening the economy.
10. Natural and food verticals. Nature intensity.
11. Economic aspects of environmental pollution.
12. Economic efficiency of environmental activities.
13. Economic mechanisms for environmental management.
14. Legislative support for environmental management.
15. Environmental economics and sustainable development of Kazakhstan.

OER3308 Environmental Risk Assessment– 3 credits

Prerequisites: Environmental impact assessment (EIA); Environmental impact of Industrial processes; Human Life Safety and Management of extreme situations.

Postrequisites: Environmental management system; Climate change; Environmental monitoring; Fundamentals of environmental auditing; Green technologies; Renewable energy.

The purpose of the discipline is formation of students knowledge aimed at solving the problem of security and sustainable interaction between man and nature, analysis and assessment of technological and natural risks.

As a result of studying the discipline, the student is able to:

- determine the nature and content of technological and natural risks;
- describe the risk formation procedures;
- form an idea of the scale and consequences of the anthropogenic impact on the environment;
- conduct a quantitative and qualitative assessment of natural and man-made risks;

– organize activities to minimize of natural and man-made risks.

Topics covered:

1. Introduction. Risks in various forms.
2. Quantitative risk assessment. Risk of death Chance and probability.
3. Natural disasters. Basic definitions.
4. Meteorological disasters.
5. Ways to reduce atmospheric hazards.
6. Hurricane mechanism.
7. Phenomenology of volcanoes. Volcanic hazard.
8. Plate tectonics. Earthquake mechanics.
9. Contradictions in interactions within the system “nature - technosphere-society”.
10. Methods of qualitative hazard analysis.
11. Environmental change and control.
12. Classification and exposure to air pollutants.
13. Contamination of soil.
14. Soil erosion and soil stability.
15. Risk assessment for human health.

Adaptation to climate change Module – 9 credits

Professional competencies:

- apply knowledge of the nature of the main physico-chemical processes occurring in the atmosphere, hydrosphere and lithosphere;
- explain ways to reduce anthropogenic impact leading to climate change and the destruction of the ozone layer of the Earth;

- analyze environmental and socio-economic problems using the methods of system analysis and mathematical modeling in solving professional problems.

Learning outcomes focused on the Dublin descriptors:

A2. Interpret the basic concepts and laws of physics, chemistry, mathematics.

B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management.

C1. Conduct an experiment using physico-chemical methods to assess the state of the Environment.

C2. Predict ecosystem adaptation to climate change for the purpose of integrated management of natural resources.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
- Written works: test, test, essay, MidTerm, exam;
- Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
- Innovative assessment tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.

Evaluation policy:

- Criterion assessment is used to determine the degree of formation of competencies;
- Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

MME4309 Mathematical modeling in ecology – 3 credits

Prerequisites: Advanced Mathematics; Environmental GIS; Physics; Statistical methods in ecology.

Postrequisites: Methods and models in waste management; Renewable energy; Green technologies; Green economy.

The purpose of the discipline is to form students' knowledge of mathematical modeling of ecological systems, types of models and principles of their construction, basic research methods, methods for analyzing one-dimensional and multidimensional ecosystem models and features of interpretation of the results and their analysis.

As a result of studying the discipline, the student is able to:

- understand the basic principles and stages of mathematical modeling of real ecosystems;
- explain the classification of mathematical models in ecology;
- to interpret methods of research of discrete, continuous and discrete-continuous mathematical models of ecological systems;
- put into practice the basic methods of analyzing environmental models;
- analyze and select methods for solving the problem of modeling.

Topics covered:

1. Introduction. Mathematical modeling, as a tool in solving environmental problems.
2. Methodological and theoretical foundations of the modeling process. Types of models.
3. Basic principles and stages of mathematical modeling.
4. Hard and soft mathematical models. Examples.
5. Quantitative assessment of multifactor impacts in environmental modeling.
6. Geoinformational approach to modeling.
7. Digital modeling of geosystems.
8. Mathematical modeling of the environment.
9. Features of modeling local natural processes.
10. Features of modeling global natural processes.
11. The main stages of the development and research of models on the computer.
12. Modeling of conditions for dispersion of emissions from industrial enterprises.
13. Some mathematical methods for implementing models.
14. Some mathematical methods for implementing models. Convergence and stability.
15. Visualization of simulation data.

IK4310 Climate change – 3 credits

Prerequisites: Environmental Risk Assessment; Desertification and Reclamation of lands; Environment and Sustainable Development.

Postrequisites: Fundamentals of environmental auditing; Green economy; Land management; Water resources management; Sustainable Resource extraction; Green technologies; Renewable energy.

The purpose of the discipline is to form the student on the basis of the competence-based approach of theoretical knowledge on climate change, international and national actions in the field of climate change impacts, practical skills in analyzing changes in environmental components and the potential of socio-economic systems, taking into account international experience.

As a result of studying the discipline, the student is able to:

- describe the causes, current state and trends of climate change;
- identify uncertainties associated with the complexity of the climate system;
- explain the features of the impact of climate change on the environmental, social and economic security of the Republic of Kazakhstan;
- analyze literary, statistical sources about the state of environmental components;
- argue your view on measures to reduce the vulnerability of ecosystems;
- assess the effects of climate change in climate-dependent sectors and select the best adaptation measures;
- determine, based on the analysis of climate policy formation factors, national stakeholders and scenarios for the development of socio-economic systems at the local level;
- compile scientific and educational reports and presentations on climate change based on independent work with educational, reference, scientific literature, information resources of the Internet
- use the acquired knowledge and skills on climate change to solve scientific, practical and educational tasks.

Topics covered:

1. Introduction to the discipline.
2. Climate change of the Earth. The climates of the past. Modern Climate change.
3. Dynamics and state of the climate system at the global, regional and national levels.
4. Observation system and climate data. Climate models, scenarios and forecasts.

5. Anthropogenic concept of climate change. UN Framework Convention on Climate Change and the activities of the IPCC.
6. Criticism of the anthropogenic concept of climate change in scientific publications.
7. New concepts of complex terrestrial and astronomical research.
8. Socio-environmental systems (SES). Scientific uncertainty.
9. The principle of precaution. Vulnerability of social and ecological systems.
10. Adaptation to climate change.
11. Mitigation of climate system impacts.
12. International climate policy. History and principles of formation, current trends.
13. National Policy on Climate Change in the Republic of Kazakhstan.
14. Development of climate strategies, plans and activities at the local level.
15. Climate change – strategy, politics and reality.

PhOC4311 Environmental physics – 3 credits

Prerequisites: Physics; Environmental GIS; Advanced Mathematics; Environment and Sustainable Development.

Postrequisites: Green economy; Land management; Water resources management; Sustainable Resource extraction; Green technologies; Renewable energy.

The purpose of the discipline is to form students' ideas about the fundamental laws of physics to describe the behavior of biological, social and other systems and instill a physical understanding of many processes occurring in the environment.

A student should be able to:

- have knowledge of the origin and manifestation of the anthropogenic factor in thermal, electrical, magnetic and light phenomena;
- form scientific ideas about the causes and consequences of the influence of the anthropogenic factor on some natural phenomena;
- explain various physical processes and phenomena in the surrounding world;

- analyze the physical processes in the atmosphere, hydrosphere and lithosphere and the influence of human activity on them;
- apply methods and means of environmental protection from the effects of physical pollution when their level exceeds the maximum allowable.

Topics covered:

1. Introduction. The subject and objectives of the discipline «Environmental physics». Physics - the science of nature.
2. The general concept of "pollution" of the environment. Main types of pollution.
3. Noise, biological and physical concept of sound. Sound vibrations and waves.
4. Methods of protection from noise. Sound absorption. Soundproofing.
5. General and local vibrations, sources of occurrence.
6. Electromagnetic fields and their impact on the environment.
7. Biological effect of EMF.
8. The concept of thermal radiation and its characteristics. The laws of thermal radiation.
9. General information about infrared radiation.
10. General information about ultraviolet radiation.
11. The mechanism of formation and destruction of the ozone layer.
12. The protective properties of the atmosphere from the action of UV radiation.
13. Laser radiation. Definition of quantum electronics.
14. Ionizing radiation. Types of ionizing radiation.
15. Problems of radiation safety of the Republic of Kazakhstan and ways to solve them. Reducing radiation. Types of ionizing radiation.

Environmental protection Module – 9 credits

Professional competencies:

- describe the main stages of the evolution of the biosphere and its specific features; the main links of the small biological and large geological cycles of substances;

- apply geosystem analysis and bio-geographic data to assess resource potential, environmental management and biodiversity conservation;
- to develop practical recommendations for the preservation of the natural environment, taking into account the ecological design of cities, industrial enterprises
- justify the use of ecosystem services for providing people with material goods and resources, managing diseases and climate, providing recreational, cultural and spiritual benefits;
- use the methods of organization and planning of scientific research, search for scientific information, principles for determining the permissible errors of laboratory experiments.

Learning outcomes focused on the Dublin descriptors:

A3. Use basic knowledge in the field of theoretical and applied ecology.

B2. Master the methods of collecting and statistical analysis of environmental information; computer literacy.

B5. Conduct laboratory and field research, evaluate the accuracy and reliability of the results of experiments.

C2. Predict ecosystem adaptation to climate change for the purpose of integrated management of natural resources.

Methods for evaluating the results achieved:

- Oral survey: interview, colloquium, exam;
 - Written works: test, test, essay, MidTerm, exam;
 - Control using technical means and information systems: computer testing programs, complex situational tasks; exam testing, educational tasks for specialized programs;
 - Innovative evaluation tools: case-method, portfolio, business (role-playing) game, debate, discussion, incident method, method of successive situations, etc.
- Evaluation policy:
- Criterion assessment is used to determine the degree of formation of competencies;
 - Summative assessment is applied to indicators of the quality of the curriculum of the discipline.

CBZL4309 Biodiversity conservation – 3 credits

Prerequisites: Environmental biogeography; Environment and Sustainable Development; Environment and Humans; Ecology of animals and plants.

Postrequisites: Green economy; Land management; Water resources management; Sustainable Resource extraction; Green technologies.

The purpose of the discipline is formation of students' ideas about biodiversity, its structure and distribution in space, the role in the biosphere and in practical human activities, the current state and trends of change, biological and socio-economic mechanisms for the conservation of biodiversity.

As a result of studying the discipline, the student is able to:

- explain the basic laws and concepts of ecology and biodiversity, the properties of living systems, the environment-forming functions of the living, the structure and evolution of the biosphere and the role of man in it;
- describe the theoretical principles of biological taxonomy, the environmental characteristics of representatives of various systematic groups, their role in the biosphere;
- generalize ideas about the principles of functioning and the limits of the sustainability of ecosystems and the biosphere, about the interaction of man with the natural environment, about the causes of environmental crisis situations and about the possibilities of overcoming them;
- apply the knowledge gained in predicting changes and stabilization of biomes in specific conditions;
- conduct environmental protection measures at various levels to maintain biological diversity.

Topics covered:

1. Introduction. The subject and objectives of biodiversity. The history of the development of scientific views.
2. Methods for studying biodiversity. Biosphere functions of biodiversity.
3. Biodiversity created by man. Selection methods: hybridization, mutagenesis and genetic engineering.
4. Systematics of living organisms.
5. Taxonomic diversity. Evolutionary and typological concept of the species. Concepts of immense and multidimensional form. Intraspecific categories.
6. Geography of biodiversity. Genogeography.
7. Human-made impact on the stability of biosystems. The concept of sustainability and stability.

8. Monitoring biodiversity. Biodiversity indices and models. Global and regional levels of biodiversity monitoring.
9. Environmental protection. Environmental laws - as the basis for environmental planning.
10. The value of zoos and nurseries in maintaining biodiversity.
11. Ecosystem modeling.
12. Seed and vegetative reproduction of plants as a basis for the conservation of rare species.
13. Sustainable use of natural resources.
14. Biotechnical measures and biotope protection.
15. Domestic and international programs, the creation of natural biosphere reserves in accordance with the principles of the UNESCO program "Man and the Biosphere", UN conventions.

EY4310 Ecosystem services – 3 credits

Prerequisites: Environmental impact assessment (EIA); Environmental economics; Environmental Risk Assessment.

Postrequisites: Land management; Water resources management; Sustainable Resource extraction; Green technologies.

The purpose of the discipline is to determine the importance of ecosystem services, justify the use of economic analysis of ecosystem services, familiarity with the main achievements and trends in this area, as well as the processes and methods of environmental and economic assessment.

As a result of studying the discipline, the student is able to:

- demonstrate the knowledge gained about ecosystem services, their classification; have an idea of foreign experience in assessing environmental services; ecosystem assessment methods;
- develop methodological abilities, build strategies for decision-making and resolution of environmental problems;
- conduct ecosystem assessment in accordance with sustainable development goals;
- apply the knowledge gained in practical examples;
- conduct a logical discussion on issues related to the solution of environmental problems;
- apply a scientific approach to research, interdisciplinary and intersectoral problems of optimal use of ecosystems;
- assess the anthropogenic impact of production on the environment and its environmental consequences.

Topics covered:

1. Introduction to the course. What is Ecosystem services (ES)? Classification of ES. Stages of formation and identification of ES.
2. Promotion to sustainable development. Goals for sustainable development.
3. Biosphere - the fundamental shell of the Earth.
4. Productive ecosystem services.
5. Environment-forming ecosystem services.
6. Recreational ecosystem services.
7. Decision making within / outside of ecosystems.
8. Decision making within / beyond ecosystems
9. The value of the scale.
10. Ecosystem assessment concepts.
11. Analytical assessment approaches. Data collection.
12. Analysis and reporting.
13. Scenarios for the implementation of ES.
14. Methods of economic assessment of ES.
15. Application of economic assessment of water resources management.

EP4311 Environmental Project – 3 credits

Prerequisites: Global environmental challenges and Sustainable Development Goals; Environmental Impact Assessment (EIA); Environmental Safety; Environmental risk assessment.

Postrequisites: Land management; Water management; Sustainable subsoil use; Green technology; Writing and defense of the thesis (project).

The purpose of the discipline is formation of a person who has theoretical knowledge and practical skills to assess the impact of existing industrial facilities on the environment, environmental studies and project design.

As a result of studying the discipline, the student is able to:

- classify the types and types of environmental impacts of economic activity;

- form ecological thinking in solving design problems with various types of ecological design;
- interpret the principles and systems for assessing and rationing the state of landscapes and their components;
- make an environmental justification of projects;
- develop an environmental project.

Topics covered:

1. Formation and development of environmental design. Ecological development of society.
2. Basic concepts and objects of environmental design.
3. Methodology and principles of environmental design.
4. Technosphere. The concept of geotechnical systems.
5. Types and types of environmental management (sectors of the economy).
6. The impact of economic activity on the environment.
7. Geoecological principles of design.
8. Regulatory framework and informational basis for environmental design.
9. Ecological design of sanitary protection zones.
10. Environmental justification of industrial projects.
11. Engineering and environmental surveys in environmental design.
12. Ecological design of environmental facilities.
13. Purpose and typology of environmental objects.
14. Environmental justification of urban projects.
15. Ecological infrastructure of the city. Eco-city concepts.

ADDITIONAL TYPES OF TRAINING (ATT) – 23 credits

OBLIGATORY COMPONENT (OC)

Physical Training Module– 8 credits

Upon successful completion of this module, students are able to:

- use in life practical skills and abilities ensuring the preservation and strengthening of health, development and improvement of psychophysical abilities and qualities;
- independently maintain and develop basic physical qualities in the process of exercising;
- use methods and means of physical culture to ensure full social and professional activities;
- evaluate the current state of physical culture and sports in the world;
- adhere to a healthy lifestyle;
- self-organization and self-education in the formation of a healthy lifestyle.

The learning outcomes focused on the Dublin descriptors:

D1. To be ready for independent creative activity, cooperation, to use practical skills that ensure the preservation and strengthening of health, the development and improvement of psychophysical abilities and qualities.

Professional Practice Module– 12 credits

Professional competencies:

- understand environmental terminology and nomenclature;
- apply knowledge of the nature of the main physicochemical processes occurring in the atmosphere, hydrosphere and lithosphere;
- describe the main stages of the evolution of the biosphere and its specific features; the main links of the small biological and large geological cycles of substances;
- to apply principles and objectives of sustainable development to address situations of global, regional and local levels;
- understand the basic principles of the system of state regulation in the field of ecology and use legal documents in professional activities;
- perform monitoring of the biosphere using innovative methods, such as: satellite observations, GIS technology, bioindication, biotesting, ecostatistical analysis and others;

- using the fundamentals of industrial ecology, solving problems in this area, as well as applying the obtained theoretical knowledge in applied ecology;
- develop practical recommendations for the preservation of the natural environment, taking into account the ecological design of cities, industrial enterprises;
- analyze environmental and socio-economic problems with the use of systems analysis and mathematical modeling in solving professional problems;
- to assess the quality of the environment and own modern methods of waste management, using sanitary and hygienic and production standards;
- carry out calculations to assess the levels of hazardous environmental factors, develop comprehensive programs for environmental safety;
- apply regulatory documents during environmental impact assessment, environmental impact assessment and auditing, assess the level of preparation of management systems for certification for compliance with the requirements of ISO series standards;
- use the methods of organizing and planning research, searching for scientific information, principles for determining the permissible errors of laboratory experiments;
- preparation of scientific and technical documentation.

Upon successful completion of this module, students are able to:

- apply methods of field gathering (samples for chemical analysis, samples of soil and soils, herbariums, etc.) for processing, analysis and synthesis of field and laboratory (cameral) sources of environmental information;
- perform work on the description, diagnosis of soils, phytocenoses, determine in the field the mechanical composition of the soil;
- collect statistical material, use technological information in the work, compile cartographic material, build soil, profile, draw up a report; Conduct independent research based on the use of analytical information obtained at a particular enterprise;
- use the skills of collecting, organizing and summarizing the collected material to complete the thesis;
- formulate conclusions on the work that determine the scientific novelty and practical value;

- perform labor operations within the framework of the functional duties of the company's employees.

As a result of studying the module, students are able to:

- A2. Interpret the basic concepts and laws of physics, chemistry, mathematics.
- A3. Use basic knowledge in the field of theoretical and applied ecology.
- B2. To possess methods of collecting and statistical analysis of environmental information, computer literacy.
- B3. Apply this knowledge to solve scientific and applied problems in the field of ecology and environmental management.
- B4. Use the procedures of rationing, certification, auditing, licensing, examination, analysis of calculations of environmental risk and damage when conducting an environmental impact assessment and predicting the consequences of human impact on the ecosystem.
- B5. Conduct laboratory and field research, evaluate the accuracy and reliability of the results of experiments.
- C1. Conduct an experiment using physico-chemical methods to assess the state of the Environment.
- C2. Predict ecosystem adaptation to climate change with the goal of integrated management of natural resources.
- C3. To critically evaluate world experience in the field of energy and resource conservation and monitor the implementation of established environmental management standards.
- D1. To be ready for independent creative activity, cooperation, to use practical skills that ensure the preservation and strengthening of health, the development and improvement of psychophysical abilities and qualities.

UP Educational practice – 3 credits

The purpose of the practice is to consolidate students' knowledge gained during the classroom sessions at the university in specialty disciplines, familiarize themselves with ecosystems of various levels and the elements that compose them, processes occurring within ecosystems, familiarize themselves with the structure and functioning of the environmental control service of enterprises and environmental organizations.

As a result of the internship, students are able to:

- understand the limits of tolerance of organisms and populations;

- analyze the basic laws of the functioning of the biosphere and biogeocenoses, the basic principles of protecting the environment from pollution, the laws governing the formation of biodiversity, and its differentiation in geographic space;
- use environmental research methods, information tools, computer technologies to search, analyze and summarize environmental information on various landscapes;
- compile relevant databases;
- assess the diversity of animals, plants and microorganisms at different levels of its differentiation by modern methods;
- apply monitoring methods to monitor, assess and predict the state of the environment to make operational decisions to improve its quality;
- evaluate the nature and direction of anthropogenic impacts on natural complexes and their components in specific environmental conditions.

PrP Practice Training (field practice) – 1 credits

The purpose of the practice is to form students' understanding of the structure of ecological systems, the patterns of organization of natural plant and animal communities, the identification of the influence of environmental factors on the distribution of living organisms, and the interrelations between ecosystem components.

As a result of the internship, students are able to:

- apply the method of work in the field to study both individual components of nature and the entire natural-territorial complex, competently perform work on the description, diagnosis of soils, phytocenoses, determine in the field the mechanical composition of soil;
- use environmental research methods, environmental research methods, etc. for processing, analysis and synthesis of field and laboratory (cameral) sources of environmental information;
- conduct analytical work, collect statistical material, use technological information in work, compile and format cartographic material, build a profile, be able to write a report, draw up literature and application lists, etc.

PrP Practice Training – 6 credits

The purpose of the practice is to consolidate the theoretical knowledge and master the skills of the professional activity of an environmental specialist.

Professional skills acquired during the practice relate to research and development, design and production, and control and expert activities.

As a result of internship, students are able to:

- understand the nature of the work of organizations that have an impact on the natural environment and control its state;
- apply experimental and instrumental methods of studying natural systems, conducting scientific research, methods of economic incentives for environmental activities;
- conduct independent research based on the use of analytical information obtained at a particular enterprise;
- interpret the EIA data during environmental activities in the process of production and control and expert activities;
- use skills to collect, systematize and summarize information in the field of environmental protection and environmental management.

Pre-Graduation Internship – 2 credits

The purpose of practice is the practical application of skills and abilities to use theoretical knowledge of fundamental and applied sections of special disciplines to determine the field of their professional activity, collecting material on the production (professional) activity of the enterprise and using it in the performance of the thesis.

The professional competences gained during the practice relate to research, design, production and control and expert activities.

As a result of pre-diploma internship, students are able to:

- explain the nature of the organization's work, methods of analysis, regulation, planning of its activities;
- justify the experimental and instrumental methods of studying natural systems;
- conduct independent research based on the use of analytical information obtained at a particular enterprise;
- compile and consolidate professional skills and information in the field of environmental protection and environmental management in order to carry out research work;

- use the skills of collecting, organizing and summarizing the collected material to complete the thesis;
- formulate conclusions on the work that determine the scientific novelty and practical value.

FINAL ATTESTATION

State exam in the specialty (according to the university approved program) – 1 credit.
Writing and Presentation of Diploma Work (Project) – 2 credits.

CATALOG OF DISCIPLINES

GENERAL EDUCATION DISCIPLINES (GED)			
OBLIGATORY COMPONENT (OC)			
Social and humanitarian module – 6 credits			
MHK1101	Modern history of Kazakhstan (State Examination)		
Prerequisites	No	Postrequisites	Philosophy; Sociology; Political science; Culturology
Credits	3	Semesters	1
Purpose of the discipline	To form a system of scientific views on the history of modern Kazakhstan society in the context of the world historical process.		
Discipline summary	<p>The discipline “Modern history of Kazakhstan” is aimed at shaping future thinking ecologist-specialists with a focus on self-development with the priority of universal human values. Large-scale transformations are accompanied by the modernization of the public consciousness, which involves the transformation of learning based on the problem approach. Knowledge gained from the study of modern history of Kazakhstan contributes to the understanding of the dynamics of the development of the historical process and forms value reference points for ethnic, social, cultural identity in the surrounding world. The successful implementation of the state programs “Cultural heritage” and “People in the flow of history” expanded the horizons of historical knowledge and led to fundamental work aimed at changing the public consciousness and forming a single Nation of strong and responsible people. The present stage of development of our country is characterized by the Third Modernization of Kazakhstan, the creation of a new model of economic growth that will ensure the global competitiveness of the country. Modernization of the economy is inextricably linked with the modernization of consciousness, when every citizen of Kazakhstan must understand the need for change in order to move to a qualitatively new level of development of his country. Kazakhstan society should have a spiritual and ideological core for the successful implementation of the goals set, this is facilitated by the program “Ruhani Zhangyru”, which reveals the mechanisms of modernization of public consciousness and is based on the continuity of spiritual and cultural traditions. Knowledge of the history of its people contributes to a broader perception</p>		

	and ability to rethink.		
Phil2102	Philosophy		
Prerequisites	Modern history of Kazakhstan	Postrequisites	Psychology; Political science.
Credits	3	Semesters	2
Purpose of the discipline	Formation of students' holistic system understanding of philosophy as a special form of knowledge of the world, its main sections, problems and methods of their study in the context of future professional activity.		
Discipline summary	Discipline "Philosophy" is aimed at developing students' openness of consciousness, understanding their own national code and national self-awareness, spiritual modernization, competitiveness, realism and pragmatism, independent critical thinking, the cult of knowledge and education, and the mastery of such key ideological concepts as justice, dignity and freedom, as well as the development and strengthening of the values of tolerance, intercultural dialogue and a culture of peace. Special attention is paid to the problems of preserving national identity, the inner core of the national "I" and the national spirit, which are reflected in the project "Ruhani Zhangyru", the role of philosophy in modernizing public consciousness and solving global problems of modernity. Philosophy helps students to develop philosophical reflection, moral self-regulation, contributes to the development of research abilities and the formation of intellectual and creative potential.		
Instrumental module – 15 credits			
FL1103	Foreign Language		
Prerequisites	No	Postrequisites	Professionally-oriented foreign language, Scientific writing.
Credits	6	Semesters	1, 2
Purpose of the discipline	Teaching a foreign language as a subject of a general education unit is learning practical knowledge of colloquial everyday language and specialty language for the active use of a foreign language both in everyday and in professional communication.		
Discipline summary	The "Foreign Language" discipline is aimed at further developing the language competences acquired at school as part of the English language discipline program (General English), as well as deepening skills in using English as a means of communication with the formation of the following competencies:		

	communicative (reading, writing, listening, speaking), language (pronunciation, vocabulary, grammar), general cultural and interpersonal.		
K(R)L1104	Kazakh (Russian) Language		
Prerequisites	No	Postrequisites	Professional Kazakh (Russian) language
Credits	6	Semesters	1, 2
Purpose of the discipline	Provide high-quality Kazakh (Russian) language proficiency in the context of Kazakh national culture as an instrument of social, intercultural, professional and personal communication through the formation of communicative competence in all types of speech activity in accordance with the levels of proficiency in a foreign language according to the Council of Europe scale (A1, A2 + LSP; B1, B2+ LSP; C1 + LSP).		
Discipline summary	The discipline "Kazakh (Russian) language" is aimed at shaping the social and humanitarian outlook of students in the nationwide idea context of a spiritual modernization, involving the development of internationalism, tolerant attitude to world cultures and languages as the basis of national consciousness and cultural code, advanced modern technologies, the use and transfer of which are capable of ensuring the modernization of the country and the personal career growth of future specialists.		
ICT1105	Information and Communication Technologies		
Prerequisites	No	Postrequisites	Statistical methods in ecology; Environmental management system; Green economy.
Credits	3	Semesters	2
Purpose of the discipline	Formation of the ability to critically evaluate and analyze processes, methods of searching, storing and processing information, methods of collecting and transmitting information through digital technologies.		
Discipline summary	The discipline «Information and Communication Technologies» is designed to build the ability to critically understand the role and importance of modern information and communication technologies in the era of digital globalization. In connection with the entry of the economy of Kazakhstan into the era of the Fourth Industrial Revolution, the adoption of a comprehensive program “Digital Kazakhstan”, the development of new technologies such as the Internet of Things, cloud technologies, big data, block chain, etc. thinking, the acquisition of knowledge and skills in the use of modern information and communication		

	technologies in various activities.		
ELECTIVE COMPONENT (EC)			
Human and Environment– 4 credits			
GVChYR210	Global environmental challenges and Sustainable Development Goals (SDG)		
Prerequisites	Modern history of Kazakhstan; Environmental aspects of natural science; Environment and Sustainable Development.	Postrequisites	Fundamentals of industrial ecology; Introduction to ecotoxicology; Environmental Impact Assessment (EIA).
Credits	2	Semesters	3
Purpose of the discipline	Formation of students' knowledge about the essence of the global problems of today and the goals of sustainable development.		
Discipline summary	The discipline “Global Challenges and Goals for Sustainable Development” examines the issues of global environmental problems facing society with regard to the goals of sustainable development, analyzes the relationship of environmental, social and economic aspects of sustainable development.		
BGChYES2107	Human Life Safety and Management of extreme situations		
Prerequisites	Environment and Sustainable Development.	Postrequisites	Environmental chemistry; Environmental impact of Industrial processes; Introduction to Ecotoxicology.
Credits	2	Semesters	3
Purpose of the discipline	Formation of students' knowledge of the theoretical and practical bases of ensuring human security from dangerous, harmful environmental factors.		
Discipline summary	The discipline “Human Life Safety and Management of extreme situations” deals with issues of life safety, harmful and damaging factors, methods of protection from hazards, measures to eliminate the consequences of accidents, catastrophes and natural disasters, laws of the Republic of Kazakhstan and regulations in the field of life safety and environmental protection.		
Geographical Module – 4 credits			

ESGK2108	Economic and social geography of Kazakhstan		
Prerequisites	Modern history of Kazakhstan; Environmental aspects of natural science.	Postrequisites	Environmental biogeography; Environmental regulation and governance; Green Economy.
Credits	2	Semesters	3
Purpose of the discipline	Formation of students' knowledge about the socio-economic potential of modern Kazakhstan, the state system, the economy of Kazakhstan from antiquity to sovereignty, population size and natural growth, demographic policy, labor resources of the Republic of Kazakhstan.		
Discipline summary	The basis of the course "Economic and social geography of the Republic of Kazakhstan" is the geographical environment of Kazakhstan, highlights the natural economic conditions and historical conditions that determined the development of its economy and culture. Questions about its current economic and social appearance, its enormous potential, as well as problems and prospects for further development are considered. The place of Kazakhstan in the Commonwealth of Independent States (CIS) and the world community, its role in the international division of labor is shown. Each of its five economic regions is characterized, their characteristic features are emphasized.		
EGK2109	Environmental geosystems of Kazakhstan		
Prerequisites	Modern history of Kazakhstan; Environmental aspects of natural science.	Postrequisites	Geoecology; Environmental monitoring.
Credits	2	Semesters	3
Purpose of the discipline	Formation of students' knowledge of the nature and fundamental principles of the ecology of geosystems, the scientific foundations of scientific concepts and components of environmental protection.		
Discipline summary	The discipline " Environmental geosystems of Kazakhstan " considers patterns of development of the geographic shell of the earth as a holistic education, large-regional features of its individual territories (natural belts, physical-geographical zones, continents, sectors, countries), anthropogenic impact on various geospheric shells, consequences of natural and man-		
Module of social and political knowledge – 4 credits			
Soc2106	Sociology		

Prerequisites	Modern history of Kazakhstan.	Postrequisites	Urbanistics; Environmental economics.
Credits	2	Semesters	3
Purpose of the discipline	Formation of sociological thinking and imagination of the dynamic social world in which we live, as well as the formation of critical thinking and analysis of modern societies, their social structures, systems and institutions.		
Discipline summary	The discipline "Sociology" will allow you to become more familiar with the basics of sociology, including topics and applied aspects of research, theory and methodology. By developing what S. Wright Mills calls "sociological imagination," the discipline will provide insights into how culture, religion, history, people and institutions intersect in shaping their own experience, life chances and identity. Throughout the course, a number of macro- and micro-sociological "perspectives" will be presented and issues related to social inequality and accessibility of education, ethnicity, gender, social class, as well as institutions such as family, education, and the media, which play an important role in shaping our our own life and the whole social world in which we live. Based on the Head of State programmatic paper "Looking into the Future: Modernizing Public Consciousness", the course considers the features of the process of modernization of consciousness and the adaptation of Kazakhstan's society to the global challenges of our time.		
Pol2107	Political Science		
Prerequisites	Modern history of Kazakhstan.	Postrequisites	Urbanistics; Environmental economics; Fundamentals of environmental law.
Credits	2	Semesters	3
Purpose of the discipline	The study of the laws governing the formation and functioning of politics, the preparation of students for participation in the political life of the country, the formation of an active citizenship.		
Discipline summary	The discipline "Political Science" forms knowledge of the laws and laws of world politics and modern political processes, explaining the essence and content of the policies of national states, based on national security and the realization of national interests. The study of this discipline contributes to the formation of the socio-humanitarian outlook as the basis for the modernization of public consciousness. Understanding of internal and external relations and relations, major trends and patterns operating in		

	different political systems, objective criteria of the social policy dimension contributes to the formation of national and civic identity.		
Cultural heritage and interpersonal communication Module – 4 credits			
Cul2110	Cultural science		
Prerequisites	Modern history of Kazakhstan.	Postrequisites	Urbanistics.
Credits	2	Semesters	3
Purpose of the discipline	To form undergraduate students an understanding of the specifics of the development of national culture in the context of world culture and civilization; the need to preserve the cultural code of the Kazakh people, and the ability to pursue the cultural heritage of the Kazakh people in a dynamically changing multicultural world and society in independent professional activity.		
Discipline summary	The discipline "Cultural science" is aimed at developing the socio-humanitarian worldview as the basis for the modernization of public consciousness through the formation of cultural identity, the ability to analyze and evaluate cultural situations based on understanding the nature of cultural processes, the specifics of cultural objects, the role of cultural values in intercultural communication.		
Psy2111	Psychology		
Prerequisites	Modern history of Kazakhstan.	Postrequisites	Ecosystem services.
Credits	2	Semesters	3
Purpose of the discipline	To form students' social-personal and instrumental competences in the field of psychological theory and practice of interpersonal communication, necessary in professional activities.		
Discipline summary	The discipline "Psychology" contributes to the formation of a general psychological culture of a person, awareness of his past, present and future from psychological positions, as well as for mastering knowledge of the socio-psychological patterns of behavior in interpersonal communication.		
CORE DISCIPLINES(CD)			
OBLIGATORY COMPONENT (OC)			
«Environmental and natural sciences» Module – 5 credits			
EAE1203	Environmental aspects of natural science		

Prerequisites	No	Postrequisites	Core and major disciplines.
Credits	2	Semesters	1
Purpose of the discipline	Formation of basic environmental thinking among students, ensuring a systematic approach to the study of the biological, chemical and physical environment, the definition and control of the state of the biosphere (its ecosystems) and the prevention of negative environmental situations.		
Discipline summary	At the studying the discipline "Environmental Aspects of Natural Science", students should familiarize themselves with the main components of the environment, study the biological, chemical and physical components of the environment as spheres of human habitation and production activity, environmental factors, mechanism of environmental pollutants, chemistry and physics their separation and purification; modern concepts and strategies for sustainable human development.		
EH2204	Environmental chemistry		
Prerequisites	Environmental aspects of natural science.	Postrequisites	Core and major disciplines.
Credits	2	Semesters	4
Purpose of the discipline	Formation of knowledge among students: on the patterns of accumulations, distributions and sources of chemical substances entering the environment; about the features of physicochemical transformations in the lithosphere, atmosphere and hydrosphere of chemical compounds of anthropogenic origin, leading to modern environmental problems, to understand the chemistry of global processes in the biosphere.		
Discipline summary	At the studying the discipline "Environmental Chemistry", students should be known with the transformation of chemical compounds and their behavior when released into the environment; chemical processes occurring in the environment under the influence of anthropogenic activities; the effects of pollutants on the state of various media, including flora, fauna and humans, and changes in the chemical composition of these media and forecasts of the possible environmental consequences of such changes; biogeochemical cycles of elements and substances and their quantitative characteristics; anthropogenic environmental impact; chemistry of the atmosphere, hydrosphere and lithosphere and the problems of their pollution; chemical pollution of natural waters; problems of water purification and water treatment; anthropogenic impact on the soil of agricultural and industrial production. Understand the toxic effects of pollutants on the environment; methods and tools for analyzing chemical pollution; ionizing radiation and		

	its impact on environmental objects; methods of environmental management.		
Biosphere Ecology – 11credits			
EB2205	Environmental biogeography		
Prerequisites	Economic and social geography of Kazakhstan; Environmental geosystems of Kazakhstan.	Postrequisites	Core and major disciplines.
Credits	3	Semesters	4
Purpose of the discipline	Formation of students' knowledge about the factors that determine the patterns of formation of biocenoses, about the basic patterns of distribution of the plant and animal world of the planet and the structure of the spatial distribution of biota components.		
Discipline summary	The course “Environmental Biogeography” is intended to form an understanding of the links between the living conditions of plants and animals and the formation of biogeographic zones and belts, an understanding of the role of animals and plants in the biosphere and the significance of all life forms for the functioning of biota, the patterns of formation of various hierarchical levels of life integration habitats of organisms on planet Earth and their interaction in biocenoses.		
P 3206	Soil Science		
Prerequisites	Environmental geosystems of Kazakhstan; Environmental aspects of natural science; Environment and Sustainable Development.	Postrequisites	Core and major disciplines.
Credits	4	Semesters	5
Purpose of the discipline	Formation of basic knowledge among students about a special shell of the Earth - the soil, as a natural body, its formation, properties and modes, evolution; the study of environmental factors of soil formation, the role of soil in nature and human activities, ways of rational use of soil resources.		
Discipline summary	The course "Soil Science" is intended to form the ability of a critical understanding of the current ecological state of the soil cover and the ways of their rational use. It is aimed at studying the genesis, composition and properties of the soil, its role and place in the biosphere and human life. The study of soil formation processes,		

	the formation of soil fertility, its continuous exchange of matter and energy with other components of the biosphere leads to the understanding that the soil cover acts as an indispensable condition for maintaining between all its spheres (atmosphere, hydrosphere, biosphere) of the equilibrium on Earth that is necessary for development life on the planet, also having the property of fertility, the soil is the main means of production in agriculture.		
EZhR2207	Ecology of animals and plants (systems ecology)		
Prerequisites	No	Postrequisites	Core and major disciplines.
Credits	4	Semesters	3
Purpose of the discipline	Formation of a student of a holistic view of: the unity of living matter and peculiarities of interaction with the environment of organisms of various groups, dietary habits, self-reproduction (reproduction) and resettlement of pre-cellular and cellular organization organisms, evolution principles that determine the diversity of the animal and plant world and lead to the formation of biocenoses.		
Discipline summary	The course “Ecology of animals and plants” gives an idea of the diversity of modern plants, animals and other forms of living things; their morpho-anatomical and biological features; on the evolution of organisms and their adaptability to different habitats, shows the practical importance of ecological knowledge for the conservation and rational use of animal and plant diversity.		
Professional Language Module – 4 credits			
PK(R)L2201	Professional Kazakh (Russian) Language		
Prerequisites	No	Postrequisites	Core and major disciplines.
Credits	2	Semesters	3
Purpose of the discipline	To form students' skills and techniques of effective speech interaction in various situations of communication, the formation of grammatical skills and knowledge. Implementation of the main tasks of speech models and relative types at various levels of learning the state language.		
Discipline summary	The discipline "Professional Kazakh (Russian) language" is aimed at further developing knowledge of the Kazakh (Russian) language. The goals and objectives of the course at each level are taken as a basis. The knowledge gained is aimed at the performance of all types of speech actions (listening, reading, speaking and writing), the formation of correct speech and literate writing, the definition of the requirements set for		

	students.		
POFL2202	Professionally-Oriented Foreign Language		
Prerequisites	No	Postrequisites	Core and major disciplines.
Credits	2	Semesters	3
Purpose of the discipline	Formation of a foreign language professionally oriented communicative competence of students, allowing them to integrate into the international professional environment and use a professional foreign language as a means of intercultural and professional communication.		
Discipline summary	The discipline "Professionally-oriented foreign language" promotes the understanding of the functional features of oral and written professional-oriented texts, takes into account the requirements for the design of documentation, adopted in professional communication and in the country of the language being studied, strategies of communicative behavior in situations of international professional communication.		
ELECTIVE COMPONENT (EC)			
Main disciplines of the educational program			
STEM- Module- 9 credits			
VM1208	Advanced Mathematics		
Prerequisites	No	Postrequisites	Environmental GIS; Statistical methods in ecology.
Credits	3	Semesters	1
Purpose of the discipline	A summary of the basic principles of mathematical analysis, analytical geometry and linear algebra, which are necessary for the study of special disciplines.		
Discipline summary	The discipline "Advanced Mathematics" is focused on the use of algorithmic skills in solving formalized problems, the study of mathematical methods for the study of functional systems, obtaining the fundamental mathematical training necessary to study basic and major disciplines.		
GIS1208	Environmental GIS		
Prerequisites	Advanced Mathematics; Physics; Environmental aspects of natural science; Environment and Sustainable	Postrequisites	Statistical methods in ecology Environmental management system.

	Development.		
Credits	3	Semesters	2
Purpose of the discipline	Formation of students' theoretical and practical bases of geoinformatics, practical skills of working with basic geoinformation packages and the possibilities of their use in environmental studies.		
Discipline summary	The discipline "GIS technology in ecology" is focused on the formation of the bachelor's knowledge and skills on the theoretical foundations of GIS technology, software platforms and features of the use of geographic information systems in ecology. Discipline is fundamental for system analysis, modeling and prediction of the ecological state and functional quality of the basic components of natural, agro and urban ecosystems using GIS technologies. The peculiarity of the discipline is that it is closely interconnected with all disciplines of the mathematical and natural science training cycle in the direction of "Ecology".		
Phys1210	Physics		
Prerequisites	No	Postrequisites	Core and major disciplines.
Credits	3	Semesters	1
Purpose of the discipline	Formation of students' understanding of physical phenomena and the laws of physics, the limits of their applicability in the most important practical applications.		
Discipline summary	The discipline "Physics" introduces the physical phenomena and laws of physics, the basic physical quantities, their definitions, the units of their measurement with modern technical means; explains the logical connections between the sections of the physics course based on the use of innovative teaching technologies: case studies, design tasks, the use of ICT. The course is aimed at developing ideas that physics is a universal base for the natural and technical sciences.		
Sustainable development and environmental security – 7 credits			
OSYR 1211	Environment and Sustainable Development (introduction to the specialty)		
Prerequisites	No	Postrequisites	Core and major disciplines.
Credits	3	Semesters	1
Purpose of the discipline	Formation of students' deep system knowledge about the basics of sustainable development of society and nature, theoretical and practical knowledge about modern approaches to the rational use of natural resources and environmental protection.		

Discipline summary	The discipline "Environment and Sustainable Development" is knowledge about the basic laws governing the interaction of living organisms with the environment; features of the distribution and dynamics of the number of organisms, community structure and their dynamics; patterns of energy flow through living systems and the circulation of substances, the functioning of ecological systems and the biosphere as a whole; natural and anthropogenic ecological processes in the environment and possible ways of their regulation; basic principles of sustainable development. The discipline "Environment and Sustainable Development" is designed to help future professionals to organize human activities in a tough environmental imperative.		
EB2212	Environmental Security		
Prerequisites	Environmental aspects of natural science; Environment and Sustainable Development.	Postrequisites	Core and major disciplines.
Credits	2	Semesters	3
Purpose of the discipline	Formation of students' knowledge in the field of environmental safety at the international and national levels as a system of measures to ensure the protection of natural systems, the vital interests of society and the rights of the individual from threats arising from anthropogenic and natural impacts on the environment.		
Discipline summary	The discipline "Environmental safety" considers issues of ensuring environmental safety and identifying a set of measures for sustainable environmental development on an international and national scale. In the process of its development, bachelors should be able to use their knowledge of environmental safety to solve specific professional tasks in the field of environmental monitoring and monitoring, optimize the licensing system for environmental management and environmental impact assessment, and promote public participation in decision making to ensure environmental safety.		
SW2213	Scientific writing		
Prerequisites	Environmental aspects of natural science; Environment and Sustainable Development; Environment and Humans.	Postrequisites	Core and major disciplines.

Credits	2	Semesters	4
Purpose of the discipline	Formation of students' knowledge about the principles and methods of organizing and planning research.		
Discipline summary	The discipline "Scientific writing" will allow you to become more familiar with the methodology and main methods of scientific research, practical organization and conduct of research works. The course will cover the main issues of preparing a future environmental specialist for scientific, technical, organizational and methodological activities related to conducting scientific research: formulating the task, organizing and conducting research, including organizing the work of the research team, formalizing research results, evaluating the effectiveness of the proposals developed and their implementation. Students will acquire the skills of writing abstracts and scientific articles, conducting experiments, processing and analyzing the data obtained. Ways of using the RISC, Scopus, Web of Science abstract databases for optimal search of scientific information will be studied. Throughout the course, students will analyze the dynamics of solving scientific problems in the field of environmental protection.		
Applied Ecology Module – 6 credits			
OPE2214	Environmental impact of Industrial processes		
Prerequisites	Advanced Mathematics; Physics; Environmental GIS; Environment and Sustainable Development.	Postrequisites	Core and major disciplines.
Credits	3	Semesters	4
Purpose of the discipline	Formation of students' knowledge of the composition and structure of industrial production, methods and techniques for analyzing technological systems, rational development of industry, resource and energy saving, the fundamentals of technology and technology to protect production and the environment from harmful emissions.		
Discipline summary	The discipline " Environmental impact of Industrial processes" is will allow to get acquainted with the composition and structure of industrial production; the influence of natural conditions on the functioning of enterprises and their complexes; the classification of industrial pollutants and the main characteristics of environmental pollution - the atmosphere, hydrosphere and lithosphere by industry; environmental		

	activities in industrial enterprises; the main methods and equipment to ensure the treatment of emissions of wastewater and air emissions, as well as with the main methods and equipment for the processing of solid waste from various industries; processes and devices (equipment) to ensure environmental safety and resource-saving technologies.		
BE2215	Introduction to ecotoxicology		
Prerequisites	Environment and Humans; Environmental Safety.	Postrequisites	Core and major disciplines.
Credits	2	Semesters	4
Purpose of the discipline	The discipline "Introduction to Ecotoxicology" is directed to providing future environmental specialists with knowledge on the study of chemical toxicity factors, forms and manifestations of the toxic process.		
Discipline summary	The basic concepts, aims and objectives of toxicology and ecotoxicology, the elements of toxicometry and toxicity criteria for poisons are considered; receipt, transport, distribution, transformation and release of poisons from the body; accumulation and combined action of poisons; the main taxicants in natural environments and agricultural products are their sources and migration features; sanitary and hygienic assessment of food additives, alcoholic beverages, drinking water, features of population ecotoxicology, hygienic regulation and standardization of xenobiotics.		
Environmental Management Module – 9 credits			
OVOC2216	Environmental impact assessment (EIA)		
Prerequisites	Environmental Safety; Environmental GIS; Environment and Humans.	Postrequisites	Core and major disciplines.
Credits	3	Semesters	4
Purpose of the discipline	Formation of basic concepts and rules for students, such environmental control tools as environmental impact assessment (EIA), environmental impact assessment (EE) and environmental audit (EA), especially the organization of these types of environmental activities in the near and far abroad and Kazakhstan.		
Discipline summary	The discipline “Environmental Impact Assessment” considers sustainable development as a key aspect of the EIA procedure, forms in students an understanding of the legislative aspects and the administration of		

	the EIA process. In the process of its development, bachelors must master the tools for conducting a full survey of objects and quantitative assessment of environmental impact, be able to determine the environmental consequences of an engineering project or activity, and propose a set of mitigation and correcting such activities to minimize environmental impact.		
OEA4217	Fundamentals of environmental auditing		
Prerequisites	Environmental impact assessment (EIA); Environmental Monitoring; Environmental management system.	Postrequisites	Core and major disciplines.
Credits	3	Semesters	7
Purpose of the discipline	Formation of students' knowledge on modern methods of collecting, processing and analyzing statistical information in the field of environmental protection, adopted in domestic and international accounting and statistics practice.		
Discipline summary	The discipline "Fundamentals of environmental auditing" considers the procedure for conducting an independent, objective assessment of the activities of an economic entity for compliance with environmental standards, rules, standards in the field of environmental management and environmental protection and the development of a system of corrective measures.		
SME3217	Statistical methods in ecology		
Prerequisites	Advanced Mathematics; Environmental GIS.	Postrequisites	Core and major disciplines.
Credits	3	Semesters	3
Purpose of the discipline	Formation of students' knowledge on modern methods of collecting, processing and analyzing statistical information in the field of environmental protection, adopted in the domestic and international practice of accounting and statistics.		
Discipline summary	The discipline "Statistical methods in ecology" with the study of numerical descriptions of phenomena in the field of ecology, environmental management, as well as in related fields. As a result of mastering this discipline, modern computer technologies for processing information using mathematical statistics should be studied, and skills in working with software tools for analyzing and modeling data should be acquired.		

Environmental regulation Module – 6 credits			
ERY3219	Environmental regulation and governance		
Prerequisites	Environmental Safety; Environmental impact of Industrial processes; Introduction to ecotoxicology; Environmental impact assessment (EIA).	Postrequisites	Core and major disciplines.
Credits	3	Semesters	6
Purpose of the discipline	Formation of students' knowledge and basic competences about modern management and regulation mechanisms aimed at reducing environmental pollution from the government and economic entities.		
Discipline summary	The main provisions of the system of state regulation and management are considered, including: licensing of activities in the field of environmental protection (EP); environmental regulation; technical regulation in the field of environmental protection; state ecological expertise; issuance of environmental permits; state environmental control; system of economic regulation of environmental protection; encouraging the adoption of the best clean technologies; a system for financing environmental protection measures, state environmental monitoring, accounting for users of natural resources, sources and areas of environmental pollution, setting limits and allocating quotas for the use of natural resources, and more.		
SMOS3220	Environmental management system		
Prerequisites	Environmental Safety; Environmental impact of Industrial processes; Introduction to ecotoxicology; Environmental impact assessment (EIA).	Postrequisites	Core and major disciplines.
Credits	3	Semesters	6
Purpose of the discipline	Formation of students' holistic system understanding of the environmental management system and skills of its application in various fields of production and economics.		
Discipline summary	The discipline "Environment Management System" is aimed at developing students' modern ideas and knowledge in the field of environmental management system. The principles, structure and content of the environmental management system are reviewed both at the national level and internationally. At the		

	national level, EMS is implemented in enterprises, businesses, and is also used in government bodies on environmental law and environmental management. Students study methods of using the system. Students are given methods of using the system. It also proposes the basics of introducing the international environmental management system ISO 14000 and 9000, the main requirements for the implementation of international standards in national practice.		
Human and Environment Module – 6 credits			
OSCh2221	Environment and Humans		
Prerequisites	Environmental aspects of natural science; Environment and Sustainable Development (introduction to the specialty).	Postrequisites	Core and major disciplines.
Credits	3	Semesters	2
Purpose of the discipline	Formation of students' knowledge of each of the three main components of the natural environment: soil, climate and weather, as well as the role of determining factors of habitat and ecological niches. The course aims to develop an understanding of human influence on the functionality of the ecosystem. The main environmental issues are studied through an individual study (project) aimed at developing research skills and reporting. The course also explores the theory of complex systems and its implications for environmental change and the future of people.		
Discipline summary	The discipline “Environment and Humans” deals with the study of general patterns of interaction between the environment and living organisms, the main components of the environment, its factors, conditions and resources affecting living organisms and humans, as well as the impact of human activities on the environment. As a result of training, bachelors will be able to explain the importance of ecosystem goods and services and evaluate them, assess methods of managing wildlife populations in different countries of the world, carry out research, analysis and reporting on major environmental issues, including rural areas.		
EP2222	Food science		
Prerequisites	Environment and Sustainable Development (introduction to the	Postrequisites	Green Economy; Fundamentals of environmental law.

	specialty); Environmental Security; Environment and Humans.		
Credits	3	Semesters	4
Purpose of the discipline	Formation of students' theoretical knowledge and practical skills according to the criteria of risks caused by the use of food; hygienic and environmental characteristics of the main components of food products, their values for the human body; current trends in the rationalization of nutrition of the population.		
Discipline summary	The discipline “Food science” is aimed at studying: the historical unity of the environment and human health, human nutrition in the process of evolution, nutrition, its current state and development prospects, food products for special purposes, dietary, therapeutic, and preventive nutrition. Food substances and nutrients, their types, food additives, their effect on human health and toxicological and hygienic assessment are considered. The quality and safety of food products, the contamination of food raw materials by microorganisms and their metabolites are studied. An important task is to develop students' knowledge of certification and quality control of food, information, food labeling and analysis of ISO standards in the field of food safety.		
Environmental Policy Module – 6 credits			
ZE4223	Green Economy		
Prerequisites	Economic and social geography of Kazakhstan; Environmental aspects of natural science; Environmental monitoring.	Postrequisites	Core and major disciplines.
Credits	3	Semesters	7
Purpose of the discipline	Formation of student knowledge in the field of “green economy”, as the basis for environmental management and sustainable development on a global and national scale; development concepts and mechanisms for their implementation as the main tool for combating climate change through an alternative energy, sustainable use of water resources and transport, “green” bio-chemical technologies, agriculture, methods and techniques of waste management, resource and energy saving.		
Discipline summary	The discipline “Green Economy” is considered trends and prospects for the development of “green		

	economy” in the modern World, the concept of transition to a “green economy” and the mechanisms for its implementation in the Republic of Kazakhstan. Studying the discipline provides students with an idea of reducing the anthropogenic impact on the environment and greenhouse gas emissions through the development of alternative energy, the introduction of sustainable transport and new “green” bio-chemical technologies, as well as actions aimed at resource and energy saving, including by creating an organization’s “green” office. In the process of its development, undergraduate students come to realize the feasibility of an integrated approach to improving legislation, economic incentive mechanisms, the development of science and innovation practice, and expanding international cooperation in the field of green economy.		
OEP4524	Fundamentals of environmental law		
Prerequisites	Economic and social geography of Kazakhstan; Political science; Environmental Security.	Postrequisites	Core and major disciplines.
Credits	3	Semesters	7
Purpose of the discipline	Formation of students' legally competent approach to solving problems of environmental protection and rational use of natural resources.		
Discipline summary	The discipline “Fundamentals of environmental law” allows you to become more familiar with the content and principles of environmental legislation of the Republic of Kazakhstan. The course will cover the main issues of international legal protection of the environment, general and special legislation of the Republic of Kazakhstan on environmental protection and rational use of natural resources, the concept and general description of the right of state and private ownership of objects of nature. The legal basis for the economic mechanism of environmental protection and environmental management, legal liability for violation of environmental legislation, legal regime and protection of the subsurface, land, water, specially protected objects of nature will be studied. Throughout the course, students will analyze problem situations in the field of environmental management from a legal point of view and learn how to apply environmental legislation with practical examples.		
MAJOR DISCIPLINES (CD)			

OBLIGATORY COMPONENT (OC)			
Ecology of Geosystems Module – 6 credits			
Geo3301	Geoecology		
Prerequisites	Environment and Sustainable Development (introduction to the specialty); Environmental geosystems of Kazakhstan; Economic and social geography of Kazakhstan; Environmental biogeography; Environmental GIS.	Postrequisites	Core and major disciplines.
Credits	3	Semesters	5
Purpose of the discipline	Formation of fundamental knowledge among students of the essence of geo-ecology, scientific foundations of the theory of nature conservation, fundamental principles of geo-ecology as a science of the ecological background of the natural and anthropogenic systems of the Earth for practical application of the revealed patterns to the theory and practice of applied ecology.		
Discipline summary	The course is aimed at the formation of ideas about the inseparable unity of all components of the geographic environment, knowledge about the geosystems forming its structure. The course “Geoecology” is based on the analysis of global geoeological problems of humankind, the features of their regional and local manifestation. It discusses the theoretical and methodological foundations of geoecology, various approaches to the study of changes in the geographic environment occurring during the natural tendencies of its development and human impact, geoeological aspects of functioning natural and man-made geosystems, possible solutions to geo-ecological problems, etc. The study of this course will allow students to deepen their knowledge in the field of developing the basics of optimizing the interaction between man and nature.		
EM3302	Environmental monitoring		
Prerequisites	Environmental Security; Environmental chemistry; Environmental GIS; Physics;	Postrequisites	Core and major disciplines.

	Advanced Mathematics.		
Credits	3	Semesters	3
Purpose of the discipline	Formation of students' theoretical knowledge, practical skills, methodological and theoretical foundations of monitoring research.		
Discipline summary	This course examines the priority issues of the basic principles of monitoring research, the organization and conduct of environmental monitoring at various levels, ideas about the relationship of environmental factors and human health, including on the basis of innovative eco-acoustic methods. Environmental problems and practical approaches are being studied at the global, regional and local levels.		
ELECTIVE COMPONENT (EC)			
Integrated Ecosystem Management Module – 9 credits			
YZR3303	Land management		
Prerequisites	Environmental GIS; Environmental monitoring; Desertification and Reclamation of lands; Agroecology; Environmental economics.	Postrequisites	Core and major disciplines.
Credits	3	Semesters	7
Purpose of the discipline	To form students' system of knowledge and methodological foundations of land management, mastering practical skills to analyze and calculate land payments.		
Discipline summary	The discipline "Land Management" considers the conceptual framework for the protection of land resources, which will allow to get deeper knowledge of the territorial distribution of the modern economic complex of the Republic of Kazakhstan; regulations and international land management practices. Throughout the course, an analysis of problematic situations in the field of land resources protection will be conducted; assessment of the basic principles, elements and procedures adopted in land administration.		
YVR3304	Water resources management		
Prerequisites	Environmental monitoring; Environmental economics.	Postrequisites	Core and major disciplines.

Credits	3	Semesters	7
Purpose of the discipline	To form students' ideas about the current problems of the water sector and prepare them to participate in the development and implementation of comprehensive water management plans in accordance with the requirements of the Water Code of the Republic of Kazakhstan.		
Discipline summary	The discipline "Water resources management" allows to understand the territorial distribution of the water complex of the Republic of Kazakhstan; regulations and international practices in the planning and use of water resources; conceptual framework for the protection of water resources. Throughout the course, an analysis of problematic situations in the field of water resources protection will be conducted; considered the application of environmental legislation on practical examples; use of methods for assessing water and economic balance; assessment of the basic principles, elements and procedures adopted in water management.		
YN3305	Sustainable Resource extraction		
Prerequisites	Environmental GIS; Environmental monitoring; Environmental economics; Resource Management.	Postrequisites	Core and major disciplines.
Credits	2	Semesters	3
Purpose of the discipline	Formation of systematic knowledge among students of sustainable subsoil use, ecological functions of the lithosphere, requirements for the rational and integrated use of the subsoil, legal and economic mechanisms for the management of Resource extraction.		
Discipline summary	The discipline "Sustainable Resource extraction" examines the basics of modernizing economic relations and giving them innovative quality, studies the patterns of formation of mineral deposits, the resources of the subsoil, and ways of developing deposits in compliance with the principles of sustainable development. In the structure of the discipline, a special place is occupied by the issues of the impact of mining on the components of the environment and ways to reduce this impact. A separate module deals with issues of state regulation of subsoil use, the regulatory framework of subsoil use and economic mechanisms for the regulation of sustainable subsoil use.		
Applied Green economy Module – 9 credits			

ZT3303	Green technologies		
Prerequisites	Environmental economics; Resource Management, Agroecology; Urbanistics.	Postrequisites	Core and major disciplines.
Credits	3	Semesters	7
Purpose of the discipline	Formation of students' knowledge in the field of "Green Technology" a complex of theoretical and practical knowledge about green technologies and the principles of low-carbon development in the country and the world, about the importance of technological innovations in the effective use and introduction of advanced green technologies in the Republic of Kazakhstan.		
Discipline summary	The discipline "Green Economy" considers innovations based on the principles of sustainable development and the reuse or saving of natural resources. The main goal of green technologies is to reduce the negative impact on the environment. Green technologies cover the following areas of the economy: energy production from renewable sources, such as solar energy, wind energy, biofuels, etc., waste management, combating water and air pollution, restoring disturbed lands, etc. The discipline study is based on the use of modern interactive methods learning and generates students' knowledge of ways to reduce the human impact on the environment.		
BE3304	Renewable energy		
Prerequisites	Environmental economics; Resource Management; Environment and Humans.	Postrequisites	Core and major disciplines.
Credits	3	Semesters	7
Purpose of the discipline	Formation of students' knowledge in the field of development prospects and existing world and domestic experience in the development of energy sources that are alternative to traditional ones used in thermal and atomic energy.		
Discipline summary	The discipline "Renewable Energy" allows to form general ideas about resources, basic technologies, state and prospects of development of power plants using renewable energy sources in the modern sense of the term The reasons, arguments and incentives for the development of electric power industry using inexhaustible energy resources are shown. The features of the inexhaustible, universally available energy, its potential in Kazakhstan and global usage trends are revealed. The study of the discipline is based on the		

	use of modern interactive teaching methods: the method of projects, fishbone, case studies and others.		
MMYO3305	Methods and models in waste management		
Prerequisites	Environmental management system; Environmental impact assessment (EIA); Environmental impact of Industrial processes; Environmental monitoring.	Postrequisites	Core and major disciplines.
Credits	3	Semesters	7
Purpose of the discipline	Formation of students' knowledge on issues and problems related to the management of municipal solid waste and the creation of a basis for understanding specific technologies and options for managing them.		
Discipline summary	The discipline “Methods and models of waste management” deals with the issues of occurrence, classification of types and properties of solid waste, forms students' understanding of the system of waste collection and determination of their composition. In the process of its development, students will be able to differentiate waste into special, domestic, hazardous, construction, road transport waste, understand the processes of composting, biogas production from waste, and know the criteria for the formation of solid waste landfills. As a result of training, bachelors will own tools for determining waste disposal sites, landfill management and maintenance.		
Sustainable land use Module – 9 credits			
ORZ3306	Desertification and Reclamation of lands		
Prerequisites	Soil science; Environmental impact assessment (EIA); Environmental monitoring; Economic and social geography of Kazakhstan.	Postrequisites	Land management; Sustainable Resource extraction; Green technologies; Climate change.
Credits	3	Semesters	5
Purpose of the discipline	Formation of students' ideas about the current state of the problem of desertification, factors of desertification, methods to combat desertification and methods of rational use of natural resources, a set of modern measures to combat desertification, about desertification in Kazakhstan Formation of knowledge about the general principles of rehabilitation and land remediation, which allow for rational use of natural		

	resources and limit the anthropogenic pressure on the environment.		
Discipline summary	The discipline “Desertification and Reclamation of lands” considers the factors causing desertification, regional features of the problem of desertification, criteria for desertification; legislative foundations and organizational principles for the selection of the main directions of land reclamation; technological principles for the formation of structures for land reclamation production processes; technological schemes of mining and planning biomeliorative works on engineering preparation of the restored lands; means of mechanization of the main production processes; development of technological schemes for reclamation of disturbed lands; the organization of a complex of environmental measures to reduce the negative impact of mining, oil and gas or processing complex on the environment.		
Agr3307	Agroecology		
Prerequisites	Soil science; Environmental impact assessment (EIA); Environmental monitoring; Economic and social geography of Kazakhstan.	Postrequisites	Land management; Sustainable Resource extraction; Green technologies; Climate change.
Credits	3	Semesters	5
Purpose of the discipline	Formation of students' theoretical knowledge and innovative technical solutions for the rational use of the potential of the soil, plants and animals in the production of agricultural products.		
Discipline summary	The discipline "Agroecology" provides in-depth knowledge of the natural-resource potential of agricultural production, develops in students the skills of rational use of the potential capabilities of soil and plant resources based on the use of innovative bio-nanotechnologies. The main sections of the course: agro-ecosystems, technogenic pollution of soil-biotic complexes, rational use of soil and water resources, environmental problems of chemicalization and agricultural radiology, agro-monitoring, optimization of agricultural landscapes, production of environmentally safe agricultural products, environmental protection activities in agriculture.		
Yrb3308	Urbanistics		
Prerequisites	Environment and Humans; Economic and social geography of Kazakhstan; Human	Postrequisites	Land Management; Green technologies; Climate change; Biodiversity conservation;

	Life Safety and Management of extreme situations; Environment and Sustainable Development (introduction to the specialty).		Ecosystem services
Credits	3	Semesters	5
Purpose of the discipline	Formation of students' knowledge about the processes of creating a comfortable urban environment using SMART technologies, problems of dynamics and prospects for the development of global urbanization.		
Discipline summary	Academic discipline provides a comprehensive view of the dynamics and spatial patterns of urbanization processes, spatial organization, evolution and functioning of urban systems at various levels in the post-industrial world development, as well as practical skills that allow analyzing local and regional problems of urbanization to develop and substantiate urban development programs of settlements based on the use of innovative technical project solutions.		
Sustainable Nature Use Module – 9 credits			
Res3306	Resource Management		
Prerequisites	Environmental geosystems of Kazakhstan; Environment and Sustainable Development (introduction to the specialty).	Postrequisites	Land management; Water resources management Sustainable Resource extraction; Green technologies; Renewable energy; Climate change.
Credits	2	Semesters	5
Purpose of the discipline	Formation of students' theoretical and applied ideas about various types of natural, integral and socio-economic resources, problems and prospects for the search for renewable resources based on innovative bio-nanotechnologies, on the relationship of all natural factors of social life with the socio-economic development of mankind.		
Discipline summary	The discipline “Resource Management” examines the use of all types of resources: natural, integral and socio-economic. The concepts of resource management, interdisciplinary communication of resource studies are explained, attention is paid to resource cycles and the natural resource potential of territories. Most of the discipline is devoted to the study of the use of natural resources: water, land, climate, plant,		

	forest, mineral resources, wildlife. Separate modules study integral resources (recreational, tourist, environmental and anthropogenic) and socio-economic resources (labor, demographic, financial, intellectual). A link is established between resource availability, resource consumption and sustainable development.		
EP3307	Environmental economics		
Prerequisites	Economic and social geography of Kazakhstan; Environmental geosystems of Kazakhstan; Environment and Sustainable Development (introduction to the specialty).	Postrequisites	Land management; Water resources management Sustainable Resource extraction; Green technologies; Renewable energy; Climate change; Green Economy.
Credits	3	Semesters	5
Purpose of the discipline	Formation of students' experience in using the most innovative effective ways of rational use of natural conditions and resources and environmental protection, taking into account environmental, socio-economic impacts.		
Discipline summary	The discipline "Environmental Economics" examines the relationship of technical, economic and socio-political environmental management, forms among students an understanding of the need to green the economy and the mechanisms for its implementation, and measures for the economic support of environmental management at local, regional and global levels. In the process of its development, bachelors should possess methods and technologies for analyzing environmental processes and protecting the environment to form priorities and set specific objectives in environmental protection activities, as well as be able to use in practice the legislative acts regulating environmental protection activities in Kazakhstan.		
OER3308	Environmental Risk Assessment		
Prerequisites	Environmental impact assessment (EIA); Environmental impact of Industrial processes; Human Life Safety and Management of extreme situations.	Postrequisites	Environmental management system; Climate change; Environmental monitoring; Fundamentals of environmental auditing; Green

			technologies; Renewable energy.
Credits	3	Semesters	5
Purpose of the discipline	Formation of students' knowledge aimed at solving the problem of security and sustainable interaction between man and nature, analysis and assessment of technological and natural risks.		
Discipline summary	The discipline "Environmental Risk Assessment" is devoted to modern conditions in the field of assessment and analysis of technological and natural risk. Particular attention is paid to assessing the risk and risk of environmental pollution: soil, water, air as a result of anthropogenic activities. The objective of the course is to form an idea of the scale and consequences of human impact on the environment, to acquaint students with the principles of quantitative and qualitative assessment of natural and man-made risks, to develop an independent and creative approach, to develop an integrated way of thinking that allows minimizing the negative impact on humans and the environment.		
Adaptation to climate change Module – 9 credits			
MME4309	Mathematical modeling in ecology		
Prerequisites	Advanced Mathematics; Environmental GIS; Physics Statistical methods in ecology.	Postrequisites	Methods and models in waste management; Green Economy; Green technologies; Renewable energy.
Credits	4	Semesters	6
Purpose of the discipline	Formation of students' knowledge of mathematical modeling of ecological systems, types of models and principles of their construction, basic research methods, methods for analyzing one-dimensional and multidimensional ecosystem models and features of interpretation of the results obtained and their analysis.		
Discipline summary	The discipline "Mathematical Modeling in Ecology" considers the patterns of interaction of living organisms with the environment based on the construction of mathematical models of ecological systems; the basic principles and stages of mathematical modeling of real ecosystems, the classification of mathematical models in ecology, research methods for discrete, continuous and discrete-continuous mathematical models of ecological systems; basic methods for analyzing environmental models.		

IK4310	Climate change Module		
Prerequisites	Environmental Risk Assessment; Desertification and Reclamation of lands; Environment and Sustainable Development (introduction to the specialty).	Postrequisites	Fundamentals of environmental auditing; Green Economy; Land management ;Water resources management; Sustainable Resource extraction; Green technologies; Renewable energy.
Credits	3	Semesters	6
Purpose of the discipline	Forming a student on the basis of the competence-based approach of theoretical knowledge on the problem of climate change, international and national actions in the field of climate change, practical skills for analyzing changes in environmental components and the potential of socio-economic systems using modern GIS technologies and international experience.		
Discipline summary	The academic discipline is designed to familiarize students with the basic conceptual and terminological apparatus on the problem of climate change; acquaintance with the methods of establishing the spatio-temporal patterns of current climate change based on mathematical modeling; determine the impact of climate change on the environmental, social, economic security of the Republic of Kazakhstan and measures to adapt and mitigation of the climate system. Discipline studies involve familiarity with various climate change hypotheses, which will help assess the role of international and national organizations in the accumulation of knowledge and the development of international and national documents on climate change; develop basic understanding of climate policy at global, regional and national levels.		
PhOC4311	Environmental physics		
Prerequisites	Physics; Environmental GIS; Advanced Mathematics; Environment and Sustainable Development (introduction to the specialty).	Postrequisites	Green Economy; Land management ;Water resources management; Sustainable Resource extraction; Green technologies; Renewable energy.
Credits	3	Semesters	6
Purpose of the	Form students' ideas about the fundamental laws of physics to describe the behavior of biological, social		

discipline	and other systems and instill a physical understanding of many processes occurring in the environment.		
Discipline summary	When studying the discipline "Physics of the Environment", students should become familiar with the main aspects of physical ecology from the perspective of modern physics; with physical fields of near-Earth space (electromagnetic radiation, static electric and magnetic fields, radiation, noise, vibration, etc.); with the physical nature of energetic pollution and the influence of physical fields on the biosphere and the causal relationship of these interactions, as well as with methods of protection against the harmful effects of physical (energy) environmental pollution when their level exceeds the allowable and their means of measurement based on the use of modern research methods.		
Environmental protection Module – 9 credits			
CBZL4309	Biodiversity conservation		
Prerequisites	Environmental biogeography; Environment and Sustainable Development (introduction to the specialty); Environment and Humans ; Ecology of animals and plants (systems ecology).	Postrequisites	Green Economy; Land management ;Water resources management; Sustainable Resource extraction; Green technologies.
Credits	3	Semesters	6
Purpose of the discipline	Formation of students' competence-based approach to the study of biodiversity, its structure and distribution in space, its role in the biosphere and in human activities, the current state and trends of change, biological and socio-economic mechanisms for the conservation of biodiversity based on the principles of sustainable development.		
Discipline summary	The discipline “Conservation of biodiversity” considers the interaction of man with the natural environment, the theoretical principles of biological taxonomy, the environmental characteristics of representatives of various systematic groups, their role in the biosphere, ideas about the principles of functioning and the limits of sustainability of ecosystems and the biosphere of creating natural biosphere reserves in accordance with the principles of the UNESCO program “Man and the Biosphere”, UN conventions.		

EY4310	Ecosystem services		
Prerequisites	Environmental impact assessment (EIA); Environmental economics; Environmental Risk Assessment.	Postrequisites	Land management; Water resources management; Sustainable Resource extraction; Green technologies.
Credits	3	Semesters	6
Purpose of the discipline	Forming students with a competent approach to assessing ecosystem services, methods of environmental and economic assessment, major achievements and trends in the conservation of natural ecosystems and resources, the use of economic analysis of ecosystem services based on mathematical modeling.		
Discipline summary	The discipline "Ecosystem services" examines ecosystem services (EU), their classification; international experience in evaluating EI; ecosystem assessment methods; characteristics of production and environment-forming ecosystem services, especially the formation of environment-forming, production and recreational services in the Republic of Kazakhstan; valuation of ecosystem services; economic valuation of ecosystem services of water, land and other resources with using innovative teaching methods: case study, project method.		
EP4311	Environmental Project		
Prerequisites	Global challenges and sustainable development goals; Environmental Impact Assessment (EIA); Environmental Safety; Environmental risk assessment.	Postrequisites	Land management; Water management; Sustainable Resource extraction subsoil use; Green technology; Writing and defense of the thesis (project).
Credits	3	Semesters	6
Purpose of the discipline	Formation of a person who has theoretical knowledge and practical skills to assess the impact of existing industrial facilities on the environment, environmental studies and the preparation of innovative technical solutions for projects.		
Discipline summary	The discipline "Environmental Project" examines methods for compiling an assessment of the impact of the designed activity on the environment, environmental justification of projects, principles and procedures for conducting state environmental impact assessment of projects, the impact of existing industrial facilities on the environment. Discipline is based on the use of interactive student-centered		

	teaching methods: case studies, portfolios, synquain, quest, problem-based and project-based teaching methods, brainstorming, buzzing bee, decision tree.		
ADDITIONAL TYPES OF TRAINING (ATT)			
OBLIGATORY COMPONENT (OC)			
Physical Training Module			
FK	Physical Training		
Prerequisites	No	Postrequisites	Food science.
Credits	8	Semesters	1,2,3,4
Purpose of the discipline	Formation of students' physical culture of the individual, the acquisition of skills and abilities of the directional use of various means of physical culture, sports and tourism for the sake of maintaining and promoting health, psychophysical training and self-preparation for future life and professional activities.		
Discipline summary	The course is dedicated to the development and improvement of physical qualities, motor skills and skills of students to ensure psychophysical readiness for future professional activities and the use of physical culture in the process of organizing active leisure and improving the quality of life.		
Professional practice module – 12 credits			
UP	Educational Internship (Introductory)		
Prerequisites	Environmental aspects of natural science; Environment and Sustainable Development (introduction to the specialty); Physics.	Postrequisites	Core and major disciplines.
Credits	3	Semesters	2
Purpose of the discipline	Formation of knowledge of various abiotic environmental factors, their influence on the morphophysiological adaptations of ecological groups of organisms, the ability to compare different communities and their relationships with environmental factors, practical skills of field study of ecosystems, skills of independent research work and the design of written scientific reports based on the analysis of experimental data on the state of the environment in the study area.		

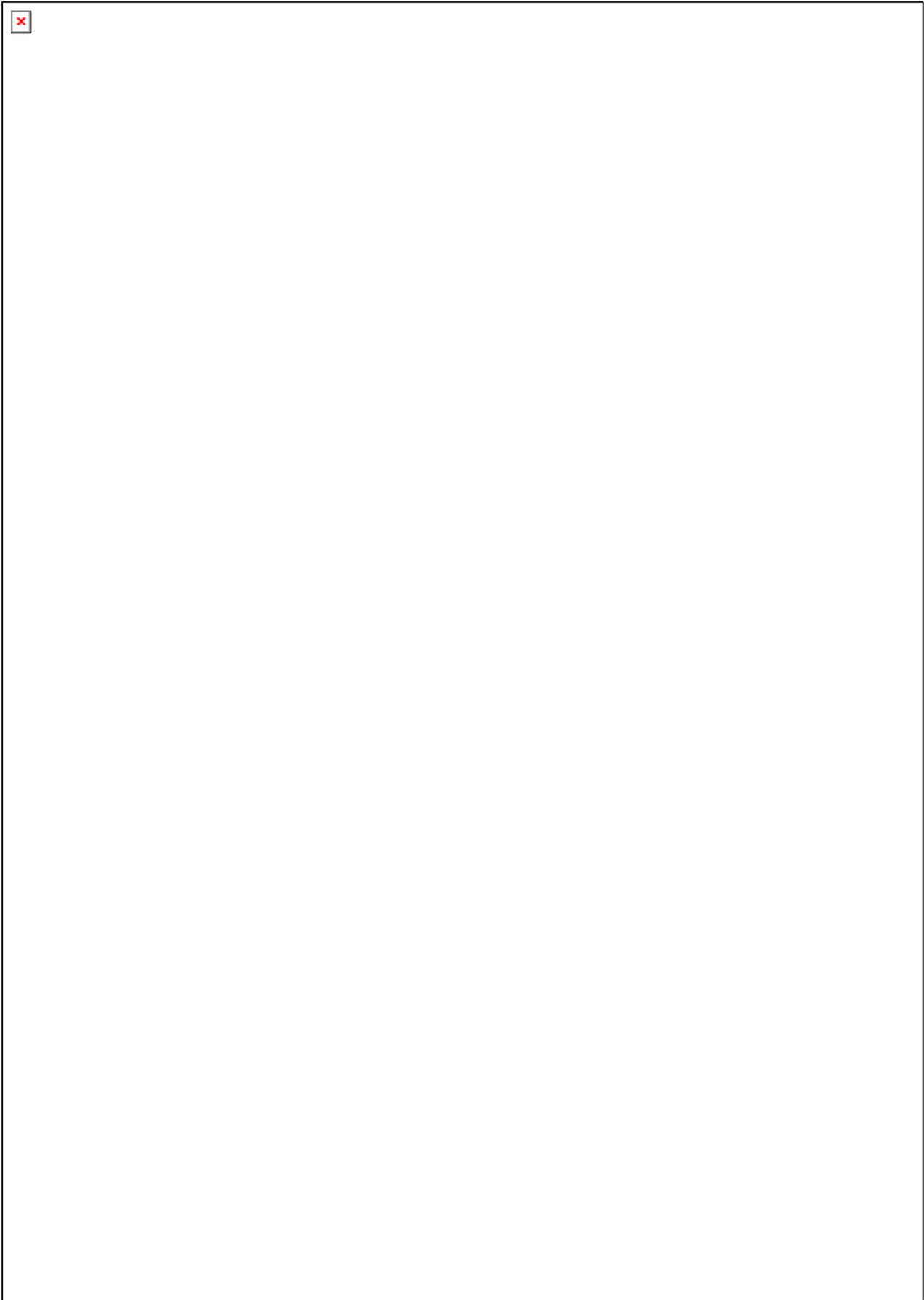
Discipline summary	Educational practice is designed to study the basic laws of the functioning of the biosphere and biogeocenoses, the action of abiotic factors on organisms, the methodology for studying ecosystems, the laws governing the formation of biodiversity, its differentiation in geographical space and the basic principles of environmental protection.		
PrP	Practice Training (field practice)		
Prerequisites	Environmental aspects of natural science; Environment and Sustainable Development (introduction to the specialty); Physics; Educational Internship (Introductory); Global environmental challenges and Sustainable Development Goals (SDG); Human Life Safety and Management of extreme situations.	Postrequisites	Core and major disciplines.
Credits	1	Semesters	4
Purpose of the discipline	Formation of students' knowledge about the structure of ecological systems, the patterns of organization of natural plant and animal communities, the influence of environmental factors on the distribution of living organisms, as well as the relationships between components of the ecosystem.		
Discipline summary	Production practice (field) is intended for the development of methods of work in the field to study both individual components of nature and the entire natural-territorial complex, competently perform work on the description, diagnosis of soils, phytocenoses, determine the soil mechanical composition in the field, work with the instrument base (topography, hydrology, etc.), to possess the method of full-scale gathering (samples for chemical analysis, samples of soil and soils, herbariums, etc.); apply the methods of environmental studies, analysis and synthesis of field and laboratory (cameral) sources of environmental information, collection of statistical material.		
PrP	Practice Training		
Prerequisites	Core and major disciplines.	Postrequisites	Pre-Graduation Internship; Writing and

			Presentation of Diploma Work (Project).
Credits	6	Semesters	6,8
Purpose of the discipline	Work practice - consolidation of theoretical knowledge and mastering the skills of the professional activity of an environmental specialist.		
Discipline summary	Production practice is designed to master instrumental and experimental methods of studying natural ecosystems and their changes in the process of human activity, familiarize themselves with the work of organizations that have an impact on the environment and controlling its condition, study methods of economic incentives for environmental activities of an enterprise, develop students' creative initiative, acquire future engineers of administrative experience in the organization and management of production.		
PdP	Pre-Graduation Internship		
Prerequisites	Core and major disciplines	Postrequisites	State exam in the specialty; Writing and Presentation of Diploma Work (Project)
Credits	2	Semesters	8
Purpose of the discipline	Formation of students' skills in mastering the methods and techniques of research work, processing of factual material collected during pre-diploma practice for writing graduation qualification work.		
Discipline summary	Pre-diploma practice is necessary to consolidate theoretical knowledge, deepen practical skills acquired at the university in the learning process, as well as the acquisition of skills in an objective assessment of the scientific and practical significance of the results of the study; search, collection, processing, analysis and systematization of information on the selected research topic; acquisition of experience of a logical presentation of the research results in writing, public defense of the results, presentation of the presentation in electronic form, preparation of reviews, reports and scientific publications, final qualifying work.		
FINAL ATTESTATION			
GES	State exam in the specialty		

Prerequisites	Core and major disciplines	Postrequisites	No
Credits	1	Semesters	8
Purpose of the discipline	The purpose of the state exam is to assess the level and quality of theoretical, general professional and special training of graduates in the cycles of disciplines stipulated by the Basic curriculum for the specialty “5B060800 - Ecology”. The preparation and passing of the state exam completes the process of mastering a basic bachelor's degree program by a student.		
Discipline summary	The final attestation is a form of state control of the educational achievements of the bachelor, aimed at determining the compliance of the knowledge, skills, abilities and competences received by him with the requirements of state educational standards in the specialty “Ecology”.		
NZDR	Writing and Presentation of Diploma Work (Project)		
Prerequisites	Core and major disciplines	Postrequisites	No
Credits	2	Semesters	8
Purpose of the discipline	Writing and defending a thesis - systematization, consolidation and expansion of theoretical knowledge and practical skills in the specialty and their application in solving specific problems, development of skills for conducting independent work of scientific research and experimentation.		
Discipline summary	The thesis represents a synthesis of the results of independent study and research of the actual problem of the specialty “Ecology”. Contains the results of research, scientific decisions, scientifically based theoretical conclusions of the object under study.		

CONCLUSIONS OF EXPERTS





Foreign universities and organizations-partners



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Independent Review of the core curriculum on speciality Ecology 5B060800

Many thanks for the opportunity to be part of the international team contributing to the development of the Bachelor of Natural Science in the speciality Ecology (5B060800). As a member of the international team I have had access to documents relating to the programme structure in English, participated in a workshop on programme development working directly with the team who will deliver the programme and had the opportunity to present the process of B.Sc. programme development from a national (UK) and institutional perspective. I found these workshops very informative and the staff engaged, motivated and enthusiastic in regard to ensuring both subject matter and pedagogical approach are up-to-date and considered international best practice.

As an international contributor to programme development, I am a Professor of Environmental Science at Middlesex University (UK) and Guest Professor at Lulea Technical University (Sweden). My research expertise lies in the fields of urban stormwater management, the sources, behaviour and fate of diffuse pollutants and the delivery of ecosystem services by urban green spaces. With regard to programme development and validation, I was co-ordinator of EU TEMPUS I-WEB (Integrating Water cycle management: building capability, capacity and impact in Education and Business supporting three Kazakh universities to develop Bologna-compliant integrated water cycle management PhD and MSc programmes, I am co-developing an integrated M.Sci. programme in Environmental Science at Middlesex University and I am external examiner on the B.Sc. (Hons) Environmental Science and Technology programme at Abertay University (Scotland, UK).

As part of my role on the international development team, I have been asked to provide a report which summarises my opinion on the proposed programme structure, its content and delivery plans. In doing so I have been asked to highlight aspects of innovation, attractiveness to international students and relevance of the knowledge and skills students develop to meet the needs of the employment market. I have also been asked to include recommendations to enhance the programme contents and its attractiveness to potential students and employers.

Programme structure

The proposed programme is four years in duration. This is one year longer than a degree at an English University (where students pay university fees on an annual basis) but consistent with the duration of a degree offered by a Scottish University (Scottish students do not pay University fees). Depending on their personal circumstances, a four year undergraduate degree may act as a disincentive to some international students (i.e. if they are self-funding). The current requirement for English students to pay University fees has led to increased interest in the provision of degrees by private universities which teach throughout the year (i.e. over the usual summer break) which therefore enables students to undertake a traditional three year undergraduate degree programme over a two year time period.

I am aware that development of this programme has included consultation with potential employers with regard to the types of knowledge and skills they would wish graduates (as prospective employees) to hold. This approach is considered international best practice in programme development and is commended. A further step would be to invite prospective employers to give 'guest lectures' as part of programme delivery. I understand this approach to 'real world application' of taught concepts is included within some programmes and its inclusion within this programme is recommended.

Programme content

The proposed programme includes an appropriate range of subjects drawn from the fields of geography, biology, chemistry, physics and international, national and local conventions and legislative approaches. For example, during the workshop on programme development, I had the opportunity to review the programme content against the UK Quality Assurance Agency Benchmark (QAA) Statements for Biosciences (which includes ecology). QAA benchmark statements outline the knowledge and skills students undertaking a particular subject at degree level should develop by the end of their degree. Benchmark statements are used by all UK Universities as a key part of programme development and the external

validation process. Review of the proposed ecology programme against the benchmark statements for ecology indicated that all required areas of knowledge and skills are included within the current proposal. However, whilst discussions with the local programme team indicate that aspects of social science are included within modules such as 'approaches to environmental protection', 'human ecology' and the industry work placement, a more explicit inclusion of social science theories and concepts would be useful to ensure students have a grounding in the contribution and value of social sciences within ecology e.g. need for / value of stakeholder engagement, partnership working, ethics of climate change and addressing challenges of urbanisation.

Whilst I appreciate that the Kazakh education system requires students to undertake several compulsory elements around the history and culture of Kazakhstan, these compulsory elements take up a considerable amount of teaching and learning opportunities in year 1 and 2. These aspects are unlikely to appeal to international students wishing to pursue a degree in ecology and as such may act as a disincentive to achieving increased international student recruitment objectives.

I have also suggested several minor rewordings of module titles to better reflect proposed contents in English (see Appendix I).

Programme delivery plans

Teaching and learning will be delivered through a combination of lectures, seminars, laboratories, field work and work placements. This mixed approach to enabling students to develop the knowledge and skills required is considered appropriate with regard to the subject matter (field work is an essential component of ecology programmes) and considered international best practice with regard to supporting student learning. Within a UK context, a particular emphasis is placed on ensuring lectures and seminars engage students by providing students with opportunities to be active learners. This includes, for example, the opportunity for students to work in small groups (team work skills) to research questions (research skills) which requires them to apply their learning (applying knowledge) and report their findings back to their colleagues (peer-to-peer learning; presentation skills). I have shared some examples of this approach from my own teaching and would look to see this form of interactive teaching as an element within delivery of this programme.

Relevance and graduate employability

Many of the key challenges at a global, national (including Kazakhstan and the UK) and local scale pertain to the interactions between humans and the environment. These include

climate change, population growth and rapid urbanisation. Our ability to respond to these challenges – to adapt to increasing temperatures and changes in rainfall patterns, to produce more food and maintain water supplies in physically and economically-scare water areas – depend on our understanding of the ecosystems, environmental cycles and ecologies that make up and inform the stability of our planet. This programme will enable students to develop the necessary skills to work and /or undertake further research with this important field and is therefore a key contribution to enabling Kazakhstan to develop an evidence-based approach to addressing these challenges and contributing to international debates on issues that affect us all.

The proposed ecology programme will equip students with thorough and in-depth specialist knowledge and technical skills to become proficient professionals in the field of ecology. Successful graduates will be well-qualified for either professional practice or to progress to postgraduate study in a related discipline, graduate training programme or research degree. Graduates could also be employed in public and private sectors, for example, found in environmental and sustainability consultancies, environmental industries, non-governmental organisations (NGOs), as an education officer, pollution officer or find a job in the growing field of communicating and popularising science.

I look forward to keeping in contact with the local programme development team and I am happy to provide further support as this programme develops. For example, I am happy to provide further teaching materials as examples of the approaches taken to delivering subject matter in the UK, and in the innovate ways we work with students to co-produce their learning experiences. I would also be happy to contribute to programme delivery by, for example, delivering a webinar.

Your sincerely



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P.PORTO

Expertise

concerning the
BACHELOR OF NATURAL SCIENCE

Specialty 5B060800 – Ecology

Developed on the basis of experimental educational
program

Order of MES of the RK №457 from 14.07.2015

AL-FARABI KAZAKH NATIONAL UNIVERSITY

Almaty, Kazakhstan

provided by

Dr. José Carlos Quadrado

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Expertise Specialty 5B060800 – Ecology by Dr. José Carlos Quadrado

Introduction

This expertise is provided for the “BACHELOR OF NATURAL SCIENCE EDUCATIONAL PROGRAM, in english, Specialty 5B060800 – ECOLOGY” as provided to the reviewer as pdf-file with the name “ОУП англ 05.05.18.pdf”.

As the reviewer is a senior expert in the energy field, working in Polytechnic of Porto, Portugal, this document covers the global content of the program of study with special focus in the topic of expertise encountered in the program.

Innovation

Ecology is defined as the scientific study of interactions of organisms (both biotic and abiotic) with one another within the physical and chemical environment. Ecology involves use of scientific methodology via lab experiments to understand how the different organisms grow, populate, how they interact with other organisms either as parasites, predators, how the organisms die out as well as how they evolve or adapt to changing climatic and environmental situations.

In the recent years, the innovative studies in ecology become all about connections. In the innovative degrees appearing worldwide, by carefully using the principles of ecology, students can learn to predict, extinguish, counteract and prevent potentially adverse effects we might have on the globe around us.

This specialty has been designed to train individuals to comprehend and simultaneously act under the ecology principles under the umbrella of the Sustainable Development Goals and with deep knowledge of the Kazakhstan reality in the field. The mix of these fields with the understanding of the green technologies associated undoubtable support the unique and innovative character of this specialty.

Providing and regularly adapting such educational program is of paramount importance for a higher educational institution with a broad educational spectrum. This holds especially for a national university like the AL-FARABI KAZAKH NATIONAL UNIVERSITY.

Relevance

As already pointed out, this specialty conveniently bridges several major aspects of ecology worldwide while having a specific focus on the Kazakhstan needs, namely by covering the major discussion issues of environmental conservation, the resources allocation and the energy conservation.

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By studying the environmental conservation aspects of ecology in the analyzed specialty, emphasis is put on how each species needs the other for peaceful coexistence. Lack of understanding ecology has led to degradation of land and environment which is home to other species thus leading to extinction and endangerment of species because of lack of knowledge.

The issue of resource allocation deals with the needs of all the plants and animals to share limited natural resources such as air, minerals, space and environment. Lack of ecological know-how has led to deprivation and looting of these natural resources leading to scarcity as well as exploitation and competition in many countries including Kazakhstan.

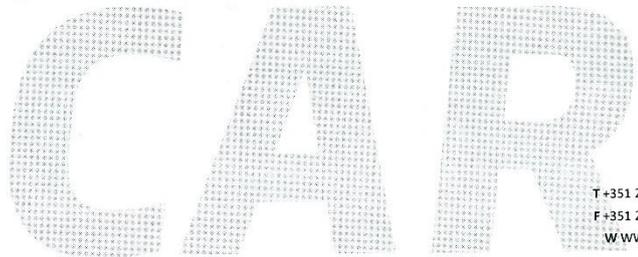
By understanding that all species require energy, whether light, radiation or nutrition, this degree covers the need for energy conservation, and how the poor understanding of ecology is seeing the destruction of the energy resources e.g. Nonrenewable sources like oil, coal, natural gas and also pollution and climate change.

Ecology has become an important part of science as well as of research and development in the economic world. Having a sufficient number of well-educated experts in this field is therefore of high importance for future scientific success and for future growth and further improvement in the economic field. Consequently, educating students in this area is of high importance for future success of a region, a state and even a continent.

The employment market in Kazakhstan is currently lacking well trained ecology experts. As a result, the well needed developments in the fields of environmental conservation, resources allocation and energy conservation cannot be performed as required for the country.

This is of crucial importance in a country where several important economic fields require well educated ecology specialists. These are for example oil and gas industry, medical instrumentation industry and mining. As ecology studies has become a key requirement in all these fields, having a sufficient number of well-educated experts on ecology is highly relevant for the economy and the society.

Providing a program in natural sciences with the specialty ecology is therefore a precondition for the future success of science and the green economy of a country. Therefore, it is a major requirement to have such a program for each major university in Kazakhstan.





Compliance with the World Educational Standards

The definition of the educational program Bachelor in natural Science, Specialty in Ecology is mostly coherent with world educational standards. However, there are a few points which needs reconsideration.

First, the length of a bachelor program with 8 semesters is quite long, however this is necessary to incorporate the mandatory national specific courses. Typically, the effort within a semester should add up to approximately 30 ECTS points. Here, the program is coherent. Being outside of the scope of this work, the mandatory status of the national specific courses should be weighted with the desired reduced run time of the program that would result in making the graduates earlier available to economy.

However, the number of courses that then reflects in ECTS points is at the upper limit. One ECTS point should be worth about 25hrs of effort.

Besides physical training, the minimum factor between ECTS points and presence time at the university is for the considered degree 1.5. In other countries, there are courses with a judgment of 1:1 in a few exceptions even less.

The stated mission of the BSc in Natural Sciences specialty Ecology is to train specialists in the field of ecology and environmental protection, equipping them with expert knowledge and implement activities that ensure the rational use of natural resources and meet sustainable development goals. This is clearly within the world education standards for similar education programs.

Conformity of the Learning Outcomes to Labor Market

The main purpose of each university educational program is twofold. First and most important, it shall provide skilled specialists for the national economy and industry. And second, it shall also provide the young academics for the universities and to support the research efforts of the scientific community. In the ecology field, this means that the graduates should become qualified specialists who have solid foundations in ecology and can perform as ecologist for various industries, agriculture sector and services. Graduates of this program can also work in state, non-governmental and international organizations, research institutions involved in the analysis and forecasting of changes in the state of environment.

In addition, there should be the opportunity to specialize, through master and PhD degrees, in one or two application areas where a deep insight to the used methodologies and processes is provided. The selection of those application fields which are provided by a university should be aligned to the needs of the respective local and national economy.



The educational program of BSc in Natural Sciences specialty Ecology fulfills all those requirements. The graduates of this program will have the necessary knowledge allowing them to work in various sectors of economy (industry, agriculture and services) related to the processing of raw materials, industrial wastes, to conduct basic scientific research in the field of environmental protection. In addition, they have an overview and the basics to work in all the different relevant employment sectors. Three important sectors with a major relevance for the Kazakh economy, Oil & Gas, the Financial Area and the Biomedical field are directly addressed with an emphasis in the program. In addition, it is expected that successful graduates have the ability to even translate the adopted knowledge into new and upcoming application areas.

Accordingly, the reviewer expects very good chances on the national and international labor market for the graduates of this program.

Recommendations

The planned education program for BSc in Natural Sciences specialty 5B060800 – Ecology is already at a solid level, however, the reviewer would like to provide recommendations to further improve the program.

1. It is recommended to reconsider the number of courses offered as mandatory electives within this Bachelor program. Bachelor programs in other countries have around half of the mandatory courses than the ones offered in this degree. All the considered elective disciplines offered are relevant but the students should be required to attend less disciplines, allowing for different pathways of the students. Reconsidering increase credits of the existing elective courses to around 5-6 ECTS per course.
As stated, although being outside of the scope of this work, the mandatory status of the national specific courses should be weighted with the desired reduced run time of the program that would result in making the graduates earlier available to economy.
2. The global weighting in ECTS points is at the upper limit. It is recommended to reconsider the weighting of the courses having in mind that one ECTS point should reflect a study effort of 25 hours including all required preparation and post-processing work.
3. Recommendations specific for the General Education disciplines identified in the curriculum:
 - 3.1. Philosophy discipline, move it to an earlier stage in the education program, making the course more interactive, aligned with the ecology issues and providing effective training in thinking techniques.
 - 3.2. English modules, consider spread them all over the curricula and not concentrated in the first years. It is more efficient to respond to the requests arising from a degree taught in English.
 - 3.3. Global environmental issues discipline, consider moving to an earlier stage, 1st semester, since it serves as the basis of many of the subsequent disciplines.



- 3.4. Human Life Safety: Management of extreme situations discipline, should be more focused on these extreme situations.
- 3.5. Fundamentals of Ecological Economics should increase its focus in the ecological elements.
- 3.6. Fundamentals of Environmental Law discipline should increase its focus in the environmental global legislation.
4. Recommendations specific for the Core disciplines identified in the curriculum:
 - 4.1. Interdisciplinary environmental aspects of natural science discipline should focus on its interdisciplinary role among the different knowledge fields.
 - 4.2. Ecology of animals and plants (EEEE) discipline should emphasize the systemics aspects of ecology
 - 4.3. Environmental chemistry discipline should broaden its focus to fully integrate the ecological issues.
5. Recommendations specific for the Main disciplines identified in the curriculum:
 - 5.1. Mathematical modeling in ecology discipline should move forward one semester to be available after the physics discipline, allowing therefor to implement mathematical models of the physical models already studied.
 - 5.3. Biogeochemistry and ecotoxicology discipline should be considered to be divided in two subsequent disciplines.
 - 5.4. Environmental GIS discipline should focus the GIS into more applied situations to Ecology
 - 5.5. Human Environmental Safety discipline should be more focused in the human factor.
 - 5.6. Environmental regulation and governance discipline should increase the governance factor, considered key for ecology management.
 - 5.7. Evolutionary human ecology discipline should be emphasized as core discipline.
 - 5.8. Green Economy discipline should become mandatory and key for subsequent optional decision of elective disciplines by the students
 - 5.9. Environmental legislation discipline should study several national legislations (EU, USA, Kazakhstan) to allow the comparison and the identification of best practices.
 - 5.10. Industrial Ecology discipline as a key discipline in the curriculum should include advance methods of Corporate Social Responsibility implementation.
6. Recommendations specific for the Major disciplines identified in the curriculum:
 - 6.1. Introduction to Ecosystems discipline should be given as a key discipline for subsequent optional decision of elective disciplines by the students.
 - 6.2. Climate Change discipline should be introduced as mandatory in 6th semester as a cap for all the multidisciplinary previous disciplines.



- 6.3. Environmental monitoring discipline should be introduced as mandatory in the 6th semester to allow subsequent optional decision of elective disciplines by the students.
- 6.4. Land management discipline should be moved to the 5th semester to better articulate with the remaining of the curriculum.
- 6.5. Water resources discipline should be moved to the 5th semester to better articulate with the remaining of the curriculum.
- 6.6. Biosphere Reserves discipline should be moved to the 5th semester to better articulate with the remaining of the curriculum.
- 6.7. Applied Green Economy module should be revised
 - 6.7.1. Green Technologies discipline should be offered in the 5th semester as part of the advanced knowledge of multiple emerging technologies in the different fields covered by the ecology.
- 6.8. Sustainable Environmental management module should be revised
 - 6.8.1 Methods and models in sustainable waste management discipline should be moved in the curriculum and offered in the 6th semester
 - 6.8.2. Advanced Environmental monitoring discipline should be moved in the curriculum and offered in the 6th semester
 - 6.8.3. Environmental risks discipline should be moved in the curriculum and offered in the 6th semester.
- 6.9. Sustainable Energy Management discipline should be introduced in the 7th semester
- 6.10. Smart Grids discipline should be introduced in the 7th semester
- 6.11. Green Mobility discipline should be introduced in the 7th semester.
- 6.12. Restoration of damaged ecosystems discipline should be more focused in the restoration methods.
- 6.13. Resource extraction discipline should be more focused in the Kazakh extensive experience.
- 6.14. Organization of environmental protection activities discipline should be more focused in the best practices worldwide.
7. Recommendations specific for the Additional types of training modules identified in the curriculum:
 - 7.1. Environmental field trip module, very basic but fundamental as first contact with the companies that operate in the ecology domain.
 - 7.2. Field research training module, to get acquainted with the research competences necessary in this field.
 - 7.3. Trainee internship module as a more professional first involvement in the field of ecology
 - 7.4. Junior specialist internship module as a professional involvement with some autonomy in the technical field of the educational program.

- 7.5. Pre-Graduation Internship as the final contact with the professional world as students of the educational program.
8. Writing and Presentation of Diploma Work (Project), has a number of credits that does not reflect the workload corresponding to the task. The revision of the number of credits attributed should be revised.
9. It is recommended to clarify the potential overlaps of different courses which are all in the mandatory modules.
10. To react on the developments in the field of ecology technics and technologies, as well as, on the changing requirements of the economy and industry, a regular review and update of the educational program is recommended.

Conclusion

The education program on Natural Sciences specialty 5B060800 -Ecology is considered an important program to react on the needs of the international labor market. Specialists in Ecology are searched for by many companies in the different economic fields. In addition, scientific institutions have also a demand for these specialists. Having a sufficient number of these specialists has already become an important economic factor for several economic fields. In addition, science and research are having a high demand in these specialists, to gain scientific knowledge to accomplish the Sustainable Development Goals set worldwide.

The program is setup in way that will provide the students with all relevant knowledge and skills for a successful working life. The requirements of the economy are well respected and the students have the opportunity to deepen their knowledge in one of three economically relevant fields in Kazakhstan.

The program is in general compliant with the world educational standards. Nevertheless, some adjustments are recommended and should be considered. Further recommendations are provided which should help to improve the educational program.

Almaty, 13th of June 2018



José Carlos Lourenço Quadrado

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Ref: EE2018

Faculty of Geography
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12/06/2018

Expert recommendations concerning the BSc educational programme 5B060800 - **ECOLOGY**

Provided by Dr. Stanislav Shmelev

Introduction

The purpose of the 'Ecology' educational programme (5B060800) is to train bachelors for the practical application of the acquired ecological knowledge and skills in various economic sectors. The mission of the programme is to create a new generation of specialists in ecology and environmental protection and efficient use of natural resources. Graduates of the programme will be able to work in state, non-governmental and international organizations focusing on sustainable development and environmental protection.

Relevance

The programme is clearly extremely relevant for the state of the current environmental affairs with climatic change, plastics pollution of the oceans and the global biodiversity crisis occupying front pages of the leading news publications.

Innovation

The programme is very innovative for Kazakhstan in the sense that it will be offered in English and will be attractive for students from a wide range of countries in the region: India, Nepal, Sri Lanka, Afghanistan, Pakistan,

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semester; introduce contemporary cultural issues (e.g. environmental art) and a broader discussion of the attitude towards the environment into the 'Culture and religion' course; focus the course on law more specifically on 'Environmental law'; to emphasize 'Interdisciplinary environmental aspects of natural science' in the programme; to focus more on 'systems ecology' discussing ecology of animals and plants; move the "Mathematical modelling in ecology" from the second into the third semester; to focus the GIS course on environmental applications; to introduce a new course on 'Environmental regulation and governance', to separate if possible 'Biogeochemistry and ecotoxicology', to emphasize evolutionary aspects of human ecology; to establish a solid introductory course in Green economy; to make environmental legislation course more interesting by introducing a comparative component discussing experience of the European Union, USA and Kazakhstan; to bring 'Introduction to ecosystems' and 'Climate change' as compulsory courses into the 5th and 6th semester; to rename a module 'Integrated Ecosystems Management' and move it into the 5th semester; create a module on 'Applied Green Economy' focused on courses in 'Green technologies', 'Renewable energy' and 'Waste management'; to introduce a module in 'Sustainable Environmental Management' with courses in 'Methods and models in sustainable waste management', 'Environmental monitoring' and 'Environmental risks';

- Rename the practical engagements 'Environmental field trip', 'Trainee internship' and 'Junior specialist internship', reflecting their change of focus;
- Our recommendation is to cross-check the 'Passport of the specialty' to make sure that there is complete consistency between the attached plan and the test of the passport.
- We would like to recommend to invite leading speakers to give invited lectures within the courses (one-two guest lectures for each course): we could propose our own course in Ecological Economics for example.
- An additional recommendation could be to use active teaching methods: discussions forums, simulation games, problem-solving sessions as much as possible.
- Finally, syllabi should be updated with the most recent and relevant literature in English, which should include textbooks (key text and a two-

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three additional sources) as well as reports (3-5) and articles published in top journals (8-10).

Conclusions

Overall, the proposed programme is designed based on the leading Western BSc programmes in Ecology, addresses most relevant contemporary environmental themes and builds the necessary skills and expertise to create a new generation of highly proficient experts in the field of environment and sustainable development.

Yours sincerely,



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EXPERT REPORT

CONCERNING THE BSc EDUCATIONAL PROGRAMME 5B060800 – “ECOLOGY”

This report has been requested by Al-Farabi Kazakh National University (KazNU) and it has been produced and delivered after the meetings held during the Second International Workshop on the Development of the Ecology Educational Programme in English on the specialty “5B060800-Ecology”, held in KazNU, Almaty between Sep. 18th and 21st 2018.

1.- GENERAL CONSIDERATIONS

The content of the Core Curriculum on Specialty Ecology (5B060800) shows clearly the willing of KazNU to provide bachelor students both with knowledge and skills not only on pure ecological aspects but on many other disciplines that may be included on the general term “Environmental management”¹.

Following the commonly accepted definition of this term, the concept “Ecology” refers to²:

1: a branch of science concerned with the interrelationship of organisms and their environments

2: the totality or pattern of relations between organisms and their environment

Considering the existence of compulsory disciplines such as “Environmental aspects of natural science” and “Environmental monitoring” and elective disciplines such as “Global environmental issues and Sustainable Development Goals”, “Environmental security”, “Environmental Impact Assessment” or “Environmental management system”, in my opinion the KazNU BSc Educational Programme in “Ecology” provides a really interesting option for new students who are interested on developing a professional life on Environment.

¹ Environmental management is not easy to define. As Barrow (2005) has acknowledged, it can refer to a goal or vision, to attempts to steer a process, to the application of a set of tools, to a philosophical exercise seeking to establish new perspectives towards the environment and human societies, and to much more besides. In general, however, environmental management is concerned with the understanding of the structure and function of the earth system, as well as of the ways in which humans relate to their environment. Environmental management is therefore concerned with the description and monitoring of environmental changes, with predicting future changes and with attempts to maximize human benefit and to minimize environmental degradation due to human activities.

² Merriam Webster Dictionary

2.- STRUCTURE OF THE CURRICULUM

The Core Curriculum on Specialty Ecology (5B060800) is organized as follows:

1. **General Education Disciplines (29 credits)**
 - Compulsory Components (CC) (21 credits)
 - Social and humanitarian module (6 credits)
 - Instrumental module (15 credits)
 - Elective Components (EC) (8 credits)
 - Human and Environment (4 credits)
 - Geographical module (4 credits)
 - Module of socio-political knowledge (4 credits)
 - Cultural heritage and interpersonal communication module (4 credits)
2. **Core Disciplines (69 credits)**
 - Compulsory Components (CC) (20 credits)
 - Environmental and natural sciences (5 credits)
 - Biosphere Ecology (11 credits)
 - Professional Language (4 credits)
 - Elective Components (EC) (49 credits)
 - STEM Module (9 credits)
 - Sustainable development and environmental security (7 credits)
 - Applied Ecology (6 credits)
 - Environmental Management (9 credits)
 - Environmental regulation (6 credits)
 - Human ecology (6 credits)
 - Environmental Policy (6 credits)
3. **Major Disciplines (33 credits)**
 - Compulsory Components (CC) (6 credits)
 - Ecology of Geosystems (6 credits)
 - Elective Components (27 credits)
 - Integrated Ecosystem Management (9 credits)
 - Applied Green Economy (9 credits)
 - Sustainable land use (9 credits)
 - Sustainable Environmental Management (9 credits)
 - Global Climate Change (9 credits)
 - Environmental protection (9 credits)
4. **Additional Types of Training (23 credits)**
 - Obligatory Components (OC) (20 credits)
 - Physical Training Module (2→8 credits)
 - Professional Practice Module (12 credits)



- Final Attestation (3 credits)

In my opinion, the structure of the Core Curriculum is complex and ambitious. The existence of many elective disciplines provides the opportunity that many potential students could be interested in joining the Programme. The curriculum structure is very interesting and attractive to a potential high number of students, both from Kazakhstan and the rest of Central Asian countries.

3.- RECOMMENDATIONS

After the analysis of the Core Curriculum, the following recommendations arise:

- It is convenient to unify the terminology using the term “Compulsory” instead of “Obligatory” as they may induce confusion when used.
- The curriculum includes 64 different disciplines and many of them consider the use of laboratories and seminars. The use of laboratories is highly recommended to BSc students as it allows them to use special resources which are very important on Environmental Science (computers, chemical reagents, special equipment, ...)
- Basic disciplines such as mathematics or physics are important to BSc students as they provide them a basis for future scientific knowledge. In my opinion, they should be included on the first year and they should be considered as Compulsory disciplines.
- An elective course of Basic Statistics might be included on the second year, once the students have passed the mathematics and physics courses.
- In my opinion some of the Compulsory Components Modules (21 credits) are focused on topics which are not in relation with the BSc in Ecology:
 - SIK1101 – Modern history of Kazakhstan (3 credits)
 - FIL2102 – Philosophy (3 credits)
 - K(R)Ya1104 – Kazakh (Russian) Language (6 credits)
- It should be clarified which is the foreign language being taught in discipline IYa1103 – Foreign Language. I strongly recommend that this discipline is changed for “English for Science” or a similar one.
- Following the current structure of the Core Curriculum, in order to obtain the BSc diploma students must select a group of 3 modules (9 credits each) of Elective Components of Major Disciplines (27 credits total). There are 6 different modules to choose from. Some strategies should be implemented to ensure an approximate equal number of students in all the 6 modules.
- In my opinion, the following disciplines should be considered to be compulsory to all the students and be included on the list of Compulsory Core disciplines:
 - YES4309 – Mathematical Modeling in Ecology
 - NR4311 – Environmental Physics



4.- FINAL REMARKS

Being this programme taught exclusively in English language, a high skill of use of this language is expected both from students and professors. The experience in Spain about this topic is extremely positive but many difficulties will arise when implementing the programme at the beginning.

It is absolutely necessary that the professors compromise to provide all the documentation of the disciplines in English language and the students communicate both with professors and other students also in English.

Therefore, students who obtain the BSc in Ecology are expected to have a high level of English skills and will obtain a very high level of understanding of the main environmental problems and they are expected to join the market both on private companies and public administration soon after leaving the University. It is strongly recommended that the University provides the convenient support to the students, so there is a special communication between the University and the private companies. The promotion of Intership and Industrial Placement Programmes for BSc in Ecology is strongly recommended.

Do not hesitate to contacting me for further comments about this report. I will be delighted to cooperate with you on the development of this interesting programme.

Yours sincerely,

Almaty, September 21st 2018



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Independent Review of the core curriculum on speciality Ecology 5B060800

First of all, I am really honored to be part of the international team contributing to the development of the Bachelor of Natural Science in the speciality Ecology (5B060800). In the quality of member of the international team I have envisioned the documents referring to the program structure in English, participated via skype to a workshop on program development interacting with the team who will deliver the program and had the opportunity to present the process of B.Sc. program development from a national (ITALY) and institutional perspective.

I am a Professor of Ecology at the Department of Pure and Applied Sciences at the Urbino University (Italy). My research expertise lies in the fields of theoretical ecology, ecosemiotics, code ecology, landscape ecology and ecoacoustics.

As member of the international development team, I have been asked to provide a report which summarizes my opinion on the proposed program structure, its content and delivery plans. In particular, I have been asked to focus on the scientific contents of the program, on the aspects of innovation, attractiveness to international students and relevance of the knowledge and skills students develop to meet the needs of the domestic and international employment market. I have also been asked to include suggestions to enhance the program contents in order to offer the best and more complete vision of the cultural tools necessary to depict the best scenario for an ecological curriculum.

The goal of the 'Ecology' educational program (5B060800) is to train students for the ecological principles and methods largely applied to humanities and related fields of social and economic domain with particular attention on the potential



application of ecology to solve problems, to find solutions and propose innovative practices to apply in the real world.

The mission of the program is to create specialists in environmental protection and experts in efficient uses of natural resources according the principles and the empirical knowledge of ecology. Graduates of the program will be able to offer competencies in state, non-governmental and international organizations with special emphasis in sustainable development of natural resources, in environmental protection, land remediation, hazard control, landscape design in natural and human modified conditions.

Program structure

The program here proposed is four years in duration and it results one year longer than a degree at an Italian University. The utilization of a public consultation with stake holders represents an important strategy to exchange knowledge with graduates and these modalities confirm relevant international best practice character of this curriculum. The invitation of prospective employers as guest lecturers is an interesting and promising strategy to create a connection between students and the employers that should be strongly encouraged. Working in the real world represents an obligate step for the program implementation.

Program content

The program in ecology is composed of a broad range of topics emerging from the fields of physics, geography, biology, chemistry, agronomy, economics, social sciences, philosophy, mathematics, cybernetics and informatics technologies, integrated by international, national and local legislative elements. The program is harmoniously developed and covers the majority of the ecological themes and related disciplines. The distribution of the disciplines along then VIII semesters reflects the policy to increase the knowledge in the ecological realm integrating progressive knowledge according a nested well balanced strategy.

An interesting part of the program deals with social sciences and human ecology.



Working in the details, it emerges during the first and the second semester the importance to include the modern history of Kazakhstan and fundamentals in philosophy, both aspects reflect the multidisciplinary approach of the program design. Furthermore, foreign language, information and communication technologies are both important topics to be developed in this first two semesters, and represent indispensable part of the program. During the first semester I strongly suggest to introduce general principles of ecology that represent the fundamentals on which ecology is developed along the program with a long list of applications. The number of credit for this module would be at least of 3. Principles of ecology represent an important and obligate component of this curriculum to be developed at the beginning of the course. The principles that guide the development of the modern ecology require specific space, time and competencies. In particular to link the ecological knowledge with humanities requires an ecosemiotic approach that using the theories of signs, the eco-field principles, the theory of resources allow to discover and understand the importance of cognition and encoding processes in the ecological processes responsible of the complex functioning of the environment. The study of encoding processes (ecological codes) allow to better understand how the ecological systems are working at every scale and how the fluxes of energy and matter are distributed along networks at different scales. Working in the applied field it is important to select the more appropriate temporal and spatial scale at which to collect information to definitively create a link between general principles, quantitative output from knowledge and action in the practice, competing to consolidate ecology as a solving problem science, environmental design and sustainable development.

I suggest to reinforce the innovative footprint of this program, by the addition of a recent ecological discipline: the ecoacoustics. The module could be titled: principles and methods in ecoacoustics. This discipline represents a real innovative approach to investigate the ecological complexity using the sonic environment as a powerful proxy. The sonic environment or soundscape, is the result of the combination of geophonies, biophonies and technophonies. The importance and the role of sound in natural and human disturbed systems is of growing concern. Human acoustic intrusion in every part of the world represents a true threat affecting aquatic life and terrestrial organisms as well. Unwanted sound can become source of severe annoyance for humans and animals producing



negative effects on their physiology. The quality of the life is strongly affected by the level of acoustic cues that emerges from a system. The acoustic approach can be considered a new methodology to monitor and to assess the quality of the environment. Acoustic monitoring can be applied to natural and human modified systems with a modest financial investment and with the possibility to open to a citizen sciences.

Program delivery plans

The program offers a rich variety of modalities to meet the learning demand of students and confirm the possibility of efficient educational tools. The combination of lectures, seminars, laboratories, field work and stages seem appropriate to consolidate knowledges and skills. The use of remote conferences seems a powerful opportunity to cover several competencies. The international character of the staff is a warranty that this course is innovative, international oriented and finally attractive according a recognized standard. My suggestions in the delivering plans are concentrated on the test phase of the program. The complexity of the program requires a careful verification. In fact, particular attention should be devoted to test the teaching modalities during the first development of the course in order to validate teaching strategies, and repeated control on the results expected by the students. Feedbacks between teachers and students should be established periodically at the end of each semester with the goal to verify the student interest, the difficulty met by students to absorb new disciplines, the integration of the different topics, the progressive growing of competencies among the students.

Program relevance

This program offers a broad spectrum of ecological disciplines and specific themes on which during this Anthropocene era humanity urgently must match. The challenges and threat produced by climate change, diffuse pollution, biological mass extinction, degradation and rarefaction of resources, soil consumption, spread of impervious surfaces by diffuse urbanization and logistic infrastructures require new competencies and deep knowledges of the ecological and social/economics processes involved. The ambition of



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this program is to develop skills for a new generation of environmental experts that could operate at national and international level.

The challenge and the strength of this program is represented not only by the great amount of competencies that should be transferred by using efficient educational tools but also the capacity to create experts able to investigate complex and critical systems like degraded ecosystems and to find appropriate tradeoff between natural functioning and the demand of ecosystem services.

The survival of humanity and biodiversity largely depend on the next generation of policy makers and by the capacity of scientists to transfer in short time scientific knowledge in efficient practices. This program seems to have all the ingredients to achieve this important mission.

After that, I declare my full availability to deliver lectures when requested according my skills.

Your sincerely

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Urbino, 12 luglio 2018

19 September 2018

Independent Review of the core curriculum 5B060800-Ecology

Reviewer background

Currently, I am the Professor of Ecosystem Science at the University of Reading, where my duties include teaching on undergraduate and postgraduate modules, research student supervision, running fundamental and applied research projects and outreach activities to represent the University and the area of my expertise vis-à-vis the public and the society at large. My research targets the area of agriculture, forestry and soil science, but also soil biodiversity and ecosystem services. I have co-authored two books and my Web of Science record lists 50 papers, with 1675 citations and H-index of 20. Over the course of my publishing career, I have co-authored papers with 173 collaborators.

Over the years, I have taught several different subjects to groups of students varying in size, from about a dozen to two hundred. One of my main teaching aims is for my students to learn to think critically and to be able to distil a complex issue into a clear message. I strive to instil the notion that our knowledge is not exhaustive and that new ideas and explanations always emerge to challenge the status quo. I became a Fellow of Higher Education Academy in September 2015.

1. General positioning of the proposed degree

Having reviewed the draft curriculum of 5B060800-Ecology, it is clear that the programme aims to represent the best of current practice by exposing students to a wide range of subjects connected to the main topic of human ecology. The programme is logically laid out, with most introductory and general science subjects lined up at the beginning of the 4 year degree. This is in line with accepted international standard, where students from a

potentially diverse range of backgrounds need to be brought up to a common standard prior to specialisation later in the degree. Comparing learning outcomes and justification for the degree with existing UK Quality Assurance Agency Benchmark (QAA) Statements for Biosciences shows a very good alignment. QAA benchmarks outline the knowledge and skills that students have to attain in each discipline, the proposed ecology programme cover all key areas, whilst allowing student sufficient space for specialisation.

Specific recommendations:

- a key point, but possibly beyond remedy at this moment, the curriculum does not outline what one would expect from a degree in ecology. A **degree in environmental science** would be a far better fit for the curriculum in its current form,
- the wide provision of elective modules makes clear that the students will be able to tailor their degree and specialise. Not all are able to make the full use of this opportunity at the start of their degree, an element of **prescribed pathways or specialisation** would be helpful to some students,
- looking at the curriculum, the balance between taught, practical and self-study elements of the programme is not clear. It would help potential students if this was indicated, together with the overall **expectation of workload and assessment**.

2. Programme structure and content

This is a 4 year programme, in line with the majority of contemporary degrees in most countries. As such, it is likely to appeal to a broad range of audience drawn not only from Kazakhstan, but also from neighbouring countries and further afield. It is clear that the curriculum progresses from the more general subjects to a range of specialised optional modules available at later stages. The inclusion of social science, information technology and modelling, as well as environmental law is particularly commendable. The credit balance of each semester and of the entire programme is well thought out and credible. It is also clear that programme designers are aware of the connection between the natural world and human society in its myriad forms, there is a number of modules which explore various aspects of the interaction between the natural environment and humans. This is commendable, as the limitations placed on human society by its environment are becoming more and more obvious. After completing the programme, the students will have a very good grounding in issues pertaining to environmental science, terrestrial ecology, sociology and economics. This is imperative, a key employer requirement is for graduates to be able to research an issue, understand it and to take a position on the basis of available information – the proposed degree will equip them for this task.

Specific recommendations:

- The **balance between 'natural' and 'social' sciences** could be improved. It is clear that some of the 'social' content appears in existing module provision, but can be made more visible. In particular, the close link between human society and its development on the one hand, and its natural environment on the other hand, is not evident in the degree. Issues such as environmental ethics, socio-ecological systems, government and corporate responsibility, social engagement and the like need to be represented better and perhaps deserve their own modules.
- Modules pertaining to local Kazakhstan culture and language will limit the appeal of the degree to international audience, these could be moved to the optional part of the curriculum. One way to address this could be the use of **local environmental issues as case studies**, just like any other country in the former Soviet bloc, Kazakhstan is not short of excellent examples.
- On reading the list of modules, there appears to be **substantial overlap between some modules**. In particular, the distinction between environmental biogeography, environmental chemistry, environmental aspects of natural science needs to be made clearer.
- The **EYM3305 module should be renamed**, ecosystem services framework has nothing to do with marketing. Bunching these two subjects into one module is seriously flawed.
- **SW2213 should be moved to the first year**, I am working on the assumption that the students will be required to produce written output from the first year and will thus need the skills

3. Programme relevance and graduate prospects

The proposed programme aim to equip the students on many aspects of current environmental issues, whether they are global, regional or local in their nature. This is commendable, current graduates much be able to place environmental issues into the right context in order to contribute to their resolution – and thus be valuable to their employer. Upon graduation, the students should be able to contribute to the development of knowledge-based economy in Kazakhstan, and specifically to the development of society which is based on sustainable grounding and does not erode its natural assets. Graduates of this programme will have a solid basis in environmental science and will be able to progress to a workplace or to post-graduate study. A range of employers should be interested in the graduates – private companies, both local and international, NGOs, cooperatives, but also the state sector.

Specific recommendations:

- Make sure that the core skills are **clearly advertised** to the students and to the employers
- Continue the dialogue with representatives of potential employers (e.g. those taking students on placements) and **continuously adapt the programme** to suit their requirements – the world is changing at an increasing pace
- Highlight the **contribution of practical engagement** to student learning – often this is the environment where students learn the fastest, so make it visible to them.

Overall, this is a very promising programme bringing together key aspects of environmental science, sociology and economics and thus able to show the students the crucial links between this often separate subjects. The programme is of international standard and should be able to compete with similar degrees on international stage. I am happy to continue to contribute to its development in the future and to share my expertise and knowledge.

Meeting Almaty 17-19.9.2018

I have taken part in a series of discussions organised during the three day meeting at the Al Farabi University. The main aim of these discussions was to refine the structure as well as the content of the proposed degree. There was a range of teaching materials and approaches considered, the information pertaining to student experience at Reading relates to:

- use of innovative teaching strategies and information technology in Ecology teaching (such as Prezi and Socrative)
- set up of an undergraduate degree at a UK university, balance between core and elective modules, degree pathways (BSc Environmental management)
- student workload management and mid-term testing
- final dissertation guidance, marking schemes and timing of student project work.

Sincerely Yours,

Martin Lukac



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Faculty of Geography and Environmental Sciences
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Independent Review of the core curriculum on speciality Ecology 5B060800

Many thanks for the opportunity to be part of the international team contributing to the development of the Bachelor of Natural Science in the speciality Ecology (5B060800). As a member of the international team I have had access to documents relating to the programme structure in English, and I am participating in a workshop in Almaty with the programme team in September 2018. My contribution to the workshop involved preparation of this review, a methodical complex for GVChYR210 Global Environmental Issues & Sustainable Development Goals, and two presentations to the panel (Review of Course Global Environmental Challenges & Sustainable Development Goals; Professional Practices: Experiences of the University of Cumbria).

As an international contributor to programme development, I am a Professor of Environment and Society at the University of Cumbria (UK). My research expertise lies in the fields of community conservation and reintroduction planning/rewilding. I am chair of the IUCN Rewilding Task Force, a member of the IUCN World Congress for Protected Areas and I currently lead a £1.3 million HLF reintroduction project in the UK. I am co-developing an international MSc in National Parks and

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Protected Areas at the University of Cumbria and I have recently served as external examiner on the MSc in Sustainability & Climate Change at Staffordshire University (UK).

As part of my role on the international development team, I have been asked to provide a report which summarises my opinion on the proposed programme structure, its content and delivery plans. In doing I have also highlighted areas of good practice, innovation, and programme attractiveness, particularly in relation to international students as I am aware that KazNU has aspirations to increase international student recruitment.

Programme structure

It is not clear from the documentation I have reviewed how module credits relate to academic year and progression, i.e. how many credits are required per year to progress? How many credits are required for a BSc? Will exit awards such as a Post Graduate Certificate be available? The proposed programme is four years in duration, and whilst I recognise that this decision has been made in consultation with a range of national stakeholders in response to graduate skills and employability, it is likely to act as disincentive to international students. If this is to be a four year programme, **might a placement (national or international be worth considering?** Our experience at UoC is that long placements (30 weeks or so) provide significant opportunities for student learning and development. This would offer students real world experience and enable them to develop employability skills. I will discuss this as part of my presentation in September. Whilst the programme structure shows logical progression, **the range of options is potentially confusing and will need to be carefully managed in order to maintain programme integrity; a simple, clear programme structure would be very useful and would also help attract international students** (e.g. a simple schematic diagram to explain programme structure and progression). I would also like to see greater emphasis on the role of fieldwork across the programme (and if possible in collaboration with relevant stakeholders). Fieldwork is an essential part of an ecologist's training **and I would like to see how fieldwork is integrated within and across modules** and student field skills learning developed over the 4 years of the programme. I think this would help with (international) student recruitment.

Programme content

The proposed programme draws from the fields of geography, biology, chemistry, physics and international, national and local conventions and legislative approaches, and **whilst I can see an ecology pathway through the modules on offer, there would also appear to be other potential pathways through the programme**, i.e., joint honours ecology and environmental science or ecology and geography. The team may wish to review BSc (Hons) Ecology provision elsewhere for 'benchmarking' and **consider a joint honours approach**. As other reviewers have noted, the history and culture of Kazakhstan compulsory elements take up a considerable amount

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of teaching time in year 1 and 2. These aspects are unlikely to appeal to international students. **During the workshop we discussed adding a statistics or 'research methods' course** to the programme; it is customary to include such a module to prepare students for dissertation work. The panel agreed to review this suggestion. In terms of course title and content, we discussed how 'Culturology' (cultural studies?) differs from Political Science, Sociology and Psychology. The panel agreed to review course titles.

Linked to this point there is a recurring issue with the clarity of module titles, some of which perhaps do not translate well from Russian to English, e.g. 'Human Life Safety and Management of Extreme Situations.' The panel agreed to consider a change to 'Health and Safety'. **Once module descriptors are available, I would suggest a systematic review/mapping of content and titles.** I would also suggest separate Animal Ecology and Plant Ecology modules, perhaps continued over 2 academic years to build key theory and practice and allow student specialisation.

Programme delivery plans

The team have presented a good range of programme delivery, with teaching and learning delivered through a combination of lectures, seminars, laboratories, fieldwork and work placements. This mixed approach is to be applauded. In my workshop presentation, I highlighted **the importance of students becoming active learners through evidence-based teaching and learning practice**, drawing on contemporary pedagogic research. Without being prescriptive, I would imagine this to include individual and small group work, case studies, peer to peer learning and presentations, student led seminars. The team should seek to develop a stimulating and innovative community of learning, whether encountered on campus, in the field, on placement or in the work place.

I would encourage the team to **use a range of assessment methods** (e.g. reports, portfolios, examinations, presentations, species identification tests and essays) to ensure that students have an opportunity to excel; students should not be disadvantaged through over-reliance on any one particular assessment mode. I would also suggest guest lectures and/or visiting roles for stakeholders, e.g., protected areas professionals, government scientists, etc., this will help to bring 'real world' management issues into the classroom and strengthen links with stakeholders from industry. My university has significant expertise in teaching, learning and assessment and I would be willing to assist the team in developing an appropriate strategy for the programme.

Relevance and graduate employability

My understanding is that workplace experience is built into the programme through trainee internship components. **Where possible students should learn in environments which**

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replicate the relevant workplace setting, and the programme design (and periodic reviews) developed in consultation with key stakeholders, including employers, professional and statutory regulatory bodies and community organisations. It is important to find a balance between subject skills and knowledge and skills for working with others, self-management, team work, problem-solving and resilience. **I would encourage the team to embed (and make explicit) professional competencies and readiness for work within programme modules** so that on completion of their studies, students can operate confidently and effectively in their chosen careers. I can imagine graduates from this programme finding employment in public and private sectors, for example, protected area management and government agencies, environmental consultancy, education and research.

I would like to congratulate the programme development team for their efforts to date and wish them well as the programme develops. I am willing to provide further support with programme development and to contribute to delivery in a visiting professor capacity.

Yours sincerely



Professor Ian Convery

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High educational institutions in Kazakhstan

**Экспертное заключение
на образовательную программу «5В060800 – Ecology», разработанную в
рамках специальности бакалавриата «5В060800 – Экология»
на английском языке разработчиками
Казахского национального университета имени аль-Фараби**

Общая характеристика образовательной программы.

Образовательная программа «5В060800 - Ecology» разработана для обучающихся бакалавриата высших учебных заведений Республики Казахстан и предполагает изучение в течении 4-х лет всех дисциплин на английском языке. Инициатором к разработке новой образовательной программы выступило Министерство образования и науки РК. В число разработчиков программы вошли сотрудники таких ведущих университетов мира, как Middlesex University (Великобритания), Polytechnic University of Valencia, (Испания), Porto Polytechnic Institute (Португалия), University of Urbino (Италия) и другие. Отечественными разработчиками выступили сотрудники Казахского национального университета имени аль-Фараби, Назарбаев университета, Казахского агротехнического университета имени С.Сейфуллина, университета НАРХОЗ, Филиала «Назарбаев Интеллектуальная школа» в г. Атырау.

Многочисленно анализировался базовый вариант данной ОП: основной учебный план, описание программы и другие учебно-методические документы, которые обсуждались на Международном семинаре «Инновации в разработке Образовательной программы на английском языке по специальности 5В060800-Экология» 13-14 июня 2018 года в КазНУ имени аль-Фараби, где я принимала участие дистанционно и выступала на вебинаре.

Программа полностью соответствует Национальной рамке квалификации, согласована с Дублинскими дескрипторами и Европейской рамкой квалификации, спроектирована на основе модульной системы изучения дисциплин и содержит следующие модули: социально-гуманитарный; инструментальный; блок профессиональных модулей; модули индивидуальных образовательных траекторий; междисциплинарный модуль; профессиональная практика (по видам практик), формирующие общекультурные и профессиональные компетенции.

Цель образовательной программы: осуществить подготовку высококвалифицированных специалистов, конкурентоспособных на отечественном и международном рынке труда в области охраны окружающей среды.

Основные задачи образовательной программы: формирование основных профессиональных компетенций у будущих специалистов экологов в интересах устойчивого развития и навыков в принятии рациональных решений, которые основываются не только на аспектах охраны окружающей среды, но и включают социальные и экономические проблемы, создание предпосылок для самостоятельной поисково-

исследовательской деятельности студентов в рамках проведения эксперимента на всех его этапах, умение работать с научно-технической информацией, использовать отечественный и зарубежный опыт в профессиональной деятельности, систематизировать и обобщать полученную информацию.

1. Актуальность основного учебного плана.

Государственная политика в области качества высшего образования, выделяя приоритеты развития до 2030 г., указывает на повышение качества высшего образования, удовлетворяющего потребности рынка труда, задач индустриально-инновационного развития страны, личности и соответствующего лучшим мировым практикам в области образования.

С каждым годом человечество сталкивается с новыми экологическими проблемами, справляться с которыми становится все труднее. Постепенно в обществе растет понимание того, что любая экологическая задача - задача глобальная, и для ее решения требуются высококвалифицированные специалисты с новыми теоретическими и практическими знаниями. В дальнейшем это будет отражаться и на работе всех отраслей экономики страны, так как в развитых странах все больше и больше внедряются принципы устойчивого развития на всех уровнях профессиональной и общественной деятельности.

В данном контексте разработка настоящей образовательной программы является одной из актуальных задач для нашей Республики.

2. Новизна образовательной программы.

Представленная для экспертизы образовательная программа «5B060800 - Ecology» в рамках специальности бакалавриата «5B060800 – Экология» на английском языке разработчиками Казахского национального университета имени аль-Фараби является новой и оригинальной для студентов данного направления. Для составления учебного плана привлекались специалисты из ведущих зарубежных и отечественных университетов, а также представители индустрии, которые давали свои рекомендации по включению тех или иных дисциплин, изучение которых будет способствовать получению актуальных на сегодняшний день компетенций.

3. Оценка значимости и практической ценности образовательной программы.

Значимость образовательной программы определена потребностью казахстанской экономики в отечественных высококвалифицированных специалистах в области охраны окружающей среды.

Предложения по совершенствованию образовательной программы с учетом требований квалификационных характеристик специалиста.

При проведении экспертизы базового варианта образовательной программы, отмечено что учебный план по специальности «Экология» составлен на высоком научно-методическом уровне. Выбор дисциплин произведен достаточно рационально и целесообразно, широко применен междисциплинарный и комплексный подход. Будущим специалистам в логической последовательности представлен широкий диапазон

необходимых теоретических и практических знаний в профессиональной области.

Вместе с тем, в учебный план рекомендуется введение 2 дисциплин с целью формирования основных профессиональных компетенций у будущих специалистов – экологов.

1. Казахстан обладает огромным сельскохозяйственным потенциалом, производство продукции сельского хозяйства при несоблюдении экологических норм приводит к необратимым социальным и техногенным процессам. Будущие специалисты-экологи в целях обеспечения сбалансированного динамического развития и уменьшения или предотвращения антропогенной нагрузки на природную среду должны обладать комплексом знаний, необходимых для устойчивого развития сельского хозяйства и сельских территорий. Для решения данной задачи предлагается введение дисциплины «**Устойчивое развитие сельского хозяйства и сельских территорий**».

2. Сферой профессиональной деятельности бакалавра по специальности 5В060800 – Экология является образовательная сфера. В настоящее время каждый человек, не зависимо от его специальности, должен быть экологически образован и экологически культурен. Только в этом случае он сможет реально оценивать последствия своей практической деятельности при взаимодействии с природой. Экологически культурная личность должна обладать экологическим мышлением, то есть уметь правильно анализировать и устанавливать причинно-следственные связи экологических проблем и прогнозировать экологические последствия человеческой деятельности. С целью формирования экологической культуры у будущих специалистов-экологов предлагается введение дисциплины «**Экологическое образование**» и прохождения педагогической практики (в объеме не менее 4 кредитов) в школе.

4. Оценка образовательной программы.

При разработке образовательной программы учитывались пререквизиты специальности, а также предусмотрено логическое продолжение изучения постреквизитов в рамках магистерских программ.

Выводы: образовательная программа «5В060800 – Ecology», разработанная в рамках специальности бакалавриата «5В060800 – Экология» на английском языке, соответствует требованиям, предъявляемым к квалификации выпускника.

Экспертизу провела:

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имени С. Сейфуллина
кандидат биологических наук, доцент

Г.К. Сатыбалдиева



**Экспертное заключение
на образовательную программу «Экология», разработанную в рамках
специальности бакалавриата 5В060800 – «Экология» на английском
языке разработчиками
Казахского национального университета имени аль-Фараби**

Общая характеристика образовательной программы.

Данная образовательная программа по специальности 5В060800 – «Экология» направлена на подготовку профессиональных экологов на уровне бакалавриата в целях решения экологических проблем с использованием языка международного общения и бизнеса.

Главной целью настоящей экспертизы является выявление степени соответствия содержания образовательной программы требованиям МОН РК об образовательных программах в сфере подготовки кадров высшей квалификации в области экологии.

Для экспертизы были использованы следующие документы: базовый вариант образовательной программы «Экология», разработанной в рамках специальности 5В060800 – «Экология» на английском языке, включающий описание ОП, основной учебный план по специальности 5В060800 – «Экология» и силлабусы дисциплин.

В ходе анализа было выявлено соответствие содержательного наполнения компонента ОП специфике основной образовательной программы и перечня обязательных учебных дисциплин государственным стандартам и требованиям МОН РК.

Основной учебный план по специальности 5В060800 – Экология включает в себя обязательные и элективные дисциплины, а также модули, регламентирующие цели, ожидаемые результаты, содержание, условия и технологии реализации образовательного процесса.

В учебном плане четко обозначена минимизация обязательных дисциплин, заложенных в стандартах ГОСО 2016г., что положительно отражается на дифференцированности вариативных модулей, основанных на требованиях социального заказа работодателей. В целом содержание вариативных модулей программы направлено на обеспечение практической подготовки и развитие проектных и исследовательских компетенций обучающихся.

Есть все основания полагать, что в ходе реализации данной образовательной программы, объем теоретической подготовки, реализуемый за 4 года обучения, позволит обеспечить уровень, соответствующий требованиям обучения, за счет компетентностного подхода, который отражен в учебном плане. Компетентностный подход дает возможность осуществлять контроль за результатами обучения по завершении каждого модуля, что говорит дополнительно и о преемственности в освоении ОП по ступеням и семестрам обучения.

Важно также отметить, что в целях конкретизации и дополнения набора компетенций выпускника в элективной (вариативной) части учебного

плана разработчиками были учтены региональные особенности рынка труда, результаты анализа международного образовательного опыта ведущих университетов мира, запросы работодателей и стратегические направления развития Казахстана.

Представленная к экспертизе образовательная программа «Экология» предусматривает обучение только на английском языке, что дает ей преимущество перед другими отечественными программами, будет способствовать привлечению иностранных студентов и профессоров.

Актуальность основного учебного плана.

Актуальность представленной к экспертизе ОП несомненна, т.к. профессиональная подготовка в области экологии на английском языке обучения позволяет решать проблемы практической деятельности в соответствии с запросами рынка труда и работодателей с учетом инноваций, происходящих на международной арене образования.

Оценка значимости и практической ценности учебной программы.

Решение экологических проблем становится ключевым условием устойчивого развития в будущем. Компании в лице работодателей на сегодняшний день вкладывают в это направление значительные средства, а государство поддерживает прогрессивные начинания в сфере экологии. Специалисты-экологи со знанием языка международного общения и подкованные технически на сегодняшний день являются востребованными во всех отраслях производства и представляют значительную ценность для рынка труда. Именно ОП «Экология» является одним из направлений, развитие которого необходимо для решения актуальных задач регионального и глобального характера. В данном контексте образовательная программа «Экология» представляет достаточную ценность.

Предложения по совершенствованию программы с учетом требований квалификационных характеристик специалиста.

Базовый вариант данной ОП активно обсуждался с моим участием в достаточно представительной группе зарубежных и отечественных экспертов-разработчиков на Международном семинаре «Инновации в разработке Образовательной программы на английском языке по специальности 5В060800 – «Экология», который успешно прошел 13-14 июня 2018 года в Казахском национальном университете имени аль-Фараби. Высказанные предложения рассмотрены, наиболее ценные из них учтены при формировании учебного плана и направлены на его совершенствование.

Следует отметить, что выпускник настоящей образовательной программы получит достаточно хорошую базу знаний по фундаментальным дисциплинам, однако, с моей точки зрения, путем уменьшения учебной нагрузки фундаментальных дисциплин можно было бы увеличить количество кредитов для таких дисциплин, как «Зеленые технологии», «Экосистемные услуги и маркетинг», «Экологическая безопасность» и др. Однако стоит понимать, что удовлетворить потребности каждого работодателя в одной программе невозможно, в связи с чем полагаю, что

данное замечание не снижает ценности компетенций выпускника образовательной программы.

В качестве рекомендаций предлагаю также в курсах дисциплин четко прописывать цель изучения той или иной дисциплины, формулируя ее через систему компетенций как ожидаемый результат обучения; в списке рекомендуемой литературы использовать современные источники на английском языке и отечественную литературу с ретроспективой не позднее 7- 10 лет, а также перспективные тематические интернет-ресурсы.

Выводы: образовательная программа «Экология», разработанная на английском языке по специальности 5В060800 – «Экология» соответствует стандарту и требованиям МОН РК, конкурентоспособна и при реализации позволяет достичь запланированных результатов обучения. Программа рекомендуется к использованию в образовательном процессе ВУЗов Казахстана.

Экспертизу провела:

доцент АО университета «Нархоз» к.г.н.



С.Дж. Усубалиева

**Экспертное заключение
на образовательную программу «Ecology», разработанной в рамках
специальности бакалавриата 5B060800 – «Экология» на английском
языке разработчиками**

Казахского национального университета имени аль-Фараби

Общая характеристика образовательной программы.

На основе изучения содержания дисциплин, можно отметить, что набор дисциплин образовательной программы актуален и за рубежом, поскольку разработчиками учебного плана, наравне с отечественными, являются видные ученые из таких университетов, Middlesex University, UK – Professor of Environmental Science Dr. Lian Nicola Louise Lundy, Porto Polytecnic Institute, Portugal – Vice President of International Students Exchange Programme (ISEP), Professor Jose Carlos Quadrado, Environment Europe Ltd, Oxford, UK – Director, Dr. Stanislav E. Shmelev, The University of Urbino, Campus Scientifico Segests, Italy – Professor of Ecology, Department of Basic Sciences and Fundamentals , Almo Farina, Polytechnic University of Valencia, Spain – Professor of the Hydraulic and Environmental Engineering department –Dr. Javier Rodrigo Ilarri.

Исходя из анализа представленных к экспертизе материалов, в частности, описания образовательной программы, основного учебного плана специальности, силлабусов дисциплин, можно прийти к выводу о том, что в целом образовательная программа «**Ecology**» соответствует требованиям МОН РК об образовательных программах, удовлетворяет запросам рынка труда, а заявленные компетенции выпускника отвечают на сегодняшний день потребностям работодателей.

Следует отметить, что предложенная на экспертизу образовательная программа разработана при участии специалистами ведущих ВУЗов РК, таких как Казахский национальный университет имени аль-Фараби, АОО «Назарбаев университет», “National Laboratory Astana”, Казахский агротехнический университет имени Сейфуллина, Университет НАРХОЗ. Образовательная программа предусматривает модульное обучение и включает следующие:

- Государственный обязательный модуль;
- Социально-коммуникативный модуль;
- Блок профессиональных модулей;
- Модули индивидуальных образовательных траекторий;
- Междисциплинарный модуль;
- Профессиональная практика (по видам практик).

Преимущество образовательной программы «Ecology» перед другими отечественными программами состоит в том, что она предусматривает обучение только на английском языке, что несомненно будет способствовать привлечению иностранных студентов и профессоров.

Актуальность основного учебного плана.

Английский язык обучения; направление подготовки специалистов; а также востребованность специалистов с знаниями в области экологии и устойчивого развития – это те факторы, которые обеспечивают актуальность настоящей программы.

Оценка значимости и практической ценности учебной программы.

Образовательная программа «Ecology» несомненно представляет практическую ценность, поскольку вопросы обеспечения экологической безопасности необходимы для решения многих промышленных и индустриальных задач. Достоинством предлагаемой образовательной программы является включение таких инновационных курсов, как «Зеленые технологии», «Возобновляемая энергия», «Методы и модели управления отходами»

Предложения по совершенствованию программы с учетом требований квалификационных характеристик специалиста.

С моей точки зрения, программа имеет инновационно-техническую направленность обучения с элементами самостоятельной творческой работы студентов. Хочется надеяться, что выпускник данной образовательной программы получит достаточно хорошую базу знаний по фундаментальным дисциплинам. Вместе с тем снижение учебной нагрузки по ряду дисциплин позволило бы расширить продолжительность учебной и производственной практик, включив элементы проектной деятельности.

Данное замечание не снижает ценности компетенций выпускника данной образовательной программы. Безусловно удовлетворить потребности каждого работодателя в одной программе не возможно, в связи с чем полагаю, что

Выводы: образовательная программа «Ecology» по специальности «5В060800–Экология» соответствует Государственному общеобразовательному стандарту указанной специальности.

Экспертизу провела:

доктор химических наук,
ассоциированный профессор,
СНС Лаборатории преобразования
материалов и прикладной физики
“National Laboratory Astana”,
Назарбаев Университета



Г.К. Сугурбекова

Сугурбекова Г.К.

15.11.18

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НАУЧНО-ПРОИЗВОДСТВЕННЫЙ И
ИНФОРМАЦИОННЫЙ ЦЕНТР

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Исх. № 124/18
от «15» 08 2018 г.

Экспертное заключение на образовательную программу «Ecology» на английском языке по специальности «5В060800 – Экология»

Характеристика образовательной программы, ее актуальность, новизна и практическая значимость.

Образовательная программа «Ecology» на английском языке по специальности «5В060800 – Экология», представленная к экспертизе, уникальна по своей сути и содержанию.

Впервые, по государственному заказу осуществляется разработка необходимой учебно-методической документации для подготовки в нашей стране бакалавров-экологов на английском языке. Основным разработчиком выступает ведущий вуз - Казахский национальный университет имени аль-Фараби (КазНУ имени аль-Фараби). Коллектив кафедры ЮНЕСКО по устойчивому развитию факультета географии и природопользования КазНУ имени аль-Фараби победил в открытом конкурсе Министерства образования и науки Республики Казахстан и получил право создать рабочую группу из числа зарубежных и отечественных экспертов для качественной разработки такой программы. В рабочую группу вошли представители престижных университетов Европы и Азии, входящих в ТОП 200 университетов мира, ВУЗы республики, где осуществляется подготовка бакалавров-экологов, а также ряд зарубежных и казахстанских компаний и предприятий, заинтересованных в квалифицированных специалистах в этой области.

Актуальность образовательной программы «Ecology» обусловлена глобальностью и первоочередной важностью решения экологических проблем для устойчивого развития мирового сообщества в XXI веке. Вместе с этим, возрастающая интернационализация рынка труда выдвигает требования по скорейшей интеграции казахстанского экологического образования в международную образовательную систему, способствуя повышению профессиональной конкурентоспособности выпускников, их полилингвокультурной адаптации.

№0474284



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Новизна Программы очевидна и связана с подготовкой бакалавров в течение всех 4 лет обучения на английском языке по международным стандартам образования – на основе кредитно-модульной технологии обучения, учитывающей вариативность и разнообразие элективных модулей (дисциплин по выбору), что представляет особую ценность для работодателей.

Практическая значимость Программы чрезвычайно высокая и нацелена на подготовку высококвалифицированных специалистов по экологии и устойчивому развитию, организации и проведению комплексных мероприятий по защите окружающей среды в национальном секторе экономики – государственных управленческих и промышленных предприятиях, компаниях среднего и малого бизнеса, а также для работы в международных организациях и зарубежных компаниях, расположенных на территории Казахстана и в других странах.

Цель и задачи образовательной программы, анализ базового варианта образовательной программы.

Цель и задачи образовательной программы достаточно четко прописаны и позволяют в полной мере реализовать подготовку в казахстанских вузах конкурентоспособных специалистов - экологов, сформировать основные профессиональные компетенции в интересах устойчивого развития, а также умения и навыки принятия рациональных решений в области охраны окружающей среды и рационального природопользования. Выделено 12 результатов обучения, которые охватывают не только природоохранные, но и правовые, социально - экономические аспекты, актуализируют научную, практическую составляющие и самостоятельную подготовку обучающихся.

Анализ базового варианта образовательной программы «Ecology» на английском языке по специальности «5B060800 – Экология» включал рассмотрение описания программы, проект основного учебного плана и syllabusов дисциплин. Программа содержит 131 кредит теоретического обучения. Считаю положительным моментом с точки зрения работодателя, что усилена профессионально-практическая подготовка обучающихся, а именно: учебная практика – 3 кредита, производственная (полевая) практика - 1 кредит; производственная практика молодого специалиста – 6 кредитов, преддипломная практика – 2 кредита. На дополнительные виды обучения и итоговую аттестацию отводится 20 и 3 кредита соответственно.

Рекомендации по совершенствованию образовательной программы с учетом требований квалификационных характеристик специалиста.

Какие же специалисты - экологи нужны для компании, которую я возглавляю, исходя из требований экологического рынка, современных задач, стоящих в связи с переходом на «зеленую экономику» и устойчивое развитие Казахстана? Республиканский научно-производственный и информационный центр «Казэкология» - частная коммерческая компания, специализирующаяся по широкому спектру проведения работ и оказания экологических- услуг. Нам нужны современные специалисты, обладающие компетенциями

(передовыми знаниями, умениями и навыками) в области экологического проектирования и нормирования, мониторинга окружающей среды, экологического аудита и экспертизы, проектно-изыскательских работ и архитектурно-строительного проектирования. Компания действует в сфере экологической безопасности производства и охраны окружающей среды в Казахстане с 1989 года.

РНПИЦ «Казэкология» связана с КазНУ имени аль-Фараби многолетними узами. Все ведущие работники заканчивали в свое время наш университет. Благодаря обширной практической и научно-исследовательской деятельности наш Центр для многих молодых специалистов стала хорошей школой.

Среди клиентов компании - международные организации, крупные корпорации, отечественные компании с иностранным участием, среди которых можно отметить Программу развития ООН, Всемирный Банк, компании Шелл, Шеврон, Огден, Аджип, Бритиш Газ и др. Поэтому, помимо знания основ профессии и практических навыков по экологии, большую помощь в работе нашим специалистам оказывает знание иностранных языков. В этих случаях, как правило, результаты исследований, разработанные проекты представляются на английском языке. Знание международных технических терминов, определений, основных понятий в той или иной сфере, особенностей технологических процессов в различных социально-экономических сферах служит необходимой базой при подготовке профессиональных отчетов. Английский, как наиболее широко распространенный язык международного общения, облегчает деловые контакты с нашими коллегами в зарубежных командировках, при проведении различных совещаний, рабочих семинаров и облегчает выполнение поставленных задач в рамках конкретных исследований и проектов. Кроме того, представляется важной подготовка молодых специалистов в области природоохранного законодательства, обладающих навыками работы с нормативными правовыми документами с использованием доступа к открытым информационным системам.

Для нас важен не только багаж университетских знаний, навыки работы в информационных сетях, с базами данных и компьютерными программами, но прежде всего способность к анализу, профессиональному отражению результатов исследований в отчетах и проектах. Эффективное применение в трудовой деятельности опыта, полученного в стенах университета, является залогом успешной и продуктивной работы.

Считаю целесообразным:

- наполнить дисциплины новым содержанием и внедрение современных учебных курсов, отвечающих Целям устойчивого развития ООН, приоритетным направлениям экологии, направленным на противостояние глобальным вызовам XXI века, таким как изменение климата и глобальное потепление, водная безопасность, дефицит энергетических и других ресурсов Земли, углубляющиеся антропогенные загрязнения и нарушение экосистем, т.д.

- предусмотреть углубленную подготовку по математической обработке информационных данных и компьютерному моделированию, расширение навыков проведения технических расчетов и прогнозирования при оценке рисков экологических воздействий и управлению отходами;

- усилить практическую направленность в подготовке специалистов, расширить базы практик и виды деятельности, углубить навыки творческой, самостоятельной работы, например, включение новой дисциплины «Экологический проект», «Экологические услуги и маркетинг» и другие для удовлетворения потребностей работодателей в изменяющемся рынке занятости в глобальном и национальном масштабе.

Оценка образовательной программы.

Считаю, что рассматриваемый проект основного учебного плана, и другая учебно-методическая документация составлены на высоком научно-методическом уровне. Широко применен междисциплинарный и комплексный подход, что отражает сущность современного экологического знания, выбор дисциплин произведен достаточно рационально и целесообразно, просматривается логическая связь пре- и постреквизитов дисциплин в структуре учебного плана. Надеюсь, что вышеприведенные рекомендации будут способствовать ее совершенствованию с учетом требований работодателей.

Выводы: В целом, образовательная программа «Ecology», разработанная в рамках специальности бакалавриата «5В060800 – Экология» на английском языке, соответствует требованиям, предъявляемым к квалификации выпускника.

Экспертизу провел:

**Генеральный директор РНПЦ «Казэкология»
Доктор географических наук, профессор**



Скаков А.А.



№ 150 от 9.08.2018 г.

**Экспертное заключение
на образовательную программу «Ecology», разработанную в рамках
специальности бакалавриата 5В060800 – «Экология»
на английском языке разработчиками
Казахского национального университета имени аль-Фараби**

Общая характеристика образовательной программы.

К экспертизе представлены следующие материалы – описание образовательной программы, Основной учебный план специальности, силлабусы дисциплин, по результатам которой можно прийти к выводу о том, что Образовательная программа «Ecology» разработана в соответствии с требованиями МОН РК об образовательных программах, вполне удовлетворяет запросам рынка труда на сегодняшний день, поскольку заявленные компетенции выпускника удовлетворяют потребностям работодателей. Детально изучив описательную часть дисциплин, можно заключить, что набор дисциплин образовательной программы актуален и зарубежом, поскольку разработчиками учебного плана, наравне с отечественными, являются видные ученые из таких университетов, Middlesex University, UK – Professor of Environmental Science Dr. Lian Nicola Louise Lundy, Porto Polytechnic Institute, Portugal – Vice President of International Students Exchange Programme (ISEP), Professor Jose Carlos Quadrado, Environment Europe Ltd, Oxford, UK – Director, Dr. Stanislav E. Shmelev, The University of Urbino, Campus Scientifico Segests, Italy – Professor of Ecology, Department of Basic Sciences and Fundamentals, Almo Farina, Polytechnic University of Valencia, Spain – Professor of the Hydraulic and Environmental Engineering department – Dr. Javier Rodrigo Ilarri.

Примечательно, что данная образовательная программа разработана специалистами ведущих ВУЗов РК, таких как Казахский национальный университет имени аль-Фараби, АОО «Назарбаев университет», Казахский агротехнический университет имени Сейфуллина, Университет НАРХОЗ, Филиал «Назарбаев Интеллектуальная школа ХБН» в г. Атырау.

Набор дисциплин настоящей образовательной программы предусматривает модульное обучение, в состав которой вошли:

- Государственный обязательный модуль;
- Социально-коммуникативный модуль;
- Блок профессиональных модулей;
- Модули индивидуальных образовательных траекторий;
- Междисциплинарный модуль;
- Профессиональная практика (по видам практик).

Представленная к экспертизе образовательная программа «Ecology» предусматривает обучение только на английском языке, что дает ей преимущество перед другими отечественными программами, будет способствовать привлечению иностранных студентов и профессоров.

Актуальность основного учебного плана.

Актуальность настоящей программы обоснована следующими факторами:

1. английским языком обучения;
2. направлением подготовки специалистов;
3. востребованностью специалистов со знаниями в области экологии и устойчивого развития.

Оценка значимости и практической ценности учебной программы.

Вопросы экологии в целом и в частности экологическая безопасность – это то направление, развитие которого необходимо для решения многих промышленных и индустриальных задач. В данном контексте образовательная программа «Ecology» представляет практическую ценность.

Предложения по совершенствованию программы с учетом требований квалификационных характеристик специалиста.

Следует отметить, что выпускник настоящей образовательной программы получит достаточно хорошую базу знаний по фундаментальным дисциплинам, однако, с моей точки зрения, путем уменьшения учебной нагрузки фундаментальных дисциплин можно было бы усилить модуль «Прикладная зеленая экономика» путем включения таких дисциплин, как. «Возобновляемая энергия», «Зеленые технологии». Необходимо менять мышление обучающихся, обеспечить условия для самостоятельной творческой работы, в связи, с чем программа должна иметь большую практическую и техническую направленность обучения. Необходимо расширить базы практики, использовать наработки лаборатории Национальной инженерной академии РК в области возобновляемых источников энергии, проектирования и применения гибридных технологий выработки энергии. Однако стоит понимать, что удовлетворить потребности каждого работодателя в одной программе не возможно, в связи с чем полагаю, что данное замечание не снижает ценности компетенций выпускника образовательной программы.

Заключение: образовательная программа «Ecology» по специальности «5B060800 – Экология» соответствует Государственному общеобразовательному стандарту указанной специальности.

Экспертизу провел:

Генеральный директор
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Надиров



Н. К.Надиров

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13 августа 2018 г. № Ал-18-04

**Экспертное заключение
на образовательную программу «Ecology», разработанную в рамках
специальности бакалавриата 5В060800 - «Экология» на английском языке
разработчиками Казахского национального университета имени аль-
Фараби**

Общая характеристика образовательной программы.

Образовательная программа «Ecology» разработана для учащихся бакалавриата высших учебных заведений Республики Казахстан и предполагает очное изучение в течении 4-х лет всех дисциплин на английском языке. Новая образовательная программа разрабатывается в соответствии с госзаказом Министерства образования и науки РК. В международную группу разработчиков программы вошли авторитетные ученые и специалисты 10 зарубежных университетов и компаний из Великобритании, Испании, Италии, Португалии, Китая, а также отечественные преподаватели из ВУЗов Казахстана, где осуществляется подготовка высококвалифицированных специалистов-экологов, а также ведущие работодатели, заинтересованные в принятии на работу квалифицированных выпускников бакалавриата, обладающих современными знаниями по экологии, набором необходимых компетенций в области охраны окружающей среды и устойчивого развития. Основными разработчиками данной образовательной программы выступают преподаватели кафедры ЮНЕСКО по устойчивому развитию факультета географии и природопользования Казахского национального университета им. аль-Фараби.

Образовательная программа разработана в контексте Послания Президента РК «100 конкретных шагов» для реализации долгосрочной Стратегии «Казахстан-2030», предполагающей поэтапный переход на английский язык обучения в системе образования – в старшей школе и вузах, с целью повышения конкурентоспособности национальных образовательных программ, а также притока иностранного капитала за счет расширения программ двудипломного образования и академической мобильности учащихся.

Программа соответствует Государственному общеобразовательному стандарту специальности 5В060800 – «Экология» и предусматривает

внедрение инновационных технологий в учебный процесс, посредством включения в программу дисциплин, изучение которых приводит к компетенциям выпускника, востребованным на международном рынке труда.

Цель образовательной программы: осуществить подготовку высококвалифицированных специалистов, конкурентоспособных на отечественном и международном рынке труда в области экологии и устойчивого развития.

Основные задачи учебной программы: формирование у выпускника программы комплекса компетенций для того, чтобы находить оригинальное применение полученных знаний в решении современных экологических проблем фундаментального и прикладного характера в исследовательских учреждениях, на производстве, международных организациях и общественных структурах.

1. Актуальность основного учебного плана

Современный мир предлагает множество новых технологий использования природных ресурсов и энергии. Экологические проблемы становятся проблемами № 1, т.к. их решение напрямую связано с сохранением среды обитания человека и, следовательно, с выживанием самого человечества в долгосрочном аспекте. Но и в ближайшей перспективе бездействие в отношении существующих экологических проблем неизбежно приведет к существенным экономическим потерям. Глобализация современной экономики приводит к возникновению все новых зон конфликта интересов различных стран и групп населения и обострению старых конфликтов.

Экологическое образование является важнейшей компонентой в системе фундаментальной подготовки современного специалиста. Важными направлениями совершенствования экологического образования являются усиление его прикладной направленности и индивидуализации учебного процесса. В настоящее время отмечается расширение профессиональной деятельности будущих специалистов, что, несомненно, требует введения новых курсов в систему обучения.

2. Новизна учебной программы

С представленным для анализа базовым вариантом образовательной программы «Ecology» на английском языке в рамках специальности «5В060800 – Экология» я впервые познакомился на Международном семинаре в КазНУ имени аль-Фараби в июне 2018 года. Данная образовательная программа является инновационной по сути и содержанию. Ее несомненным преимуществом стала разработка новых компонентов по выбору для студентов данного направления. Для составления учебного плана привлекались специалисты из зарубежных университетов, а также представители индустрии, которые давали свои рекомендации по включению тех или иных дисциплин, изучение которых будет способствовать получению актуальных на сегодняшний день компетенций.

3. Оценка значимости и практической ценности учебной программы

Значимость учебной программы определена потребностью казахстанской экономики в отечественных высококвалифицированных

специалистах по направлению «Экология». Удовлетворение потребностей работодателей в изменяющемся рынке занятости в глобальном и национальном масштабе влечет за собой усиление практической направленности в подготовке специалистов, расширения базы практик и видов деятельности, навыков творческой, самостоятельной работы, например, включение новой дисциплины «Экологический проект».

4. Рекомендации по совершенствованию программы с учетом требований квалификационных характеристик специалиста

Производя экспертизу образовательной программы, необходимо отметить, что выбор дисциплин произведен достаточно рационально и целесообразно, однако остается открытым вопрос о том, кто будет преподавать эти дисциплины. Опыт показывает, что главная проблема не только и не столько в содержании образовательной программы, сколько в ее реализации. Выходом может быть приглашение ведущих профессоров зарубежных ВУЗов, экспертов крупных международных программ.

Образовательной программой предусмотрена практика обучающихся. Следует поощрять практику студентов в крупных международных проектах, в которые вовлечены ведущие ученые различных стран. В качестве примера могу привести Кашаганский проект, где за 15 лет моей работы не было на практике ни одного студента-эколога КазНУ, но переводчики/ менеджеры оканчивали зарубежные ВУЗы и затем занимали ведущие позиции по экологии во многих иностранных компаниях.

Практика в крупных международных компаниях облегчает и трудоустройство студента.

5. Оценка образовательной программы

«Общеобразовательные дисциплины. Компонент по выбору». Предусмотрено 4 модуля (Человек и окружающая среда, Географический модуль, Историко-культурный модуль, Экономико-правовой модуль) представляют полную возможность обучающимся ознакомиться с современными глобальными, региональным и локальными проблемами и обозначить возможные пути их решения. Из личного опыта, а я несколько лет был Председателем ГАК в КазНУ отмечу, что во время защиты выпускных работ бакалаврами по специальности «Экология» предлагалось достаточное количество решений экологических проблем любого уровня от глобального до локального, однако слабым местом было понимание причин, почему такие прекрасные экологически чистые технологии до сих пор не внедрены в современном мире. Это касалось различных проблем, от утилизации макулатуры до современных «зеленых» энергетических технологий.

«Базовые дисциплины» Хорошо сбалансированы, как с точки зрения понимания естественнонаучных основ экологии (Обязательный компонент), так и с точки зрения решения экологических проблем: моделирование, менеджмент, нормирование и формирование экологической политики.

Стоит отметить важность модуля «Профессиональный язык», который очень важен с точки зрения точной коммуникации профессионалов, получавших образование в различных языковых и культурных средах.

На мой взгляд, дисциплину «Эволюционная экология человека» лучше рассматривать в составе «Общеобразовательных дисциплин. Компонент по выбору». Она несколько выбивается из общего контекста / логики базовых дисциплин, в том составе как ее видят разработчики Программы. Считаю, что завышено и учебное время для данной дисциплины. Например, предусмотрено 3 кредита на ОВОС (центральный вопрос экологии) и те же самые 3 кредита отведены на дисциплину «Эволюционную экологию человека», которая, конечно, дает понимание эволюции изменения взаимоотношений человека / цивилизации и окружающей среды, но не является столько значимым, как ОВОС, вопросом на данном этапе развития экологии.

В профилирующих дисциплинах в качестве обязательного компонента предусмотрен «Экологический мониторинг». Исходя из опыта работы в международном проекте по мониторингу нефтяных операций на Каспийском море, могу рекомендовать усилить преподавание данной дисциплины иностранными преподавателями. К сожалению, в курсах подготовки отечественных специалистов не предусмотрены современные методы и подходы к организации экологического мониторинга, особенно мониторинга основанного не на анализе физико-химических компонентов, а на анализе биологической составляющей окружающей среды (организмов, популяций, видов). Высказанные замечания носят рекомендательный характер и не умоляют достоинств рассматриваемой образовательной программы.

6. **Выводы:** образовательная программа «Ecology» по специальности 5В060800 – «Экология» соответствует требованиям, предъявляемым к квалификации выпускника.

Экспертизу провел:

Директор



Тимирханов С.Р.

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**Экспертное заключение
на образовательную программу, разработанную в рамках
специальности бакалавриата «5В060800 - Экология» на английском
языке разработчиками
Казахского национального университета имени аль-Фараби**

Актуальность основного учебного плана.

Актуальность рассматриваемой образовательной программы (ОП) очевидна, потому что профессиональная подготовка в области экологии на английском языке обучения отвечает современным требованиям международного образовательного пространства и позволит привлечь в будущем иностранных студентов. Помимо этого, ОП позволит будущим выпускникам быть более конкурентоспособными на рынке труда.

Общая характеристика образовательной программы.

Целью данной образовательной программы по специальности «5В060800 - Экология» является подготовка специалистов-экологов на уровне бакалавриата для решения проблем практической деятельности, применяя современные методы и технологии.

Для экспертизы были использованы такие документы, как второй вариант образовательной программы «5В060800 - Экология» на английском языке, включающий паспорт ОП, основной учебный план, содержание модулей и каталог элективных дисциплин.

Программа соответствует Государственному общеобразовательному стандарту специальности «5В060800 - Экология» и предусматривает внедрение инновационных технологий в учебный процесс посредством включения в программу дисциплин, изучение которых приводит к расширению компетенций специалистов. Программа содержит 131 кредит теоретического обучения, помимо этого даны 12 результатов обучения. Особое значение приобретают дополнительные виды обучения: производственная (полевая) практика - 1 кредит, учебная практика - 3 кредита, производственная практика молодого специалиста — 6 кредитов, преддипломная практика - 2 кредита. В общей сложности 20 кредитов.

Основной учебный план по специальности «5В060800 – Экология» включает в себя модули, регламентирующие цели, ожидаемые результаты, содержание, условия и технологии реализации образовательного процесса согласно параметрам Болонского процесса, которые содержат обязательные общеобразовательные, обязательные профессиональные и элективные дисциплины.

Образовательная программа разработана для реализации долгосрочной Стратегии «Казахстан-2030», которая направлена на постепенный переход на английский язык обучения в системе образования на всех уровнях, с целью повышения конкурентоспособности национальных образовательных программ, а также для расширения программ двухдипломного образования и академической мобильности студентов.

Также следует отметить инновационный подход в разработке ОП:

- интеграцию казахстанских и международных образовательных программ;
- реализацию трехязычного образования и в школах путем организации образовательного процесса на казахском, русском и английском языках;
- повышение качества обучения за счет определения системы целей, представленных в виде ожидаемых учебных результатов;
- сочетание академической и практической направленности естественно-математического образования, в особенности на уровне старшекласников, которая предусматривает усвоение учащимися методов научных исследований и учений о методах познания;
- поэтапное наращивание предметных знаний и навыков, обеспечивающих глубину и сложность содержания учебных предметов с учетом возрастных возможностей учащихся;
- обеспечение преемственности программ дошкольного образования, начальной, основной, старшей школ и высшего образования.

Оценка значимости и практической ценности учебной программы.

Реализация оптимальных экологических решений приобретает с каждым годом все большее значение. Правительство, компании, международные организации, научные центры и институты стараются вкладывать значительные средства в наилучшие доступные и «зеленые» технологии. Такие дисциплины как «Зеленая экономика», «Методы и модели управления отходами», «Зеленые технологии», наглядно демонстрируют инновационный подход и практическую значимость ОП.

В качестве одного из достоинств образовательной программы следует отметить включение дисциплин, которые раскрывают причинно-следственные связи возникновения экологических проблем: Окружающая среда и устойчивое развитие (введение в специальность), Изменение климата, Физика окружающей среды, Урбанистика.

Образовательная программа с учетом многолетнего опыта работы рецензента в решении экологических проблем Семипалатинского

испытательного полигона, приобретает особую актуальность в научно-практическом аспекте. В 2012-2014 гг. рецензент выступал от имени партнерских стран в качестве соруководителя Международного гранта НАТО «Устойчивый менеджмент токсичных загрязнителей в Центральной Азии: от региональной модели экосистемы до безопасности окружающей среды». На заключительной стадии проекта в 2014 г. организован Международный семинар, в котором принимали участие разработчики данной образовательной программы и докторанты по специальности «5В060800 - Экология». Начиная с 2002 г. Институт полимерных материалов и технологий систематически проводит Международный семинар по полимерам специального назначения для охраны окружающей среды с участием ученых и специалистов дальнего и ближнего зарубежья на английском языке. В нем постоянно участвуют как сами разработчики образовательной программы, так и студенты, магистранты и докторанты по специальности «5В060800 - Экология» с устными и стендовыми докладами. Эти факты свидетельствуют об активном участии студентов в научных семинарах, посвященных экологическим проблемам, и апробации результатов работ перед научным сообществом.

В качестве рекомендаций по совершенствованию научно-исследовательской подготовки будущих специалистов-экологов предлагаю: эффективно реализовать научную составляющую подготовки специалистов через вовлечение студентов в научные программы и проекты; усилить академическую мобильность; расширить базы профессиональных практик, для качественного написания выпускных работ.

Содержание модулей и каталог элективных дисциплин достаточно полно отражают современные тенденции научного знания в области окружающей среды и рационального природопользования.

Заключение.

Исходя из вышеизложенного, образовательная программа «Экология», разработанная на английском языке по специальности «5В060800 - Экология» соответствует стандарту и требованиям МОН РК, конкурентоспособна и инновационна, позволяет достичь запланированных результатов обучения.

Программа рекомендуется к использованию в образовательном процессе высших учебных заведений РК.

Директор Института полимерных материалов и технологий
доктор химических наук, профессор
Лауреат Государственной премии РК
в области науки и техники



Кудайбергенов С.Е.



от 06.12.2018 № 217

На исх.№ _____ от _____

РЕЦЕНЗИЯ

на образовательную программу «Ecology» на английском языке, разработанную в рамках специальности «5В060800 - Экология»

Общая характеристика образовательной программы, ее актуальность, новизна и практическая значимость.

Представленная к рецензированию Образовательная программа «Ecology» на английском языке по специальности «5В060800 – Экология» включает паспорт Программы, основной (рабочий) учебный план и другое учебно-методическое обеспечение. Программа соответствует Государственному общеобразовательному стандарту специальности «5В060800 - Экология» и отвечает международным требованиям в сфере высшего образования.

Программа разработана по кредитно-модульной технологии, содержит 154 кредита, в том числе 131 кредит теоретического обучения, и предусматривает 4-х летний срок обучения. Особенное значение приобретают дополнительные виды обучения: производственная (полевая) практика - 1 кредит, учебная практика - 3 кредита, производственная практика специалиста — 6 кредитов, преддипломная практика - 2 кредита. Четко обозначены компетенции выпускаемых специалистов, определены 12 результатов обучения, ориентированные на Дублинские дескрипторы. Особенностью Образовательной программы являются возможность построения собственной траектории обучения за счет выбора дисциплин. Возможны следующие траектории обучения: природопользование, экология и устойчивое развитие.

Актуальность и новизна. Решение экологических проблем становится ключевым условием устойчивого развития в будущем. Переход на «зеленые» стандарты во всех сферах социально-экономического развития Казахстана и других стран определяет актуальность рассматриваемой Образовательной программы. Компании в лице работодателей на сегодняшний день вкладывают в это направление значительные средства, а государства мира поддерживают прогрессивные начинания в сфере экологии.

Профессионально подготовленные специалисты-экологи со знанием английского языка, как языка международного общения, являются востребованными в различных отраслях производства, в том числе для предприятий атомной отрасли.

Данная Образовательная программа впервые разработана по заданию Министерства образования и науки Республики Казахстан для подготовки в нашей стране бакалавров-экологов на английском языке. Это, несомненно, будет способствовать повышению конкурентоспособности национальных образовательных программ, расширению программ двух-дипломного образования и академической мобильности студентов.

Основным разработчиком Программы выступает Казахский национальный университет имени аль-Фараби. Участниками рабочей группы стали авторитетные ученые зарубежных вузов: Миддлсекского университета, Университета Рединга, Университета Камбрии (Великобритания), Политехнического института Порто (Португалия), Политехнического университета Валенсии (Испания), Университета Урбино (Италия); образовательной организации «Окружающая среда Европы», Оксфорд (Великобритания). В разработке Образовательной программы приняли участие преподаватели других отечественных учебных заведений: Казахского агротехнического университета имени Сейфуллина, Университета НАРХОЗ, а также представители работодателей: Республиканский научно-производственный и информационный центр «КазЭкология», Научно-инженерный центр Национальной инженерной академии РК «Нефть», Институт полимерных материалов и технологии, **Казахстанская ассоциация по управлению отходами «KazWaste»**, ТОО «Биология моря» и другие.

Практическая значимость. Образовательная программа «Ecology» нацелена на повышение востребованности выпускаемых специалистов на республиканском и международном рынке труда, привлечении иностранных студентов для обучения в Казахстане, что предполагает создание инновационной по своему содержанию учебно-методической документации, ориентированной на зарубежные стандарты образования. Вариативность модулей программы направлена на повышение компетенций будущих выпускников и расширяет сферу их трудоустройства.

Атомная энергетика является по существу «зеленой энергетикой», предприятия которой практически не выбрасывают в окружающую среду оксиды серы, углерода, азота. Однако, при строительстве, эксплуатации и консервации объектов атомной энергетике, чрезвычайно важна оценка воздействия на окружающую среду и разработка комплекса мероприятий по предотвращению аварийных ситуаций. Такие работы проводятся экологами.

Профессиональный стандарт работников атомной отрасли Казахстана содержит требования к специалистам по радиационной безопасности и экологии, в связи с чем данная Образовательная программа представляет для нас интерес.

ОЮЛ в форме ассоциации «НТЦ Безопасности ядерных технологий» проводит работы по оценке воздействия предприятий атомной энергетике на

окружающую среду в соответствии со стандартами МАГАТЭ, осуществляет ряд международных научно-технических проектов по экологической безопасности, что обуславливает потребность в специалистах - экологах со знанием английского языка.

С профессиональной точки зрения считаем, что будут востребованы такие дисциплины Программы, как «Environmental impact assessment (EIA) /Оценка воздействия на окружающую среду (ОВОС)», «Environmental Security/Экологическая безопасность», «Environmental Risk Assessment/Оценка экологических рисков», «Green technologies /Зеленые технологии», а также образовательные модули «Applied Ecology/Прикладная экология», «Environmental Management /Менеджмент окружающей среды».

Заключение.

Исходя из вышеизложенного, Образовательная программа «Ecology», разработанная на английском языке по специальности «5B060800 - Экология», весьма актуальна, ее содержание имеет инновационный характер, а подготовленные специалисты станут задействованы на предприятиях атомной отрасли.

Заместитель директора
ОЮЛ НТЦ БЯТ ж.ф.м.н.



Handwritten signature of A.X. Klepikov

А.Х. Клепиков



№ 660-А-18
05.12.2018

РЕЦЕНЗИЯ
на образовательную программу «Ecology» на английском языке по
специальности «5В060800 – Экология»

Общая характеристика образовательной программы.

Представленная к рецензированию Образовательная программа «Ecology» по специальности бакалавриата 5В060800 – «Экология» впервые разработана по заданию МОН РК на английском языке. Пакет учебно-методической документации включает следующие документы: Паспорт специальности и Основной (рабочий) учебный план, описание модулей и каталога дисциплин, другие материалы.

Данная Образовательная программа – результат кропотливого труда международного коллектива ученых и специалистов. Казахский национальный университет имени аль-Фараби (КазНУ имени аль-Фараби) является основным разработчиком Образовательной программы и создал для ее осуществления международную рабочую группу, состоящую из представителей ведущих университетов Европы, вошедших в ТОП 200 университетов мира, ВУЗов республики, где осуществляется подготовка бакалавров-экологов, а также работодателей - зарубежных и казахстанских компаний и предприятий, чье мнение чрезвычайно важно для квалифицированной подготовки специалистов-экологов.

Образовательная программа «Ecology» на английском языке по специальности «5В060800 – Экология» разработана по кредитно-модульной технологии в соответствии с Болонским Соглашением и казахстанским национальным стандартом высшего образования (проект Стандарта и Типовой учебный план 2016 г.). Образовательная программа рассчитана на 4-х летний срок обучения и содержит 154 кредита, в том числе 131 кредит теоретического обучения. Предусмотрено усиление профессионально-практической подготовки обучающихся, что обуславливает увеличение числа кредитов на производственную практику. Всего на дополнительные виды обучения и итоговую аттестацию отводится 20 и 3 кредитов соответственно.

Актуальность программы.

Образовательная программа разработана в соответствии с долгосрочной Стратегией «Казахстан-2030», которая направлена на постепенный переход на английский язык обучения в системе образования, с целью повышения конкурентоспособности национальных образовательных программ, а также для расширения программ двухдипломного образования и академической мобильности студентов.

Ассоциация высших учебных заведений Республики Казахстан является некоммерческой организацией юридических лиц, входящих в число профессиональных ассоциаций Национальной палаты предпринимателей «Атамекен». В настоящее время она объединяет 81 аккредитованных вузов Казахстана различных типов и профилей: технические, педагогические, экономические, сельскохозяйственные, медицинские, юридические, культуры, искусства и спорта, в которых обучаются более 86% всех студентов страны. Вопросы экологического образования и рационального природопользования в той или иной мере, с разным набором модулей и дисциплин, охватывают практически все направления профессиональной подготовки специалистов в высшей школе Казахстана.

Современная подготовка специалистов по экологии – это междисциплинарная система знаний в области фундаментальных и прикладных проблем экологии, направленная на приобретение студентами практических навыков и компетенций для комплексного решения вопросов управления окружающей средой и устойчивого развития на национальном и глобальном уровнях.

От того, какими компетенциями, практическими навыками и мировоззрением будут обладать специалисты-экологи зависит успешное решение поставленных задач, способствующих продвижению Казахстана по пути устойчивого развития. В этой связи, представленная Образовательная программа приобретает особую актуальность и способствует качественной подготовке специалистов, их будущей востребованности на казахстанском и международном рынках труда.

Цель и новизна образовательной программы.

Цель разработки – дальнейшая глобализация и интернационализация подготовки специалистов по экологии в бакалавриате, что предполагает создание инновационной по своему содержанию учебно-методической документации на английском языке, ориентированной на зарубежные стандарты образования, потребности казахстанской и мировой экономики.

Согласованность с европейскими стандартами образования и набором дисциплин по специальности, адаптированных для зарубежных вузов, обеспечивалась участием в программе и рекомендациями ученых из университетов: Middlesex University, UK – Professor of Environmental Science Dr. Lian Lundy, Porto Polytechnic Institute, Portugal – Vice President of International Students Exchange Programme (ISEP), Professor Jose Carlos

Quadrado, Environment Europe Ltd, Oxford, UK – Director, Dr. Stanislav E. Shmelev, The University of UrbinoItaly – Professor of Ecology, Department of Basic Sciences and Fundamentals , Almo Farina, Polytechnic University of Valencia, Spain – Professor – Dr. Javier Rodrigo Ilarri.

Соответствие казахстанским образовательным стандартам и требованиям осуществлялось преподавателями Казахского национального университета имени аль-Фараби, Казахского агротехнического университета имени Сейфуллина, Университета НАРХОЗ.

В формировании компетенций будущих специалистов, результатов обучения по данной программе приняли участие представители таких предприятий и организаций, как Республиканский научно-производственный и информационный центр «КазЭкология» - Генеральный директор, д.г.н. Скаков А.А.; Научно-инженерный центр Национальной инженерной академии РК «Нефть» - Директор, академик, д.х.н. Надилов Н.К.; Институт полимерных материалов и технологий - Директор, Лауреат Государственной премии РК в области науки и техники, Кудайбергенов С.Е.; Казахская ассоциация по управлению отходами «KazWaste» - Исполнительный директор, Мустафина В.В.; ТОО «Биология моря» - Директор, Лауреат Государственной премии РК в области науки и техники, Тимирханов С.Р. и другие.

Набор дисциплин Образовательной программы предусматривает модульное обучение: Государственный обязательный модуль; Социально-коммуникативный модуль; Блок профессиональных модулей; Модули индивидуальных образовательных траекторий; Междисциплинарный модуль; Профессиональная практика (по видам практик).

Новизна Программы – подготовка в соответствии с международными стандартами учебно-методической документации для реализации в вузах Казахстана Образовательной программы «Ecology» по специальности бакалавриата 5B060800 – «Экология» на английском языке на основе кредитно-модульной технологии обучения, учитывающей вариативность и разнообразие элективных модулей (дисциплин по выбору), что представляет особую ценность для работодателей. Выделено 12 результатов обучения, которые охватывают не только природоохранные, но и правовые, социально - экономические аспекты, актуализируют научную, практическую составляющие и самостоятельную подготовку обучающихся.

Оценка образовательной программы и ее практическая значимость.

Считаю, что учебно- методическая документация к рассматриваемой Образовательной программе составлена на высоком научно-методическом уровне, умело применен междисциплинарный и комплексный подход, что отражает современные тенденции в экологическом образовании и мировой опыт подготовки кадров по окружающей среде.

Цель и задачи образовательной программы четко обозначены и позволяют в полной мере реализовать подготовку в казахстанских вузах конкурентоспособных специалистов – экологов на английском языке,

сформировать основные профессиональные компетенции в интересах устойчивого развития, а также умения и навыки принятия рациональных решений в области охраны окружающей среды и рационального природопользования.

Особый интерес для профессиональных ассоциаций Национальной палаты предпринимателей «Атамекен», наряду с хорошей фундаментальной составляющей, представляют новые образовательные модули и дисциплины, направленные на усиление практических компетенций выпускников такие, как «Интегрированное управление экосистемами», «Прикладная «зеленая» экономика», «Устойчивое земле- и недропользование» (модули); «Экологическая безопасность», «Основы промышленной экологии», «Методы и модели управления отходами», «Экосистемные услуги», ряд курсов дисциплин по «зеленой экономике» и изучению механизмов ее реализации на основе совершенствования экологического регулирования и управления, внедрения альтернативной энергетики, повышения энергоэффективности и ресурсосбережения, рационального решения водных проблем и другие. Для казахстанских предпринимателей чрезвычайно важны знания и навыки будущих специалистов - экологов по применению экологического законодательства, умения оценить экономические выгоды, не нарушая баланса экосистем, прогнозировать экологические риски и предотвращать негативные воздействия на окружающую среду, что будет способствовать дальнейшей экологизации экономики страны.

Несомненным достоинством Образовательной программы является ее практическая направленность, подразумевающая подготовку высококвалифицированных специалистов по экологии и устойчивому развитию, организации и проведению комплексных мероприятий по защите окружающей среды в национальном секторе экономики – государственных управленческих и промышленных предприятиях, компаниях среднего и малого бизнеса, а также для работы в международных организациях и зарубежных компаниях, расположенных на территории Казахстана и в других странах.

Реализация данной Образовательной программы в ВУЗах Республики Казахстан открывает большие перспективы для: подготовки преподавательского состава, знающего английский язык на соответствующем для обучения студентов уровне, либо привлечения зарубежных профессоров к преподаванию в Казахстане, возможно, в режиме видео-конференций и вебинаров; улучшения учебно-методического обеспечения литературой на английском языке по специальности; совершенствования научной база для проведения практических занятий и определения лучших баз практик для студентов из числа индустриальных предприятий, хозяйствующих субъектов и бизнес-структур.

Выводы: В целом, образовательная программа «Ecology», разработанная на английском языке в рамках специальности бакалавриата «5В060800 – Экология», соответствует квалификационным требованиям, предъявляемым к выпускникам данной специальности, имеет

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