NJSC «Kazakh National Research Technical University named after K.I. Satbayev»
K. Turysov Institute of Geology and Oil-Gas Business
Department of Chemical Processes and Industrial Ecology

EDUCATIONAL PROGRAM

«ENGINEERING ECOLOGY»

Bachelor of natural science in the educational program "6B05103 - Engineering ecology"

1-st edition
in accordance with the State Educational Standard of Higher Education 2018

Almaty 2021

The program is drawn up and signed by the parties:
From KazNRTU named after K.I. Satbayev:

1. Head of the Department of ChP&IE Sh. Kubekova

2. Director of IGOM named after K.Turysov A. Syzdykov

From employers:

1. Director of LLP "Institute innovative research and technology" K. Arynov

2. Chief specialist of the department rationing of water resources LLP "KAIE" D. Burlibayeva

Approved at the meeting of the Academic Council of the Kazakh National Research Technical University named after KI Satbayev. Protocol №3 from 25.06.2021

Qualification:
Level 6 of the National Qualifications Framework:
6B052 Environment (bachelor)
6B05 Natural Sciences, Mathematics and Statistics

Professional competence. As a result of the competencies being formed, the student will:
1) understand:
- fundamental foundations of natural science disciplines,
- the effect of ecological principles and laws on the natural environment;
2) know:
- features of the influence of environmental factors of the environment on living systems and their responses;
- regulatory and sanitary-ecological norms and requirements in the field of the natural environment;
- the chemical composition of environmental objects;
- soil, water, atmosphere;
- local, regional and global environmental problems;
- global goals of sustainable development;
3) apply:
- norms for the protection of the natural environment;
- the rules of moral ecological development;
- information technology for the analysis and collection of environmental data;

4) be able to:
- to study and analyze the features of the transformation of various pollution in the surrounding technogenic and natural environment;
- determine the sequence and timing of scientific research;
- to use ecological knowledge in various spheres of production activity;
- select methods, objects, materials and sampling points for scientific monitoring;
- to carry out laboratory scientific and scientific-industrial research;
- to give an objective assessment of the ongoing environmental changes and violations of the natural environment,
- use methods for assessing environmental pollution in the process of scientific research,
- to determine the impact of various types of human activities on the environment,
- to study the consequences of the impact of industrial enterprises on various components of the biosphere and the health of workers;
- analyze essays and scientific works (articles, monographs, patents);
- assess environmental and economic efficiency, environmental risks;
- to develop the content of the project environmental documentation;
- to carry out environmental design, taking into account environmental compatibility, technological calculations for environmental forecasting, environmental expertise;
- to manage nature management, technological and ecological production processes;
- to control the ecological quality of raw materials, materials and finished products in technological processes,
- to assess the sources of natural energy and natural resources available in the region;
5) have the ability to take into account:
- environmental requirements,
- principles of rational use of natural resources and environmental protection;
- methods of scientific and industrial research in ecology.

Content

1 BRIEF DESCRIPTION OF THE PROGRAM

1.1 The purpose of developing an educational program

The educational program (hereinafter – EP) is a set of documents developed by the Kazakh National Research Technical University named after K.I. Satpayev and approved by the Ministry of Education and Science of the Republic of Kazakhstan. The EP takes into account the needs of the regional labor market, the requirements of government agencies and the relevant industry requirements. EP is based on the state educational standard for higher professional education in the relevant field.

The EP determines the programmatic educational goals, student learning outcomes, the necessary conditions, content and technologies for the implementation of the educational process, assessment and analysis of the quality of students during training and after graduation.

EP includes the curriculum, discipline content, learning outcomes and other materials to ensure quality education for students.

The goal of the educational program "Engineering Ecology" is to train competitive specialists with knowledge in the field of environmental protection, possession of modern ecoanalytics, solving environmental problems, achieving sustainable development goals, introducing the most accessible technologies (techniques) in various industries that use regulatory legal documents in their activities, competent in production, and research and teaching areas.

1.2 Normative documents for the development of an educational program

The regulatory legal framework for the development of this educational program is:

- The Law of the Republic of Kazakhstan "On Education" with amendments and additions within the framework of legislative changes to increase the independence and autonomy of universities from 04.07.18, No. 171-VI.
- The Law of the Republic of Kazakhstan "On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan Concerning the Expansion of Academic and Administrative Independence of Higher Education Institutions" dated 04.07.18, No. 171-VI;
- Environmental Code of the Republic of Kazakhstan dated January 2, 2021 No. 400-VI LRK;
- Decree of the President of the Republic of Kazakhstan dated May 30, 2013 No. 577 "On the Concept for the transition of the Republic of Kazakhstan to a "green economy";
- Decree of the Government of the Republic of Kazakhstan dated December 27,

2019 No. 988 "On approval of the State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020 - 2025" (Goal 2: Increasing the contribution of science to the socio-economic development of the country, task 1. "Strengthen the intellectual potential science");

- Order of the Minister of Education and Science of the Republic of Kazakhstan dated 30.10.18 No. 595 "On approval of the Standard Rules for the Activities of Educational Organizations of the appropriate types";
- State compulsory standard of higher education (Appendix 7 to the order of the Minister of Education and Science of the Republic of Kazakhstan dated 31.10.18, No. 604;
- Order of the Minister of Education and Science of the Republic of Kazakhstan dated 20.01.15, No. 19 On approval of the Rules for the transfer and restoration of students by types of educational organizations, with amendments and additions by order No. 601 of 31.10.18;
- Working curriculum of the educational program "Engineering Ecology" for 2020-2021, approved by the rector of the Kazakh National Research Technical University named after K.I. Satpayev;
- Documents of the QMS (Quality Management System) on the organization of the educational process at the Kazakh National Research Technical University named after K.I. Satpayev.

1.3 Characteristics of professional activity

1.3.1 Professional area

Graduates of this EP in the field of training Biological and Related Sciences, 6B052 Environment are engaged in:

1) analysis of existing and potential environmental risks;

2) development of measures for:

- protection of objects of the natural environment
- atmosphere, soil and water, flora and fauna,
- rational use and restoration of natural resources and biodiversity,
- counteraction to negative technological processes that can lead to an ecological catastrophe
- land degradation, desertification, climate change, destruction of biodiversity and other negative consequences;

The professional activity of a graduate of this EP in the areas 6B052 Environment, "6B05201-Ecology" is aimed at the implementation of the training of specialists in the field of ecology, ecoanalytics and environmental technology.

A graduate, after graduating from EP "Engineering Ecology" in the direction of

training 6B052 Environment, "6B05201-Ecology" can carry out professional activities:

- at industrial enterprises of various sectors of the economy and various forms of ownership, as well as in the sector of environmental monitoring, ecoanalytics;
- on the introduction of the most accessible technologies (equipment) in various industries and environmental and regulatory design of enterprises in various industries in accordance with the new Environmental Code of the Republic of Kazakhstan.

1.3.2 Objects of professional activity

The objects of professional activity are:

- manufacturing enterprises and laboratories of various industries;
- engineering companies;
- research institutes and laboratories;
- secondary technical and professional, post-secondary and higher educational institutions of biotechnological, biological, medical, agricultural and technical profiles;
- environmental, customs, sanitary and communal services.

1.3.3 Subjects of professional activity:

- natural environment, biodiversity conservation, homeostasis of natural ecosystems, sustainable development, ecoanalytics, implementation of the most accessible and green technologies in various industries.

1.3.4 Professional activities

A bachelor who graduated from the EP "Engineering Ecology" in the direction of training 6B052 Environment, prepares for the following professional activities:

- production and technological,
- organizational and managerial,
- research,
- scientific and pedagogical,
- design and engineering.

1.4 Goals and objectives of the educational program

The mission of the educational program "Engineering Ecology" is to provide training of first-level specialists capable of implementing improved and new eco-technologies, design, experimental work, equipment operation, participation in solving the problems of large-scale transition, management, optimization and modernization of eco-analytics and eco-technologies that determine innovative development of scientific and technological progress and raising the standard of living of society.

In accordance with this mission, the main objectives of this EP "Environmental Engineering" are:

- the formation of the graduate's knowledge, skills and abilities necessary for solving the problems of professional activity, ensuring control of the level of mastering

competencies, giving him the opportunity to choose the field of professional activity and improve personal and professional qualities.

- social, humanitarian and professional training of bachelors in the field of environmental sciences in accordance with the development of science and production of various industries, as well as with the needs of various industries in Kazakhstan, environmental organizations, national research centers, magistracy and doctoral studies in higher educational institutions;
- ensuring high-quality mastering of professional knowledge, skills and abilities in the field of general and applied ecology, ecoanalytics and ecotechnologies, environmental protection and nature management, solving environmental security of Kazakhstan;
- development of creativity, initiative and innovation in order to move to the second stage of higher education - magistracy;
- training of highly qualified personnel with a high level of social, scientific and industrial culture, capable of formulating and solving modern scientific-fundamental and scientific-practical tasks of the regional, national and world level in the field of environmental protection.

Objectives of the educational program "Engineering Ecology":

- Studying the cycle of general education disciplines to ensure social and humanitarian education based on the laws of the socio-economic development of society, history, modern information technologies, the state language, foreign and Russian languages.
- Studying the cycle of basic disciplines to provide knowledge of natural science disciplines, as the foundation of professional education.
- Studying a cycle of major disciplines for the formation of theoretical knowledge, practical skills and abilities in the field of ecoanalytics and ecotechnologies, solving environmental problems, achieving sustainable development goals, introducing the most accessible technologies (techniques) in various industries, protecting and restoring the environment.
- Study of disciplines that form knowledge, skills and abilities of planning and organizing environmental research, environmental design; acquisition of skills and abilities of modern eco-analytical quality control of environmental components.
- Acquisition of skills for assessing the impact of economic and other activities on ecosystems, for environmental expertise and environmental risk assessment, for drawing up environmental regulatory documentation and all types of environmental reporting.

Contact Information

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2 ACADEMIC REQUIREMENTS

2.1 Requirements for applicants

Admission to a university is carried out according to the applications of an applicant who has completed in full secondary, secondary specialized education on a competitive basis in accordance with the points of the certificate issued based on the results of a single national test with a minimum score of at least 65 points.

Special requirements for admission to the program apply to graduates of 12-year schools, colleges, NIS, etc. Such applicants must pass diagnostic testing in English, mathematics, physics and special disciplines.

Table 1 – Rules for credit transfer for accelerated (reduced) education based on 12-year, secondary, technical secondary and higher education

Code	Competency type	Description of competence	Competence Result	Responsible
GENERAL (implies full training with possible additional, depending on the level of knowledge)				
G1	Communicativeness	- fluent monolingual oral, written and communication skills; - the ability to not fluently communicate with a second language; - the ability to use communicative communication in various situations; - there are the basics of academic writing in the native language; - diagnostic test for the level of language proficiency	Full 4-year study with a minimum of 240 academic credits (of which 120 contact classroom academic credits) with a possible transfer of credits in a second language where students have an advanced level. The language level is determined by passing a diagnostic test	Department of Kazakh and Russian languages, Department of English languages
G2	Mathematical literacy	Basic mathematical thinking at the communication level - the ability to solve situational problems on the basis of the mathematical apparatus of algebra and the	Full 4-year study with a minimum of 240 academic credits (of which 120 contact classroom academic credits). With a positive passing of the diagnostic test, the level	Department of Math

		principles of mathematical analysis; - diagnostic test for mathematical literacy in algebra	of Mathematics is 1, with a negative - the level of Algebra and the beginning of the analysis	
G3	Basic literacy in science	- basic understanding of the scientific picture of the world with an understanding of the essence of the basic laws of science; - understanding of basic hypotheses, laws, methods, - formulation of conclusions and assessment of errors	Full 4-year study with a minimum of 240 academic credits (of which 120 contact classroom academic credits). With a positive passing of the diagnostic test, the level of Physics 1, General Chemistry, with a negative - the level of the Beginning of Physics and Basic Foundations of Chemistry	Chairs in natural sciences
SPECIFIC (implies reduced training through credit transfer, depending on the level of knowledge in competencies for graduates of 12-year schools, colleges, universities, including humanitarian and economic areas)				
S1	Communicativeness	- fluent bilingual oral, written and communication skills; - the ability to not fluently communicate with a third language; - skills of writing text of various styles and genres; - skills of deep understanding and interpretation of their own work of a certain level of complexity (essay); - basic aesthetic and theoretical literacy as a condition for full-fledged perception, interpretation of the original text	Full credit transfer by language (Kazakh and Russian)	Department of Kazakh and Russian languages
S2	Mathematical literacy	- special mathematical thinking using induction	Credit transfer for the discipline Mathematics	Department of Math

		and deduction, generalization and concretization, analysis and synthesis, classification and systematization, abstraction and analogy; - the ability to formulate, substantiate and prove provisions; - the application of general mathematical concepts, formulas and extended spatial perception for mathematical problems; - a complete understanding of the basics of mathematical analysis	(Calculus) I	
S3	Special literacy in natural sciences (Biology, Chemistry)	- Broad scientific perception of the world, implying a deep understanding of natural phenomena; - patterns of existence and development of life; - critical perception for understanding the scientific phenomena of the surrounding world; - cognitive ability to formulate a scientific understanding of the forms of existence of matter, its interactions and manifestations in nature	Credit transfer for Physics I, General Chemistry, General Biology, Study Practice, etc.	Chairs in natural sciences
S4	English	- readiness for further self-study in English in various fields of knowledge; - willingness to gain experience in design and research work using	Transfer of English credits above the academic to professional level (up to 15 credits)	Department of English languages

		English		
S5	Computer skills	- basic programming skills in one modern language; - use of software and applications for training in various disciplines; - availability of a global standard of language level certificate	Transfer of credits by discipline Information and communication technology	Department of Software Engineering
S6	Social and humanitarian competences and behavior	- understanding and awareness of the responsibility of each citizen for the development of the country and the world; - the ability to discuss ethical and moral aspects in society, culture and science	Recalculation of credits on the Modern History of Kazakhstan (excluding the state examination)	Department of Social Disciplines
		- Critical understanding and ability for polemics for debating contemporary scientific hypotheses and theories	Recalculation of credits in philosophy and other humanitarian disciplines	
PROFESSIONAL (implies reduced training due to credit transfer depending on the level of knowledge in competencies for graduates of colleges, AV schools, universities, including humanitarian and economic areas)				
P1	Professional competence	- critical perception and deep understanding of professional competencies at level 5 or 6; - the ability to discuss and polemicize on professional issues within the framework of the mastered program	Recalculation of credits in basic professional disciplines, including an introduction to the specialty, the structure and design of systems and machines by industry, after-sales service of machines by industry, educational and training practice	Graduating department
P2	General engineering competencies	- basic general engineering skills and knowledge, the ability to solve general engineering problems and problems; - be able to use software	Credit transfer for general engineering disciplines (Engineering graphics, descriptive geometry, fundamentals of	Graduating department

		packages for processing experimental data, solving systems of algebraic and differential equations	mechanics, fundamentals of hydrodynamics, fundamentals of electrical engineering, fundamentals of microelectronics, fundamentals of thermodynamics, etc.)	
P3	Computer engineering competence	- basic skills of using computer programs and soft systems for solving general engineering problems	Перезачет кредитов по следующим дисциплинам компьютерной графике, основам CAD, основам CAE и т.п.	Graduating department
P4	Engineering and working competencies	- skills and abilities to use technical means and experimental devices for solving general engineering problems	Transfer of credits for academic disciplines of the experimental direction: laboratory or analytical chemistry, laboratory physics, etc.	Graduating department
5	Socio-economic competencies	- critical understanding and cognitive ability to reason on contemporary social and economic issues - a basic understanding of the economic assessment of objects of study and the profitability of industry projects	Recalculation of credits in socio-humanitarian and technical and economic disciplines in the offset of the elective cycle	Graduating department

The university may refuse to transfer credits if a low diagnostic level is confirmed or the final grades in completed disciplines were below A and B.

2.2 Requirements for Completion and Diploma

Description of the generally obligatory standard requirements for graduating from a university and assigning an academic bachelor's degree: mastering at least 240 academic credits of theoretical training and a final thesis or a state exam in the specialty.

Full-time form of education

Terms of study: from 4 to 7 years.
Language of instruction: Kazakh, Russian, English (more than 20 %)

2.3 Descriptors of the level and amount of knowledge, abilities, skills and competencies

A - knowledge and understanding:

A1 - knowledge and understanding of the classical results of biology, chemistry, mathematics, geography and informatics, underlying the concepts, theories and principles of ecology, environmental engineering, ecoanalytics and ecotechnology, to the extent necessary for mastering the educational program;

A2 - knowledge and understanding of basic concepts, theories and principles of ecology, environmental engineering, ecoanalytics and ecotechnology;

A3 - knowledge and understanding of the main economic, social, environmental, ethical criteria, as well as an understanding of safety and sustainable development priorities that influence environmental decisions;

A4 - knowledge of the capabilities of computer technologies in the environmental sphere and the availability of skills in using Internet communications, databases and basic software products designed to support engineering and scientific activities in the field of ecology, engineering ecology, ecoanalytics and environmental technology;

A5 - knowledge and understanding of the theoretical foundations of industrial processes, technological schemes and the relationship of stages and features of technological processes in the field of ecoanalytics and ecotechnology;

A6 - knowledge and understanding of the structure and principles of operation of analytical equipment, devices; design features and operating modes of equipment;

A7 - knowledge of the methodology of systems analysis and design,

promising directions for the development of ecology;

A8 - knowledge and understanding of basic calculations of the main parameters of technological systems in the development and justification of the choice of environmental protection measures.

B - application of knowledge and understanding

B1 - independent development and promotion of various options

solving professional problems using theoretical and practical knowledge;

B2 - the ability to apply classical scientific knowledge and traditional environmental approaches to the analysis of professional problems;

B3 - application of practical skills in laboratory and analytical work to solve professional problems of ecology;

B4 - the use of written and oral communication in a foreign language;

B5 - application of theoretical knowledge and practical skills in solving typical

professional problems in standard conditions;

B6 - application of knowledge and understanding in the development of new or improvement of existing safety systems for technological processes, in the calculations and design of technological equipment;

B7 - knowledge of the levels of development of the main branches of ecology in the world; modern methods of obtaining green technologies and products; the ability to choose the optimal paradigm for the specific application of ecotechnological methods to achieve the assigned tasks; the use of a complex of biological and chemical knowledge to meet the goals of sustainable development.

C - formation of judgments

C1 - the ability to formulate the goal of the task, the choice of means and methods to achieve it;

C2 - ability to form critical judgments, demonstration of flexibility and critical thinking;

C3 - the ability to find and make adequate solutions professional problems;

C4 - forming judgments about the types and tasks of professional activities in the field of ecology.

D - personality ability

D1 - the ability to work in a team based on interaction, understanding, awareness of priorities and organization of team activity;

D2 - ability to interact and technical cooperation with specialists from related fields of environmental protection;

D3 - the ability to manifest interpersonal understanding, readiness for a reasonable resolution of conflicts, the desire to achieve a mutually beneficial result in negotiations;

D4 - the ability to observe and maintain ethical norms and rules, understand the attitudes of tolerant behavior, prevention of domestic racism, xenophobia, extremism and countering them;

D5 - ability for systems thinking, creativity, innovation;

D6 - the ability to persuade, show critical constructive thinking, readiness to apply new methods and approaches in difficult situations of professional activity.

2.4 Competencies on completion of training

B - Basic knowledge, abilities and skills

B1 - the use of the basic laws of natural sciences (biology, geography and chemistry) and the use of methods of mathematical analysis and modeling in solving problems in the field of ecoanalytics and ecotechnology, the ability to find solutions to environmental problems;

B2 - the ability to use modern information technologies, to process information

using application programs and databases for calculating technological parameters of equipment, indicators of technological processes in the field of ecology and monitoring of natural environments;

B3 - possession of communication skills in the state, Russian and foreign languages;

B4 - knowledge of all environmental problems and development prospects in the field of environmental and safe technologies for these problems;

B5 - the ability to carry out environmental analysis and make appropriate decisions;

B6 - skills in chemical analysis, methods of obtaining and researching substances and materials, studying ecology;

B7 - skills of working on equipment during experiments, safe handling of various chemical and biological objects;

B8 - knowledge of the basic methods and ways of developing environmental protection measures; understanding the essence and significance of the relationship between production processes and their impact on the safety of industrial production, allowing the rational use of natural resources and reduce the negative impact on the environment.

P - Professional competencies, including according to the requirements of industry professional standards (if any)

P1 - a wide range of theoretical and practical knowledge in the field of ecoanalytics and ecotechnology;

P2 - the ability to carry out the technological process in accordance with the regulations and use technical means to measure the main parameters of the technological process, the composition and properties of raw materials and finished products;

P3 - the ability to participate in the improvement of existing and in the development of new technological processes from the standpoint of energy and resource conservation, the introduction of advanced green technologies, and minimization of environmental impact;

P4 - the ability to carry out technological processes of various levels of complexity, equipment operation and ensuring their safe functioning;

P5 - the ability to apply knowledge of modern trends in the development of the industry in production and technology, design, research and organizational and management activities;

P6 - the ability to apply advanced green technologies to create low-waste and non-waste technologies, knowledge of modern methods of qualitative and quantitative analysis of environmental components;

P7 - the ability to carry out environmental monitoring of the state of the natural and man-made environment using innovative methods and means of control, independently draw up environmental passports, fill out environmental reporting forms; the ability to

analyze and apply the Environmental Code and other regulatory and legislative documents during work.

O - Human, socio-ethical competences

O1 - striving for self-development, improving their qualifications and skills;

O2 - the ability to analyze socially significant problems and processes;

O3 - the ability to perceive the diversity of cultural traditions and customs, the ability to tolerate views;

O4 - knowledge of social and ethical values based on public opinion, traditions, customs, social norms and the ability to orientate themselves on them in their professional activities;

O5 - knowledge of the tendencies of social development of society, the ability to adequately navigate in various social situations;

O6 - understanding and practical use of healthy lifestyle norms, including prevention issues;

O7 - proficiency in the state, Russian and one of the foreign languages at a level that ensures human communication;

O8 - the ability to independently acquire with the help of information technologies and use in practice new knowledge and skills, including in new areas of knowledge that are not directly related to the field of activity.

C - Special and management competencies

C1 - possession of the culture of thinking, the ability to generalize, analyze, perceive information, set a goal and choose ways to achieve it;

C2 - the ability to find and make management decisions in the field of work organization and implementation of environmental protection measures; monitor the execution of tasks;

C3 - the ability to analyze the technological process as a control object and draw up technical and economic documentation;

C4 - knowledge of the basics of project management and decision-making methods used in the development, design and operation of technological processes;

C5 - knowledge of the principles of management, control and correction of activities in the context of teamwork, improving managerial and performing professionalism;

C6 - ensuring technological discipline, sanitary and hygienic operation of the enterprise, maintaining technological equipment in proper condition, organizing compliance with industrial safety rules and environmental protection rules.

2.5 ECTS Diploma Supplement

The European Diploma Supplement (hereinafter - the European Supplement), or

Diploma Supplement, is, along with ECTS (European Credit Transfer System), an effective tool for ensuring academic and professional mobility in the European Higher Education Area.

The purpose of the Application is to provide comprehensive independent data in order to ensure international "transparency" and objective academic and professional recognition of qualifications (diplomas, degrees, certificates, etc.).

Requirements:

1. The European Diploma Supplement is issued by the Kazakh National Research Technical University named after K.I. Satpayev to graduates of accredited educational programs only in strict accordance with the model developed by the Joint Working Group of representatives of the European Commission, Council of Europe and UNESCO.

2. The European Diploma Supplement does not contain any judgments of the assessment plan, comparisons with other study programs and recommendations regarding the possibility of recognition of this diploma or qualification.

3. The European Diploma Supplement consists of eight chapters and must contain information on all chapters. In the absence of information in any

4. from the sections of the European Diploma Supplement, it is necessary to indicate the reasons for refusal to provide mandatory information.

5. The European Diploma Supplement must always accompany the original document of education, as it has no legal force. The presence of the European Diploma Supplement does not guarantee the status of an educational institution, its qualifications, or the fact that it is recognized as an integral part of the national higher education system.

6. Each European Diploma Supplement must begin with a preamble:

“This Diploma Supplement follows the model developed by the European Commission, Council of Europe and UNESCO / CEPES. The purpose of the Application is to provide comprehensive independent data in order to ensure international "transparency" and objective academic and professional recognition of qualifications (diplomas, degrees, certificates, etc.). The application contains a description of the nature, level and status of training passed and successfully completed by the person named in the original qualification document. The Appendix does not allow judgments, statements of equivalence or proposals for recognition. Data should be reported for all eight sections. In the absence of such data, the reason must be indicated".

7. The European Diploma Supplement must always contain the title and the degree of qualification; the name and status of the awarding / managing institution and the classification of the qualifications. All these data must be presented in the state and English languages, since an incorrect translation misleads those who make judgments about qualifications. In cases where an alphabet other than Latin is used, transliteration

is permitted. You can link the titles of degrees and qualifications to the description of the higher education system in the eighth section.

8. Educational institutions should take appropriate measures to reduce to a minimum the opportunities for falsification and distortion that they issue with European Diploma Supplements.

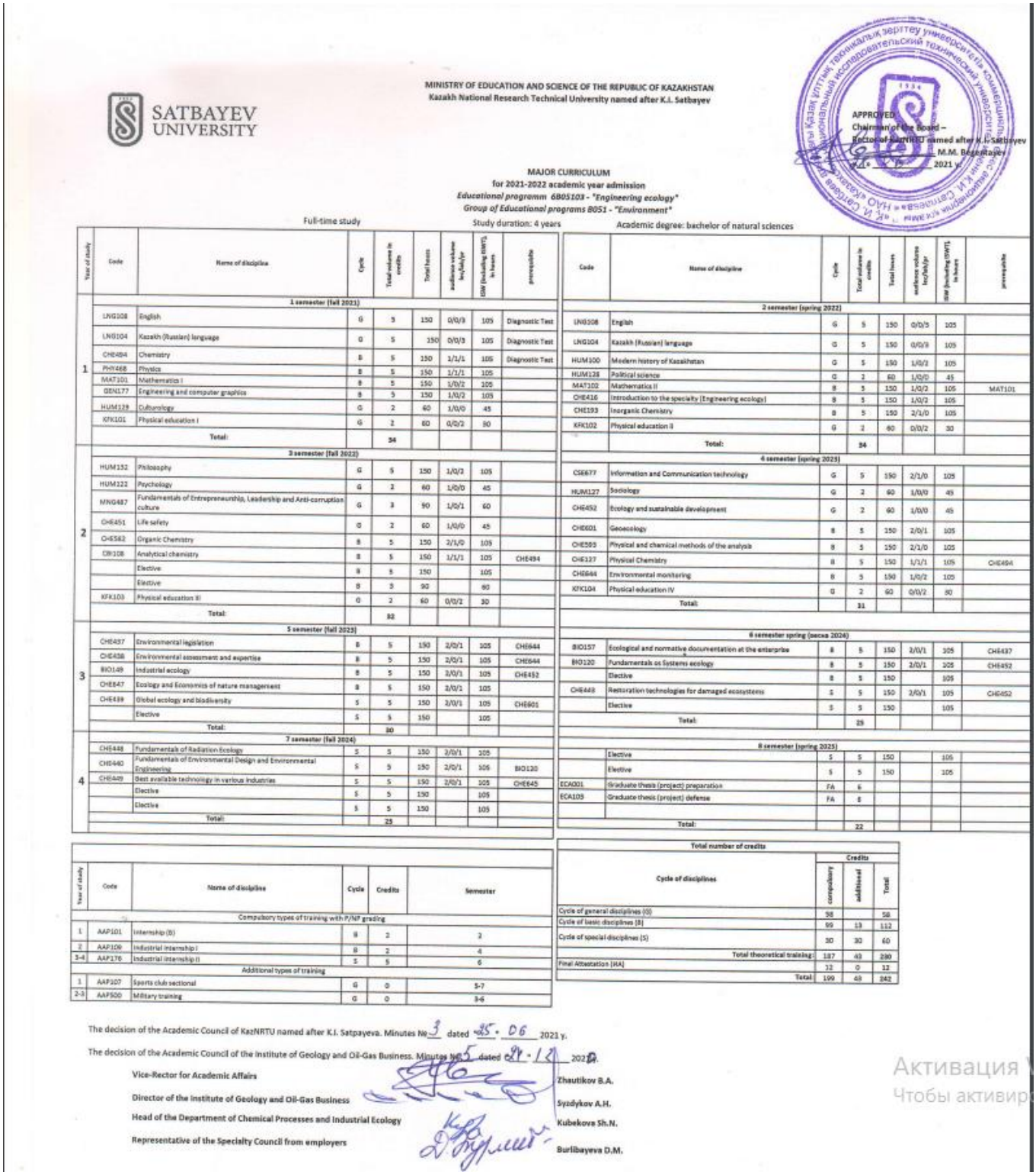
9. Special attention should be paid to translation and terminology. To overcome the problems arising in this area, it is essential that the original language is used where indicated in the document.

10. In the European Diploma Supplement, the assessment of qualifications obtained in other countries should focus on the knowledge, skills and abilities acquired, taking into account the fact that one should seek not exact equivalence, but “fair recognition”.

The application consists of 8 mandatory items and is issued in English and Kazakh / Russian languages.

1. Information about the identity of the holder of the qualification.
2. Qualification information.
3. Information about the skill level.
4. Information about the content of education and the results obtained.
5. Details of qualification functions.
6. Additional information.
7. Testimonials of the application.
8. National higher education system.

3 Curriculum of the Educational program "Engineering ecology"



MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
Kazakh National Research Technical University named after K.I. Satbayev

APPROVED
Chairman of the Board –
Rector of KazNRTU named after K.I. Satbayev
M.M. Beisembayev
«__» ____ 2021 y.

MAJOR CURRICULUM
for 2021-2022 academic year admission
Educational programm 6B05103 - "Engineering ecology"
Group of Educational programs B051 - "Environment"

Full-time study | Study duration: 4 years | Academic degree: bachelor of natural sciences

Year of study	Code	Name of discipline	Cycle	Total volume in credits	Total hours	audience volume lec/lab/pr	SIW (including SIWT) in hours	prerequisite
		1 semester (fall 2021)						
1	LNG108	English	G	5	150	0/0/3	105	Diagnostic Test
	LNG104	Kazakh (Russian) language	G	5	150	0/0/3	105	Diagnostic Test
	CHE484	Chemistry	B	5	150	1/1/1	105	Diagnostic Test
	PHY488	Physics	B	5	150	1/1/1	105	
	MAT101	Mathematics I	B	5	150	1/0/2	105	
	GEN177	Engineering and computer graphics	B	5	150	1/0/2	105	
	HUM129	Culturology	G	2	60	1/0/0	45	
	KFK101	Physical education I	G	2	60	0/0/2	30	
		Total:		34				
		3 semester (fall 2022)						
2	HUM132	Philosophy	G	5	150	1/0/2	105	
	HUM122	Psychology	G	2	60	1/0/0	45	
	MNG487	Fundamentals of Entrepreneurship, Leadership and Anti-corruption culture	G	3	90	1/0/1	60	
	CHE451	Life safety	G	2	60	1/0/0	45	
	CHE582	Organic Chemistry	B	5	150	2/1/0	105	
	CHI108	Analytical chemistry	B	5	150	1/1/1	105	CHE484
		Elective	B	5	150		105	
		Elective	B	3	90		60	
	KFK103	Physical education III	G	2	60	0/0/2	30	
		Total:		32				
		5 semester (fall 2023)						
3	CHE437	Environmental legislation	B	5	150	2/0/1	105	CHE644
	CHE438	Environmental assessment and expertise	B	5	150	2/0/1	105	CHE644
	BIO149	Industrial ecology	B	5	150	2/0/1	105	CHE452
	CHE847	Ecology and Economics of nature management	B	5	150	2/0/1	105	
	CHE439	Global ecology and biodiversity	S	5	150	2/0/1	105	CHE601
		Elective	S	5	150		105	
		Total:		30				
		7 semester (fall 2024)						
4	CHE448	Fundamentals of Radiation Ecology	S	5	150	2/0/1	105	
	CHE440	Fundamentals of Environmental Design and Environmental Engineering	S	5	150	2/0/1	105	BIO120
	CHE449	Best available technology in various industries	S	5	150	2/0/1	105	CHE645
		Elective	S	5	150		105	
		Elective	S	5	150		105	
		Total:		25				

Year of study	Code	Name of discipline	Cycle	Credits	Semester
		Compulsory types of training with P/NP grading			
1	AAP101	Internship (B)	B	2	2
2	AAP109	Industrial internship I	B	2	4
3-4	AAP176	Industrial internship II	S	5	6
		Additional types of training			
1	AAP107	Sports club sectional	G	0	5-7
2-3	AAP500	Military training	G	0	3-6

Code	Name of discipline	Cycle	Total volume in credits	Total hours	audience volume lec/lab/pr	SIW (including SIWT) in hours	prerequisite
	2 semester (spring 2022)						
LNG108	English	G	5	150	0/0/3	105	
LNG104	Kazakh (Russian) language	G	5	150	0/0/3	105	
HUM100	Modern history of Kazakhstan	G	5	150	1/0/2	105	
HUM128	Political science	G	2	60	1/0/0	45	
MAT102	Mathematics II	B	5	150	1/0/2	105	MAT101
CHE416	Introduction to the specialty (Engineering ecology)	B	5	150	1/0/2	105	
CHE193	Inorganic Chemistry	B	5	150	2/1/0	105	
KFK102	Physical education II	G	2	60	0/0/2	30	
	Total:		34				
	4 semester (spring 2023)						
CSE677	Information and Communication technology	G	5	150	2/1/0	105	
HUM127	Sociology	G	2	60	1/0/0	45	
CHE452	Ecology and sustainable development	G	2	60	1/0/0	45	
CHE601	Geoecology	B	5	150	2/0/1	105	
CHE593	Physical and chemical methods of the analysis	B	5	150	2/1/0	105	
CHE127	Physical Chemistry	B	5	150	1/1/1	105	CHE484
CHE644	Environmental monitoring	B	5	150	1/0/2	105	
KFK104	Physical education IV	G	2	60	0/0/2	30	
	Total:		31				
	6 semester spring (весна 2024)						
BIO157	Ecological and normative documentation at the enterprise	B	5	150	2/0/1	105	CHE437
BIO120	Fundamentals os Systems ecology	B	5	150	2/0/1	105	CHE452
	Elective	B	5	150		105	
CHE448	Restoration technologies for damaged ecosystems	S	5	150	2/0/1	105	CHE452
	Elective	S	5	150		105	
	Total:		29				
	8 semester (spring 2025)						
	Elective	S	5	150		105	
	Elective	S	5	150		105	
ECA001	Graduate thesis (project) preparation	FA	6				
ECA105	Graduate thesis (project) defense	FA	8				
	Total:		22				

Total number of credits

Cycle of disciplines	Credits: compulsory	additional	Total
Cycle of general disciplines (G)	58		58
Cycle of basic disciplines (B)	99	13	112
Cycle of special disciplines (S)	30	30	60
Total theoretical training:	187	43	230
Final Attestation (FA)	12	0	12
Total:	199	43	242

The decision of the Academic Council of KazNRTU named after K.I. Satpayeva. Minutes № 3 dated 25.06 2021 y.

The decision of the Academic Council of the Institute of Geology and Oil-Gas Business. Minutes № 5 dated 21.12 2021 y.

Vice-Rector for Academic Affairs — Zhautikov B.A.

Director of the Institute of Geology and Oil-Gas Business — Syzdykov A.H.

Head of the Department of Chemical Processes and Industrial Ecology — Kubekova Sh.N.

Representative of the Specialty Council from employers — Burlibayeva D.M.

СӘТБАЕВ УНИВЕРСИТЕТІ

SATBAYEV UNIVERSITY

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN

Kazakh National Research Technical University named after K.I. Satbayev

SATBAYEV UNIVERSITY

APPROVED
Director of IGaOGB
A.M. Syzdykov
«06» 06 2021 y.

ELECTIVE

for 2021-2022 academic year admission

Educational programm 6B05103 - "Engineering ecology"

Group of Educational programs B051 - "Environment"

Full-time study | Study duration: 4 years | Academic degree: bachelor of natural sciences

Year of study	Discipline Code	Name of discipline	Cycle	Total volume in credits	lec/lab/pr	prerequisite
2		**3 semester (fall 2022)**				
	CHE436	Green chemistry	B	5	1/1/1	
	CHE478	Industrial and environmental safety	B	3	1/0/1	
				8		
3		**5 semester (fall 2023)**				
	CHE598	Air-pollution control	S	5	2/0/1	CHE452
	CHE599	Cleaning technology systems and use of exhaust gas				CHE452
				5		
		6 semester (spring 2024)				
	CHE316	Ecotechnologies and renewable resources	B	5	2/0/1	BIO120
	BIO411	Reagent production technology, wastewater treatment	S	5	2/0/1	CHE645
	CHE442	Natural and waste water treatment technology				CHE645
				10		
4		**7 semester (fall 2024)**				
	CHE444	Habitat and human ecology	S	5	2/0/1	CHE645
	CHE445	Social ecology				CHE645
	CHE446	Ecoanalytics and environmental protection measures	S	5	2/0/1	
	CHE447	Ecotechnology and green energy				
				10		
		8 semester (spring 2025)				
	BIO161	Disposal, disposal and disposal of industrial waste	S	5	2/0/1	CHE645
	CHE441	Waste management				CHE645
	BIO139	Fundamentals of Industrial Technologies	S	5	2/0/1	CHE645
	BIO141	Ecologic basis of industrial technjlogies				CHE645
				10		

Cycle of general disciplines (G)	0
Cycle of basic disciplines (B)	13
Cycle of special disciplines (S)	30
Total:	43

The decision of the Academic Council of the Institute of Geology and Oil-Gas Business. Minutes № 5 dated "24" 12 2021 y.

Head of Department of Chemical Processes and Industrial Ecology — Sh.N. Kubekova

Representative of the Specialty Council from employers — D.M. Burlibayeva

4 Description of disciplines

English
CODE – LNG108
CREDITS – 5 (0/0/3/2)
PREREQUISIT: diagnostic test

PURPOSE AND OBJECTIVES OF THE COURSE

The discipline in English “Beginner English” is designed primarily for learning from scratch. This course is also suitable for those who have only general elementary knowledge of the language. After passing this level, the student will be able to confidently communicate on basic topics in English, learn the basics of grammar and lay a certain foundation that will improve their skills at the next stage of learning English.

Course post-requisites: Elementary English.

PURPOSE AND OBJECTIVES OF THE COURSE

The discipline "Elementary English" is the foundation of learning English, which is aimed at developing students' receptive skills (reading and listening) and productive skills (writing and speaking), analyzing basic knowledge, using and memorizing the main grammatical rules and mastering the features of pronunciation and elementary vocabulary as well as encouraging self-study and critical thinking.

Course prerequisites: Beginner.

Course post-requisites: General 1.

PURPOSE AND OBJECTIVES OF THE COURSE

The aim of the General English1 course is to provide students with the opportunity to acquire sufficient knowledge to become more free in their everyday social and academic settings. Students work to improve pronunciation, vocabulary and grammar. At this level, the main task will be to consolidate the skills acquired earlier, to learn how to compose and correctly apply complex syntactic constructions in English, as well as to achieve really good pronunciation.

Course prerequisites: Elementary English.

Course post-requisites: General 2.

PURPOSE AND OBJECTIVES OF THE COURSE

The General English 2 course is designed for students who continue to study General English 1. The course is focused on the ability to actively use in practice most aspects of the tenses of the English language, conditional sentences, passive phrases, etc. At this stage, the student will be able to maintain a conversation with several

interlocutors or express their point of view. The student significantly expands his vocabulary, which will allow him to freely express his thoughts in any environment. In this case, speech will be replenished with various synonyms and antonyms of already familiar words, phrasal verbs and stable expressions.

Course prerequisites: General 1.

Course post-requisites: Academic English.

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the "Academic English" English course is to develop academic language skills. The discipline is a language style that is used when writing academic papers (paragraph, abstract, essay, presentation, etc.) This course is designed to help students become more successful and effective in their learning, developing critical thinking skills and independent learning.

Course prerequisites: General 2.

Course post-requisites: Professional English.

PURPOSE AND OBJECTIVES OF THE COURSE

“Business English” is the English language for business communication, business and career. Knowledge of business English is useful for negotiating and business correspondence, preparing presentations and informal communication with business partners.

The peculiarities of training are that it is necessary not only to master the vocabulary, but also to master new skills: presentation, communication, language, professional.

Course prerequisites: IELTS score 5.0 и/или Academic English

Course post-requisites: Professional English, IELTS score 5.5-6.0

PURPOSE AND OBJECTIVES OF THE COURSE

The “Professional English” course is designed for B2 + level students, the purpose of which is to improve the language competence of students in their respective professional fields. The main goal of the course is to teach students to work with texts, both audio and written, in their specialty. The curriculum is built on the necessary vocabulary (words and terms), often used in English for specific purposes. Students will acquire professional English language skills through integrated content and language-based learning, master vocabulary in order to read and understand original sources with a great degree of independence, and practice different communication models and vocabulary in specific professional situations.

Course prerequisites: Business English.

Course post-requisites: any elective course.

Kazakh/Russian language
CODE – LNG104
CREDITS – 5 (0/0/3/2)
PREREQUISIT: diagnostic test

PURPOSE AND OBJECTIVES OF THE COURSE

- to teach students to listen to statements on well-known topics related to home, study, free time;
- understand texts on personal and professional topics containing the most common words and expressions;
- be able to conduct a conversation on everyday topics; describe your experiences; tell your opinion; retell and evaluate the content of the book read, the film seen;
- be able to create simple texts on well-known topics, including those related to professional activities.

BRIEF DESCRIPTION OF THE COURSE

The language material of the course is selected in such a way that the student, assimilating the lexical and grammatical minimum, had the opportunity to get acquainted with typical communicative situations and himself in such situations found himself, was able to correctly evaluate them and choose the appropriate model (strategy) of speech behavior.

At the same time, the main emphasis of teaching is transferred from the process of transferring knowledge to teaching the ability to use the target language during the implementation of various types of speech activities, which are reading (subject to reading comprehension), listening (under the same condition) and the production of texts of a certain complexity with a certain degree of grammatical and lexical correctness.

The material for classes is selected so that students, while studying the Kazakh / Russian language, acquire the skills of reading, writing and understanding sounding speech based on the simultaneous mastering of the basics of grammar (phonetics, morphology and syntax) and word usage in the course of constant repeated repetition with a gradual complication of tasks.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

A student, subject to active organization of work in the classroom and conscientious completion of homework, by the end of the first semester acquires skills and abilities corresponding to the all-European level A2 (Threshold according to ALTE classification), that is, is on the threshold of the level of independent language proficiency.

General chemistry
CODE – CHE494
CREDITS – 5 (1/1/1/2)
PREREQUISIT: diagnostic test

PURPOSE AND OBJECTIVES OF THE COURSE

Purpose of the course: Formation of knowledge on fundamental issues of general chemistry and the skills of their application in professional activities.

Objective of the course:

• formation of knowledge of the basic laws of chemistry and chemical properties of elements and their compounds, understanding and application of which will allow both to improve existing and create new technological processes;

• acquisition of knowledge and skills to use the laws of chemistry when describing and comparing specific professional tasks;

• acquisition of skills in laboratory work;

• acquisition of skills for solving typical problems and drawing up equations of chemical reactions;

• formation of students' chemical thinking skills.

BRIEF DESCRIPTION OF THE COURSE

The study:

- the periodic system and the structure of the atoms of the elements;

- chemical bond (covalent bond, valence bond method, hybridization, molecular orbital method, ionic bond, chemical bond in complex compounds);

- atomic and molecular structures;

- properties and physical states of matter;

- the main classes of inorganic compounds;

- solutions (ways of expressing concentrations, ideal and non-ideal solutions, activity, electrolyte solutions, electrolytic dissociation, salt hydrolysis);

- fundamentals of chemical thermodynamics and kinetics.

As a result of mastering the discipline, students should know:

• basic chemical laws and concepts,

• the structure of the Periodic Table of Elements of D.I. Mendeleev and the main characteristics of elements and their compounds resulting from it;

• basic laws of chemical reactions,

• nomenclature of chemical compounds;

• ways of expressing the concentration of substances in solutions;

• rules for safe work in a chemical laboratory.

2) be able to:

• to determine the chemical properties of elements and their compounds by their

position in the Periodic Table of the elements of D.I. Mendeleev;

• apply the basic laws of chemistry in solving their professional problems;

• paint the equations of chemical reactions,

• to calculate the concentration of solutions and prepare solutions of a given concentration.

3) own skills:

- the use of chemical laws to solve specific professional problems with quantitative calculations and the use of educational, reference and special literature;

- drawing up the equations of chemical reactions, explaining the properties of elements and their compounds by position in the Periodic Table of the elements of D.I. Mendeleev, to conduct chemical experiments and explain the phenomena taking place.

Physics
CODE – PHY468
CREDITS – 5 (1/1/1/2)
PREREQUISIT: school course/diagnostic test

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of teaching the course is to form ideas about the modern physical picture of the world and the scientific outlook.

BRIEF DESCRIPTION OF THE COURSE

Discipline Physics is the basis of theoretical training for engineering and technical activities of graduates of a higher technical school and represent the core of physical knowledge necessary for an engineer operating in the world of physical laws. The course "Physics" includes sections: physical foundations of mechanics, structure of matter and thermodynamics, electrostatics and electrodynamics, magnetism, optics, nanostructures, fundamentals of quantum physics, atomic and nuclear physics.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- the ability to use knowledge of fundamental laws, theories of classical and modern physics, as well as the use of physical research methods as the basis of a system of professional activity.

Maths I
CODE – MAT101
CREDITS – 5 (1/0/2/2)
PREREQUISIT: school course/diagnostic test

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is to give the future specialist a certain amount of knowledge in the sections of the course "Mathematics-I", which is necessary for the study of related engineering disciplines. Introduce students to the ideas and concepts of calculus. The main attention is paid to the formation of basic knowledge and skills with a high degree of understanding of differential and integral calculus.

Objectives of the course:

- the acquisition of knowledge necessary for the effective use of rapidly developing mathematical methods;
- getting the skill of building and researching mathematical models;
- possession of the fundamental sections of mathematics necessary for solving research and practical problems in the professional field.

BRIEF DESCRIPTION OF THE COURSE

The course "Mathematics-I" provides a presentation of the sections: introduction to analysis, differential and integral calculus

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

The study of this discipline will allow the student to apply the course "Mathematics-I" to solving simple practical problems, find tools sufficient for their research, and obtain numerical results in some standard situations.

Maths II
CODE – MAT102
CREDITS – 5 (1/0/2/2)
PREREQUISIT: Maths I

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the course "Mathematics II" is to form in bachelors ideas about modern mathematics as a whole as a logically harmonious system of theoretical knowledge.

The objectives of the course are to instill in students solid skills in solving mathematical problems with bringing the solution to a practically acceptable result. To develop primary skills in mathematical research of applied issues and the ability to independently understand the mathematical apparatus contained in the literature related to the student's specialty.

BRIEF DESCRIPTION OF THE COURSE

The course "Mathematics-II" provides an accessible presentation of the sections: elements of linear algebra and analytical geometry, differential calculus of functions of many variables, multiple integrals. "Mathematics II" is a logical continuation of the course "Mathematics I".

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

The study of this discipline will make it possible to apply in practice the theoretical knowledge and skills acquired with a high degree of understanding in the sections of the course, to use them at the appropriate level; translate into mathematical language the simplest problems posed in terms of other subject areas; acquire new mathematical knowledge using educational and information technologies; solve applied problems in the field of professional activity.

Engineering and computer graphics
КОД – GEN177
КРЕДИТ – 5 (1/0/2/2)
ПРЕРЕКВИЗИТ: нет

The course "E&KG" is intended for students of the OP technical direction and is aimed at the formation and development of spatial and logical thinking in students.

As part of the course, the student will master the practical use of the AutoCAD graphics program, the solution of positional and metric problems using models of lines and surfaces in parallel axonometry and the Monge plot.

This discipline will present basic knowledge and skills in the field of descriptive geometry, engineering and computer graphics, as well as methods for solving problems related to spatial forms and their relationships using graphical models.

The final stage of the course is the exam.

After completing the course, the student must demonstrate the ability to analyze, synthesize and design, as well as use the methods of projection drawing, geometric modeling, and drawing in axonometry.

The student must be able to:

- solve various positional and metric problems on complex drawing, axonometry;
- be able to solve problems in the design of surfaces;
- work with various drawing and measuring tools, instruments.

At the end of the course, the student should know:

- basic principles of discipline, basic requirements for the design process in practice; regulatory documents;
- the main professional functions of an engineer, including the competent application of the theoretical foundations of descriptive geometry;
- information computer technologies (ICT) used in the work;
- basic methods and principles of axonometry and diagrams;
- own:
- geometric techniques for solving positional and metric problems;
- methods of image of spatial forms on the plane;
-methods of graphical solution of various geometric problems related to the original;
- skills to read and execute projection drawings of an object;
- skills to create different geometric designs.

Culturology
CODE – HUM129
CREDITS – 2 (1/0/0/1)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

Purpose of the course:

- to form in 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, the ability to carry out a strategy for preserving the cultural heritage of the Kazakh people in a dynamically changing multicultural world and society in independent professional activities.

Objectives of the course:

- 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, meanings, archetypes, symbols as a system of cultural code through correlation with the type of material culture, determined by the way of being;
- to streamline information about the cultural heritage of the inhabitants of Kazakhstan and determine the channels of their influence on the formation 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 mankind and the Kazakh people;
- reasonably and reasonably provide information on the various stages of development of Kazakh culture as a factor in the preservation of cultural heritage;
- to 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 the formation of cultural and national identity;

BRIEF DESCRIPTION OF THE COURSE

The course "Cultural Studies" is aimed at the development of a social and 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.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As part of the course, the student will master the practical use of the methods of cultural studies in various aspects of life.

Basic knowledge and skills in the field of philosophy and cultural studies, as well as methods of comparison, analysis, synthesis, and resolution of the situation by the method of dialogue will be presented.

At the end of the course, the student should know:

- information about the cultural heritage of the inhabitants of Kazakhstan and determine the channels of their influence on the formation of the culture of the Kazakh people;

- classification of 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 mankind and the Kazakh people;

- reasonably and reasonably provide information on 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.

Modern history of Kazakhstan
CODE – HUM100
CREDITS – 5 (1/0/2/2)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

The aim of the course is to familiarize students of technical specialties with the main theoretical and practical achievements of domestic historical science on the problems of the history of modern Kazakhstan, an integrated and systematic study of the main stages of the formation and development of Kazakhstani society.

- to analyze the peculiarities and contradictions of the history of Kazakhstan in the Soviet period;
- to reveal the historical content of the foundations of the laws of political, socio-economic, cultural processes at the stages of the formation of an independent state;
- to contribute to the formation of students' civic position;
- to educate students in the spirit of patriotism and tolerance, belonging to their people, Fatherland.

BRIEF DESCRIPTION OF THE COURSE

The course "Contemporary History of Kazakhstan" is an independent discipline and covers the period from the beginning of the twentieth century to the present day. "Modern History of Kazakhstan" studies the national liberation movement of the Kazakh intelligentsia at the beginning of the XX century, the period of creation of the Kazakh ASSR, as well as the process of formation of a multinational society.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- knowledge of events, facts and phenomena of the modern history of Kazakhstan;
- knowledge of the history of ethnic groups inhabiting Kazakhstan;
- knowledge of the main stages of the formation of Kazakh statehood;
- the ability to analyze complex historical events and predict their further development;
- the ability to work with all types of historical sources;
- the ability to write essays and scientific articles on the history of the Fatherland;
- the ability to operate with historical concepts;
- the ability to conduct a discussion;
- skills of independent analysis of historical facts, events and phenomena;
- public speaking skills.

Political science
CODE – HUM128
CREDITS – 2 (1/0/0/1)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course is the political socialization of students of a technical university, ensuring the political aspect of training a highly qualified specialist on the basis of modern world and domestic political thought.

The objective of the course is to provide the future specialist with primary political knowledge, which will serve as a theoretical basis for understanding political processes, for the formation of political culture, development of a personal position and a clearer understanding of the extent of his responsibility.

BRIEF DESCRIPTION OF THE COURSE

The course of political science is designed to acquaint students with the basics of political science and form their general understanding of politics, its main aspects, problems, patterns and interaction with other spheres of public life.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

At the end of the course, the student should know:

- the basic conceptual apparatus of political science;
- basic methodological approaches and paradigms of political science
- the system of power relations

The student should be able to:

- to analyze the features of political systems and the functioning of political institutions;
- critically evaluate the theoretical approaches of political science;
- to compare political systems, institutions and actors in an intercountry and subnational context, based on the knowledge gained and the methods mastered;
- to draw up proposals and recommendations to public authorities.

Formation of critical thinking skills and the ability to apply it in practice. Development of skills for describing and analyzing topical problems of modern society, the essence of social processes and relationships.

Introdation to the speciality
CODE – CHE416
CREDITS – 5 (1/0/2/2)
PREREQUISIT: knowledge gained in high school

PURPOSE AND OBJECTIVES OF THE COURSE

Purpose of the study: promoting self-disclosure of students of the first year, the formation and development of fundamental knowledge in the field of technology of basic industries and new materials.

Objective of the course:

- Familiarization of students with theoretical and practical knowledge in the field of chemistry and chemical technology;
- Increasing the role of awareness of professional activity in human life and individual and personal reasons for choosing a profession;
- Study of the properties of various substances of the raw material base and the main products of inorganic synthesis and new materials;
- Acquaintance with the hardware design of technological processes.

BRIEF DESCRIPTION OF THE COURSE

Introduction: technology of the main production. The main trends in their development. The physical state of the substance. Gases and gas laws. Liquid state of matter. Solutions. Methods for expressing the concentration of solutions Stoichiometric calculations. Industrial stoichiometry. Raw material base and main sources of energy in the technology of inorganic synthesis. Basic technological operations. Hardware design of chemical technological processes

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Know: the structure of cognitive activity and the conditions of its organization; essence, social significance and modern scientific views on their profession; basic concepts of professional activity in the field of chemistry and chemical technology;

Be able to: set goals and objectives for personal and professional self-education; use reference and educational literature, apply the basic laws and regulations of chemistry when performing technical calculations; to use the achievements of modern chemistry in the work of a chemist-technologist;

Possess: the skills of building an individual trajectory of intellectual, general cultural and personal self-education; methods for determining the properties of substances and the mechanism of their participation in the processes of the chemical nature of the surrounding world.

Inorganic chemistry
CODE – CHE193
CREDITS – 5 (2/1/0/2)
PREREQUISIT: general chemistry; maths; physics

PURPOSE OF THE COURSE: the formation of students' knowledge, skills and abilities in inorganic chemistry, necessary in solving chemical problems associated with the production, description of properties and the use of the most important inorganic compounds, for further study of general and special chemical disciplines: analytical, organic, physical chemistry, general chemical technology, etc.

Objectives of the course:

The main tasks of studying the discipline include the following items:

- studying and mastering the theoretical material of the course at lectures and in the process of independent work;
- the formation of skills to solve chemical problems and tasks, in practical classes and when performing independent work;
- the acquisition of skills in conducting a chemical experiment and processing its results in the course of laboratory work and independent work in the preparation of reports.

BRIEF DESCRIPTION OF THE COURSE:

The course "Inorganic Chemistry" is devoted to the study of the composition, structure and properties of the most important inorganic substances, their production and use in technology, scientific research, solving economic and environmental problems.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

After mastering this discipline, the student must know: the classification of inorganic compounds, their structure and physical and chemical properties; acid-base and redox character of simple substances and their compounds; the periodic law and the periodic system of D.I. Mendeleev; the structure of complex compounds and their properties; classification of chemical elements by groups and periods; chemical properties of s, p, d, f-elements and their compounds.

The student should be able to:

- to predict the properties of an element and its most important compounds by the position of the element in the periodic system of D.I. Mendeleev;
- to determine the possibility and path of spontaneous occurrence of chemical processes, which are based on various chemical reactions;
- to select the optimal conditions for carrying out chemical reactions;
- be proficient in the basic methods of researching inorganic compounds and be able to interpret experimental results.

Philosophy
CODE – HUM132
CREDITS – 5 (1/0/2/2)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

The aim of the course is the formation of cognitive, operational, communicative, self-educational competencies.

to solve problems:

• contribute to the development of adequate world outlook guidelines in the modern world;

• to form creative and critical thinking in students;

• to distinguish between the ratio of spiritual and material values, their role in the life of a person, society and civilization;

• contribute to the definition of their attitude to life and the search for harmony with the surrounding world.

BRIEF DESCRIPTION OF THE COURSE

"Philosophy" is the formation of a holistic worldview that has developed in the context of the socio-historical and cultural development of mankind. Acquaintance with the main paradigms of the methodology of teaching philosophy and education in the classical and post-classical traditions of philosophy. Philosophy is called upon to develop stable life guidelines, the acquisition of the meaning of one's being as a special form of spiritual production. Promotes the formation of a moral character of a person with the ability to critical and creative thinking. The theoretical sources of this course are the concepts of Western, Russian, Kazakh scientists on the history and theory of philosophy.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

• knowledge of basic terms, main concepts and problems of philosophy;

• knowledge of the main philosophical ways of solving worldview issues in the context of culture;

• the ability to analyze the history of the development of philosophical thought;

• the ability to identify alternative ways of posing and solving worldview issues in the history of human development;

• the ability to identify the main theoretical approaches in the relationship between a person and society;

• the ability to master the methodology of performing independent work;

• skills of searching for systematization of the material;

• skills to freely discuss and make rational decisions;

• skills of ethical principles in professional activities.

Psychology
CODE – HUM122
CREDIT – 2 (1/0/0/1)
PREREQUISITES: no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline is the formation of psychological knowledge, skills and competencies necessary in professional activity; development of students' psychological thinking and systematization of their knowledge based on the study of general psychological laws.

Objectives of mastering the discipline:

1) mastering basic psychological concepts, theories and approaches to the study of personality and society;

2) the formation of ideas about the basic principles of the functioning of socio-psychological phenomena, psychological patterns of age and cultural socialization of a person, factors of his learning and cognitive development;

3) instilling the skills of using the knowledge gained in the process of mastering psychology in professional activity.

4) to develop the skills and abilities of analytical and research thinking, creative development of the content of psychological sources of foreign and domestic authors and methods of obtaining psychological information;

5) the formation of critical thinking skills and the ability to apply it in practice.

BRIEF DESCRIPTION OF THE COURSE

The discipline "Psychology" examines the patterns of the emergence, development and functioning of mental processes, states, personality traits engaged in this or that activity, the patterns of development and functioning of the psyche as a special form of life. The study of this discipline is aimed at the formation of psychological culture, worldview, self-awareness, psychological thinking of the individual for social and professional interaction.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of studying the discipline, the student must:

know:

- characterization of psychology as a science, its methods, tasks and history of development;
- the essence and structure of the emergence and development of the psyche and mental phenomena, taking into account the age and social characteristics of manifestation;
- general psychological patterns of development of psychological phenomena;
- knowledge of the psychological laws of communication and interaction of people;

- the dynamics of development and structure of personality and human activity;

be able to:

- understand and explain the need for psychological and socio-psychological knowledge in professional activities;
- to analyze the main categories of psychology, interpersonal relationships in a group, the characteristics of the activities of various individuals;
- to apply psychological knowledge as a means of self-knowledge and self-development;
- to design effective methods of work in various spheres of social communication based on the content of psychological theories and ideas;

own:

- skills of argumentation, focused on achieving high results of educational and professional activity.
- the ability to work in a team, correctly defend one's point of view, propose new solutions, find compromises;
- skills of systemic thinking and holistic perception of psychological reality;
- the ability to analyze and form judgments about the psychological problems of a person in the modern conditions of the development of society.

Fundamentals of Entrepreneurship, Leadership and Anti-corruption culture
CODE – MNG487
CREDIT – 3 (1/0/1/1)
PREREQUISITES: none

PURPOSE AND OBJECTIVES OF THE COURSE

To form systemic knowledge about the basics of organizing entrepreneurial activity. To develop organizational and managerial skills in doing business. To form knowledge about the responsibility of subjects of entrepreneurial activity, the student must master aesthetic concepts and categories, the content and features of professional ethics in legal activity, possible ways (methods) of resolving moral conflict situations in the professional activity of a lawyer, the essence of professional and moral deformation and ways of preventing and overcoming it, features of a lawyer's etiquette, its basic norms and functions; to be able to evaluate the facts and phenomena of professional activity from an ethical point of view, to apply moral rules and norms of behavior in specific life situations.

BRIEF DESCRIPTION OF THE COURSE

The discipline is aimed at the formation of students' organizational and legal form of the enterprise based on the goals of the enterprise and the characteristics of the organization and functioning of enterprises in various forms; assess the effectiveness of entrepreneurial activity; assess external and internal risks for the enterprise; develop business plans taking into account regulatory, resource, administrative and other conditions. Set goals and formulate tasks related to the implementation of professional functions. Organize team interaction to solve management problems. Diagnose organizational culture, identify its strengths and weaknesses, develop proposals for its improvement. Develop activities to motivate and stimulate the organization's personnel

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Know: typology of entrepreneurship; the role of the environment in the development of entrepreneurship; technology for making business decisions; basic components of the internal environment of the company; organizational and legal forms of entrepreneurial activity; features of constituent documents; the procedure for state registration and licensing of an enterprise; mechanisms of enterprise functioning; the essence of entrepreneurial risk and the main ways to reduce risk; the main elements of the culture of entrepreneurship and corporate culture; list of information to be protected; the nature and types of responsibility of entrepreneurs; methods and tools for financial analysis; the main provisions of accounting for small businesses; types of taxes; a system of indicators of the effectiveness of entrepreneurial activity; principles and methods for assessing the effectiveness of entrepreneurial activity; ways to improve and control the efficiency of entrepreneurial activity.

Life safety
CODE – CHE451
CREDIT – 2 (1/0/0/1)
PREREQUISITES: none

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline: to study the impact of anthropogenic hazards and risks in the conditions of new realities that disrupt the normal functioning of people, causing accidents, leading to emergencies and catastrophes, including environmental ones. To instill the skills to identify these dangers and master the prevention measures or the principles of protection against them.

SHORT COURSE DESCRIPTION

Life safety is concerned with the identification of hazards and risks that affect human health and life. Life safety gives an idea of the inseparable unity of effective professional activity with the requirements for human safety and security. Life safety includes the study of the basic principles of ensuring the safety of human interaction with his environment; rational and safe conditions of his activity; the consequences of human exposure to traumatic, harmful and damaging factors; means and methods of improving safety, environmental friendliness and sustainability of technical means and technological processes.

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

Familiarization of students with the control of parameters and the level of negative impacts on their compliance with regulatory requirements; effective use of protective equipment against negative impacts; development of measures to improve the safety and environmental friendliness of production activities; planning and implementation of measures to protect production personnel and the public.

Organic chemistry
CODE – CHE582
CREDITS – 5 (2/1/0/2)
PREREQUISIT: General chemistry

PURPOSE AND OBJECTIVES OF THE COURSE

Purpose of the course: Formation of students' knowledge and skills about the classification of organic compounds, nomenclature, structure, isomerism, about the properties of various classes of organic compounds, reaction mechanisms and their application in professional activities.

Objective of the course:

• formation of knowledge of the basic laws of chemistry and chemical properties of elements and their compounds, understanding and application of which will allow both to improve existing and create new technological processes;

• acquisition of knowledge and skills to use the laws of chemistry when describing and comparing specific professional tasks;

• acquisition of skills in laboratory work;

• acquisition of skills for solving typical problems and drawing up equations of chemical reactions;

• formation of students' skills in chemical thinking.

BRIEF DESCRIPTION OF THE COURSE

The study:

- organic compounds of the aliphatic series - the chemistry of linear hydrocarbons and their oxygen-, sulfur- and nitrogen-containing derivatives;

- physical and chemical properties of these compounds;

- methods of obtaining organic substances in the laboratory and industry;

- the use of organic substances in various sectors of the national economy;

As a result of mastering the discipline, students should know:

• know the main sources of raw materials for the production of organic compounds; the main provisions of the theory of the structure of organic compounds and some of its modern aspects;

• general physicochemical properties of the main classes of organic compounds and methods for their preparation;

• basic methods of qualitative elemental and functional analysis of organic substances;

• basic methods and techniques of work in the laboratory of organic chemistry;

• methodology of the theory of the structure of organic compounds to assess the dependence of the properties of substances on their structure;

2) be able to:

• carry out quantitative calculations in chemical reactions;

• use theoretical foundations to explain the transformations of organic compounds;

• use the knowledge gained in the process of studying academic disciplines based on organic chemistry, as well as in production, in the laboratory, in everyday life; perform stoichiometric calculations according to the reaction equations for organic compounds;

• to use basic elementary methods of chemical research of substances and compounds to solve professional problems;

• to apply the acquired knowledge, abilities, skills and competences in the study of general scientific and special disciplines related to chemical disciplines;

• to apply the acquired knowledge, abilities, skills and competencies in solving production and technological problems for the production of organic compounds.

3) own skills:

• use chemical laws to solve specific professional problems with quantitative calculations and the use of educational, reference and special literature;

• make up equations of chemical reactions, explain the properties of organic compounds, conduct chemical experiments and explain the phenomena that occur.

Analytical Chemistry
CODE – CBI108
CREDITS – 5 (1/1/1/2)
PREREQUISIT: general chemistry; maths; physics; inorganic chemistry

PURPOSE OF THE COURSE: the formation of a system of knowledge on the basics of analytical chemistry and chemical analysis, the ability to make a rational choice of a method for solving a specific analytical problem, the acquisition of skills to correctly and accurately perform analytical operations and the ability to apply them to solve problems in professional activities.

Objectives of the course:

The main tasks of studying the discipline include the following items:

- studying and mastering the theoretical material of the course at lectures and in the process of independent work;
- the formation of skills to solve chemical problems and tasks, in practical classes and when performing independent work;
- the acquisition of skills in conducting a chemical experiment and processing its results in the course of laboratory work and independent work in the preparation of reports.

BRIEF DESCRIPTION OF THE COURSE:

Analytical chemistry is the science of methods for identifying chemical compounds, of the principles and methods for determining the chemical composition of substances and their structure. Analytical chemistry has acquired particular relevance at the present time, since chemical pollution is the main factor of adverse anthropogenic impact on nature. Determination of their concentration in various natural objects is becoming a major task. Knowledge of the fundamentals of analytical chemistry is equally necessary for a modern student, engineer, teacher, and entrepreneur.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

After mastering this discipline, the student must know: methods, techniques and methods of performing chemical and physicochemical analysis to establish the qualitative composition and quantitative determinations; theoretical foundations of chemical, physical-chemical and other methods; analytical equipment and laboratory glassware; calculation methods based on the results of the experiment; have the skills to use measuring and analytical instruments, computing facilities.

The student should be able to: search for and use the information necessary for the effective performance of professional tasks, professional and personal development; solve professional production problems - control and ensure uninterrupted operation of equipment of technological lines, obtaining products of a given quantity and quality, analyzing raw materials, materials and finished products, processing and evaluating the

results of analyzes; independently acquire new knowledge and skills with the help of information technology and use in practice, including in new areas of knowledge that are not directly related to the field of activity.

Information and Communication Technologies (in English)
CODE – CSE677
CREDITS – 5 (2/1/0/2)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

Training in the skills of applying modern information technologies in the field of professional activity.

The objectives of the course include:

- To reveal the basic concepts of the architecture of computer systems;
- To reveal the basic concepts of information and communication technologies and subject terminology;
- To teach to work with software interfaces of operating systems;
- To teach how to work with data in a different presentation, both tabular structured and unstructured form;
- Teach to apply the basic principles of information security;
- To reveal the concepts of data formats and multimedia content. To teach how to work with typical applications for processing multimedia data. Use modern approaches to the presentation of the material;
- Explain the concepts of modern social, cloud and email platforms and how to work with them;
- To teach to use algorithms and programming methods to solve problems of automating business processes.

BRIEF DESCRIPTION OF THE COURSE

The course contains a training program aimed at leveling the basic knowledge of students in the field of information and communication technologies. Contains a full range of topics, with a predominance of training practical skills in working with data, algorithms and programming. The course is designed in such a way as to teach students not only the basic concepts of architecture and modern infrastructure of information and communication technologies, but also to teach how to use these tools to solve problems of an applied nature. To teach how to optimize processes, apply adequate models and methods for solving practical problems using modern methods and tools of information technology, automate routine processes, be productive and efficient.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Students will know:

- Computer device;
- Architecture of computing systems;
- Infrastructure of information and communication technologies;
- Interfaces of modern operating systems;

- Modern tools for working with data of various nature and purpose;
- Types of information security threats, principles, tools and methods of data protection;
- The Python programming language.

Students will be able to:

- Work with interfaces of modern operating systems;
- Work with modern application software for working with data of various nature and purpose;
- Apply modern social, cloud, email platforms for organizing business processes;
- Program in an algorithmic programming language;
- Analyze, model, design, implement, test and evaluate information and communication technology systems.

Sociology
CODE – HUM127
CREDITS – 2 (1/0/0/1)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course: the formation of theoretical knowledge about society as an integral system, its structural elements, connections and relationships between them, the peculiarities of their functioning and development, as well as about existing sociological theories that explain social phenomena and processes.

Objectives of mastering the discipline:

- study of the basic values of social culture and the willingness to rely on them in their personal, professional and general cultural development;
- study and understanding of the laws of development of society and the ability to operate with this knowledge in professional activities;
- the ability to analyze socially significant problems and processes, etc.

BRIEF DESCRIPTION OF THE COURSE

The discipline is designed to improve the quality of both general humanitarian and professional training of students. Knowledge in the field of sociology is the key to effective professional activity of a future specialist, which is impossible in modern society without understanding social processes, as well as without mastering the skills of their correct interpretation.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of studying the discipline, the student must:

know:

• features of the sociological approach to the interpretation of the basic concepts and terms of the social sciences;
• basic classical sociological theories and schools;
• key concepts of sociology: society, group, socialization, social facts and social actions, norms, values, social structure, mobility, culture, social institution, social organization, social process, etc .;
• basic approaches to identifying and analyzing the social structure of society, social changes;
• the main regularities of the course of social processes and the mechanisms of functioning of the main social communities;
• patterns of socio-economic, political and managerial processes, the main approaches to their study, as well as features of their application;

be able to:

• describe the processes and observed phenomena occurring in society using

sociological terminology;

• explain differences in approaches to defining sociological concepts;

• consider social phenomena, institutions and processes from different points of view, argue their own position on the problem, comparing and comparing some theoretical perspectives;

• find, analyze and present factual data, analytical information about social groups, institutions, processes and phenomena, revealing abstract concepts through examples using various kinds of data;

own:

• the ability to use sociological knowledge in practice to analyze the phenomena and events of social reality;

• the skills of independent individual preparation, constructive communication and the performance of appropriate roles in the implementation of group projects, participation in the discussion;

• presentation of the results of individual and group analytical work in written and oral form;

• skills of academic and grammatically correct writing, text structuring, source processing, design of the reference apparatus.

Ecology and sustainable development
CODE – CHE452
CREDITS – 2 (1/0/0/1)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

- the formation of ecological knowledge and consciousness, obtaining in-depth knowledge about the general ecology, the foundations of sustainable development of nature and society, obtaining theoretical and practical knowledge on modern methods of rational use of natural resources and environmental protection, as well as have an idea of the goals and indicators of sustainable development.
- to acquaint students with the environmental problems of our time;
- to study the basic laws of living nature, various ecological systems, the biosphere as a whole and its stability;
- to form knowledge about the environmental consequences of human economic activity in the context of the intensity of nature management;
- to form a complex form and creative thinking in the analysis of complex and acute problems of ecology, environmental protection and sustainable development.

BRIEF DESCRIPTION OF THE COURSE

Ecology: subject of study, tasks and methods. Short story. Sections of ecology. The field of ecology. Ecology of individuals - Autecology. Habitat. Environmental factors and their classification. Adaptation. The main patterns of action of environmental factors. Population ecology - Demecology. The concept of the population. Population static indicators. Dynamic indicators of the population. Environmental strategy for survival. Community ecology - Synecology. Species, spatial and ecological structures of the biocenosis. Types of connections and relationships between organisms in an ecosystem. Successions. Classification of natural ecosystems. Ecological systems. Food chains and networks. Ecological pyramid and its types. The circulation of substances and the flow of energy. The doctrine of the biosphere. The structure and properties of the biosphere. The biosphere and its stability. The biosphere as a global ecosystem. Pedosphere as part of the biosphere. Basic properties of the biosphere. Biodiversity. The circulation of substances and anthropogenic circulation. Evolution of the biosphere. Noosphere as a stage in the evolution of the biosphere. Anthroposphere. Global ecological problems of our time. Sustainable development: concept, principles. The history of the emergence of the concept of "sustainable development". Sustainable development indicators. Sustainable Development Goals. Significance of green technologies and efficient use of renewable resources for sustainable development. Nature protection and sustainable development. Problems of nature protection. Specially

protected areas. Species specially protected and listed in the Red Book of Kazakhstan. Actual environmental problems of the Republic of Kazakhstan.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of studying the course, students should:

Know: the history of the formation of environmental science and its problems, environmental protection and rational use of natural resources; the ecological state of the habitat of living organisms, the patterns of the impact of factors on the environment;

Be able to: use the knowledge gained to solve the assigned tasks, when analyzing environmental processes, setting priorities and tasks for the sustainable development of nature and society; own methods of combating the disturbance of the natural environment, in particular with soil erosion, new technologies and approaches in the field of environmental protection and nature management;

Be competent: in the field of environmental protection and nature management; in order to preserve the stability of the biosphere and biodiversity and the impartial development of society; in determining the degree of exposure to environmental factors.

Geoecology
CODE – CHE601
CREDITS – 5 (2/0/1/2)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course: to equip students with theoretical and practical knowledge about the relationship of the components of the Earth's geospheres with human economic activity at the present stage; about the features of the functioning of the Earth's geospheres; about the Earth's ecosphere as a complex dynamic self-regulating system; on the geoecological aspects of the functioning of natural and technogenic systems.

BRIEF DESCRIPTION OF THE COURSE

The course of geoecology is a direction at the junction of ecology and geography, which, according to the authors, studies the natural environment (lithosphere, hydrosphere, geocosmos / atmosphere, ionosphere, magnetosphere /, biosphere and landscape envelope), taking into account natural and anthropogenic processes occurring in them. Geoecology also pays attention to the problems of human interaction with the environment and the restrictions that affect the world's population, geoecological problems of territories for various economic purposes.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, students should

1) know:

- basic concepts, theories and laws of geoecology, features of the geoecological situation and the nature of the course of geoecological processes; interaction of natural and natural-man-made systems; on the anthropogenic impact and response of the Earth's ecosystems to them; about the ecological crisis and its manifestation at various hierarchical levels of geosystems;

2) be able to:

- to navigate in the geoecological aspects of the functioning of natural and technogenic systems; apply knowledge in practice;

3) own:

- methods for assessing the state of natural and anthropogenic systems; methods of analysis of geoecological problems; methods of observation and interpretation of experimental data.

Physicochemical methods of analysis
CODE - CHE593
CREDIT - 5 (2/1/0/2)
PREREQUISITES: General Chemistry, Physics

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is to give the future specialist a fundamental basis for the study of the physical and chemical properties of mineral raw materials.

To acquaint students with the theoretical foundations for the construction of basic physical concepts, which form the basis of modern methods for analyzing the structure and properties of mineral raw materials, which allow for a reasoned prediction of the physical and chemical properties of the substances under study.

Objectives of the course:

- acquisition of knowledge necessary for effective use in the field of rapidly developing modern instrumental research methods;

- possession of the fundamental principles of the study of mineral raw materials necessary for solving scientific research and practical problems in the professional field.

BRIEF DESCRIPTION OF THE COURSE

The course "Physicochemical Methods of Analysis" provides a presentation of the following sections: the current state of the concepts underlying physical and physicochemical studies of inorganic, organic substances, oil and products of its processing of biomaterials, as well as the methodology for the application of basic physical laws for metrological purposes; the relationship between the chemical structure of the studied compounds and their physicochemical parameters; establishing the details of the chemical structure of the compound based on quantitative data on its physical properties; solving problems; practical application of tools that allow you to implement, debug and run in practice all types of studied algorithms; the principles of interpretation of the results obtained are considered on the basis of data obtained by a complex of physicochemical research methods, and existing ideas about the relationship between the structure, the substances under study and their physical parameters; an integrated approach in choosing a method, apparatus and technique for studying the hydrocarbon composition of oil.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

The study of this discipline will allow the student to apply the course "Physicochemical Methods of Analysis" to solving simple practical problems, find tools sufficient for their research, and obtain numerical results in some standard situations. Knowledge can be used in a laboratory of chemical, biological, environmental, petrochemical, gas and coal profiles.

Physical chemistry
CODE – CHE199
CREDITS – 5 (1/1/1/2)
PREREQUISIT: General chemistry; Maths; Physics

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course

Form students:

- the ability to understand the physicochemical essence of processes and use the basic laws of physical chemistry in complex industrial and technological activities;
- the ability to perform calculations of physical and chemical parameters of chemical processes based on the methods of physical chemistry;
- the ability to understand the physicochemical essence of electrochemical processes and the theory of electrolytes, to use the basic laws of electrochemistry in complex industrial and technological activities;
- the ability to understand the essence of the chemical kinetics of processes and use the basic laws of chemical kinetics in complex industrial and technological activities;
- the ability to understand and describe the patterns of complex reactions and propose mechanisms for complex reactions based on kinetic patterns;
- the basics of understanding the kinetics of catalytic processes and their applications in industrial practice.

Objectives of the course:

The main tasks of studying the discipline include the following items:

- study of the main sections of physical chemistry - chemical thermodynamics, chemical kinetics, electrochemistry, photochemistry, the study of gases, solutions, chemical and phase equilibria, catalysis;
- providing students with creative thinking, combining fundamental knowledge of the basic laws and methods of conducting physical and chemical research, with subsequent processing and analysis of the results.
- finding the relationship between chemical and physical processes.

BRIEF DESCRIPTION OF THE COURSE

The course of the discipline will consider the laws of thermodynamics and thermodynamic potentials, chemical and phase equilibrium in one-component and two-component systems, state diagrams of one-component and two-component systems, thermal analysis, solid solutions, properties and thermodynamics of solutions, electrolytes, electrical conductivity and electrochemical potentials, thermodynamic description of processes and equilibrium in electrochemical systems, peculiarities of electrochemical systems, galvanic cells, electrolysis and its application, corrosion and protection of metals. Formal kinetics: reaction rate, reaction rate constant, half-life,

reaction order, influence of temperature on the reaction rate. The theory of active collisions. Transient State Theory. Kinetics of complex reactions: reversible, parallel and sequential reactions. Stationary concentration method. Fundamentals of the kinetics of catalytic processes. Photochemical reactions.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

After mastering this discipline, the student must know: the laws of thermodynamics; basic equations of chemical thermodynamics; methods of thermodynamic description of chemical and phase equilibria in multicomponent systems; properties of solutions; fundamentals of electrochemistry; basic concepts, theories and laws of chemical kinetics and catalysis.

The student must be able to: calculate the thermodynamic parameters of systems; determine the thermodynamic characteristics of chemical reactions and equilibrium concentrations of substances; determine the direction of the process in the given initial conditions; predict the influence of various factors on the equilibrium in chemical reactions; to establish the boundaries of the phase regions in one-component and binary systems; calculate heat effects and equilibrium constants of chemical reactions; carry out the necessary physical and chemical calculations; calculate the rate and rate constant of chemical reactions, half-transformation time, determine the order of the reaction, be able to describe the kinetics of simple and complex reactions, determine the degree of conversion, make an assumption about the reaction mechanism based on kinetic data.

Environmental monitoring
CODE – CHE644
CREDITS – 5 (1/0/2/2)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

Purpose of the course: Familiarization with the principles, methods and devices used in monitoring the state of the environment; methods of forecasting the ecological situation and emergency situations; training of specialists for participation in research activities in the field of monitoring the environment.

BRIEF DESCRIPTION OF THE COURSE

The course of lectures includes the following sections: environmental monitoring, basic concepts, tasks and scheme of environmental monitoring, classification of environmental monitoring systems and classification of priority pollutants by priority classes. Special attention is paid to such sections as the organization of environmental monitoring in biosphere reserves, geoinformation systems in environmental monitoring. The following sections are also considered: ecological monitoring of the ocean, land monitoring, organization of a network for observing air pollution, surface water, soil and snow pollution, the structure of information and software monitoring and state environmental monitoring of the Republic of Kazakhstan.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, students must:

Know:

- principles of organization and operation of the habitat monitoring system;
- theoretical foundations underlying methods and means of control of the environment, the main characteristics of control means;

Be able to:

- choose methods and devices for monitoring the state of the environment;
- calculate the required amount

Own:

- methods for predicting the state of the environment;
- methodological basis for monitoring;
- methods of processing analysis results.

Environmental legislation
CODE – CHE437
CREDITS – 5 (2/0/1/2)
PREREQUISIT: Ecology and sustainable development

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the course is the formation of modern scientific knowledge, theoretical and practical training of students who know the issues of legal relationships in the field of ecology and environmental protection.

Course objectives: the formation of modern scientific knowledge in the field of:

- fundamentals of natural resource and environmental law;
- the main sources of environmental law;
- basic methods of management of natural resources and environmental protection;
- institutions of state regulation of environmental protection and nature management

BRIEF DESCRIPTION OF THE COURSE

The study of this discipline gives an idea of the legal foundations of environmental management and nature management. The summary of lectures discusses in detail the main provisions of the Environmental Code of the Republic of Kazakhstan as a legal basis for environmental protection management, the concept of natural resource and environmental legislation, responsibility for its violation and international legislation in the field of environmental protection. The course of lectures will help to form students' ecological and legal worldview, and to apply theoretical knowledge in practice.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, students should

know:

- principles of environmental and natural resource legislation;
- the rights and obligations of citizens in the field of environmental protection;
- measures of responsibility for violation of environmental legislation.

Should be able to:

- analyze, interpret and correctly apply environmental and legal norms;
- make decisions and take legal actions in strict accordance with the law.

Must own:

- terminology and skills of working with legal acts;
- the skills of analyzing various legal norms and legal relations that are the objects of professional activity.

Environmental assessment and expertise
CODE – CHE438
CREDITS – 5 (2/0/1/2)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course: the formation of students' foundations of knowledge on environmental design, on the environmental justification of economic and other activities in pre-investment and project documentation, the ability to use methods, principles of environmental impact assessment and conduct environmental impact assessment. ...

BRIEF DESCRIPTION OF THE COURSE

The course is devoted to the most significant environmental document, the literacy of the practical preparation of which depends on the regulatory framework of the Republic of Kazakhstan. An EIA project is mandatory for any enterprise conducting economic activities. in order to determine the environmental and other consequences of options, management and economic decisions taken, develop recommendations for improving the environment, preventing the destruction, degradation, damage and depletion of natural ecological systems and natural resources.

The course includes information on regulatory and technical documentation in the field of environmental protection. Allows you to master the methods of drafting MPE, MPD, ecological passport, to master the calculation of establishing an economic assessment of damage from pollution, calculation of fees for emissions in the environment, get acquainted with the MU on the Organization and the procedure for conducting analytical control over the pollution of water bodies.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, students should

1) As a result of studying the discipline, students must:

have an idea of: the organizational and legal basis of environmental impact assessment in the Republic of Kazakhstan, theoretical and methodological foundations of environmental impact assessment, the procedure for organizing and conducting (procedure) EIA

know: environmental requirements taken into account during the EIA, how the impact on the atmosphere, hydrosphere, lithosphere, soil cover, flora and fauna, environmental risk is assessed, assessment and forecast of social and economic conditions of the population's life.

be able to: carry out projects of MPE, MPD, identify and solve problems for the rational use of natural resources; draw up an EIA project for an industrial enterprise;

calculate payments for emissions, damages, organize analytical control over the pollution of water bodies.

Industrial ecology
CODE – CHE645
CREDITS - 5 (2/0/1/2)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

Purpose of the course: Formation of systematized knowledge on the environmental management system and industrial safety at enterprises, depending on the sector of the economy

Objectives of the course:

- to study the systems of concepts, main factors and problems, principles and methodological techniques of industrial ecology and industrial safety;
- to consider the problems of the influence of various industries on natural ecosystems and human labor conditions;
- consider the main ways to optimize the relationship between industries and the environment;
- to increase the level of professional competence of students by establishing a system of interdisciplinary connections between the content of the course of the discipline and the content of the major disciplines.

BRIEF DESCRIPTION OF THE COURSE

When studying the course, it is assumed that the main sources of environmental pollution by industrial enterprises and the study of industrial safety issues, familiarization with methods of reducing pollution of the technosphere and ensuring the safety of production equipment and processes, methods of preventing and restoring harmful effects on OS components and workplaces are supposed to be considered.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, students should

1) know:

- basic principles of ensuring the norms and rules of environmental protection at industrial enterprises and methods of ensuring industrial safety;
- the basics of industrial sanitation and labor hygiene, accounting for accidents and occupational diseases;
- basics of electrical and fire safety;

2) be able to:

- apply the main provisions of environmental and labor legislation, sanitary and epidemiological and regulatory requirements for industrial ecology and industrial safety at work;
- carry out the correct choice of measures to reduce the negative impact of production processes on the environment;

3) own skills:

- calculation of environmental standards,
- calculation of the volumes and consequences of environmental pollution, the consequences of injuries,
- determination of indicators of working conditions

Ecology and environmental economics
CODE – CHE647
CREDITS - 5 (2/0/1/2)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is to form students' understanding of the main economic mechanisms of nature management; to acquaint with the economic foundations of the effective use of natural resources; show the importance of methods of economic stimulation of environmental management in the context of the transition to sustainable economic development; to form students' clear ideas about the methods of price formation for natural resources and compensation for damage from environmental pollution; to teach how to apply the acquired knowledge to solve problems of professional activity, including when calculating payments and damages for environmental pollution.

BRIEF DESCRIPTION OF THE COURSE

When studying the course, it is supposed to consider the social, economic, legal and managerial aspects of ecology in modern conditions. The history of the formation of ecology as a specific area of biological knowledge and its further development up to the science of socio-natural status. The reasons for the emergence of the ecological crisis are traced and the principal ways of overcoming it by means of improving scientific-technical and economic-management decisions are shown. Methods for solving the problems of environmental economics using economic and mathematical models are presented.

As a result of mastering the discipline, the student:

1) must know: the basic concepts of the discipline, the basic concepts of economic development, taking into account the environmental factor, the role of the state and the market for the rational use of natural resources; the main methodological approaches in determining the economic value of natural resources and benefits, as well as in assessing economic damage and payments from pollution.

2) must be able to: apply the knowledge gained for the practical analysis of environmental management issues in the economic aspect from the standpoint of an integrated system approach to problems and phenomena in the process of interaction between society and the natural environment; to make the choice of the optimal environmental protection measure from the ecological and economic point of view; calculate payments for environmental pollution.

3) must possess: basic methods and techniques of research and practical work in the field of economic assessment of negative impact on the environment.

4) must demonstrate the ability and readiness: for the practical application of the knowledge gained in solving professional problems and making decisions in the course of economic activity, as well as responsibility for the quality of work and the scientific reliability of the results.

Global ecology and biodiversity
CODE – CHE439
CREDITS - 5 (2/0/1/2)
PREREQUISIT: Ecology and sustainable development

PURPOSE AND OBJECTIVES OF THE COURSE

Training of specialists with high general scientific and professional training, capable of independent creative work. To give an idea of the main scientific and methodological laws of biodiversity conservation, to study the social, environmental, political and other consequences of the manifestation of global environmental problems at the global and regional levels, to form an idea of the current state of the biosphere as a result of the increasing anthropogenic impact on it, on possible ways to reduce the power of this impact.

Studying the basic concepts of the course; study of biodiversity as the basis for the preservation of life on Earth and the stability of ecosystems; to give a fairly complete picture of modern global environmental problems, the establishment for each concept of the scope, content and methods of independent study of scientific information; application of the acquired skills and abilities in the future profession; the ability to justify the choice of the appropriate field of application of knowledge.

BRIEF DESCRIPTION OF THE COURSE

The goal and objectives of the discipline "Global ecology and biodiversity". Evolution of the current state of the environment. Evolution of life and biosphere. Formation of the modern appearance of the environment. Mechanisms of biosphere and environment sustainability. Ecological homeostasis. Anthropogenic impacts on the biosphere and global environmental problems. Global problems of our time and sustainable development. The relationship of organisms in a community. Examples of basic types of relationships. Trophic structure of the community. Ecosystem productivity, types of productivity. Ecological pyramids and their types. Biodiversity levels. Genetic diversity. Species diversity. Ecosystem diversity. Taxonomic diversity. Classification of organisms. Life forms and biodiversity. Geography of biodiversity. Geographic patterns of species diversity. Biome diversity. Inland and marine ecosystems. Measurement and assessment of biodiversity. Alpha, beta, and gamma variety. Species richness indices. Monitoring biodiversity. Nature management and biodiversity. Human Impacts on Biodiversity. Biodiversity under pollution. Man-made disasters are a threat to biodiversity. Stability and sustainability of biosystems. Dynamics of biodiversity in the context of global and local environmental pollution. Environmental protection and conservation of biological diversity in Kazakhstan. The current state of the species diversity of Kazakhstan: flora and fauna, natural specifics.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of studying the course, students should:

Know - a list of the maximum knowledge, abilities and skills necessary for subsequent practical activities.

Be able to - apply the theoretical and methodological foundations of use; acquired knowledge for solving ecological problems of the environment and biodiversity.

To be competent - to apply the obtained theoretical knowledge and practical skills in practical and research activities; make conclusions and conclusions on the ecological state of the environment in the field of biodiversity conservation and solving the consequences of global environmental problems.

Restoration technologies for damaged ecosystems

CODE – CHE443

CREDITS – 5 (2/0/1/2)

PREREQUISIT: The main processes and devices of ecotechnology

PURPOSE AND OBJECTIVES OF THE COURSE

Purpose: increasing the level of professional competence of students through the development of the theoretical and practical foundations of technologies for the restoration of natural environments. study of natural, anthropogenically disturbed ecosystems, their similarities and differences, ways to restore disturbed ecosystems and the formation of ecological thinking and ecological culture among future specialists.

Tasks:

- to ensure the environmental literacy of future specialists through the development of environmental knowledge;
- develop strong-willed skills in analyzing environmental problems;
- to form ideas about the main directions of reclamation of anthropogenically disturbed natural areas, modern technologies for the restoration of water bodies, soils, natural ecosystems.
- To develop skills in practical exercises for conducting research on the state of natural environments, their pollution and the necessary restoration measures.

BRIEF DESCRIPTION OF THE COURSE

The academic discipline "Technologies for the restoration of disturbed ecosystems", which sets out the fundamental issues of the interrelated study of the ways of using natural resources and measures to restore, transform and protect these resources and the human environment. The content of the course contributes to the development of an ecological worldview among future specialists, which is based on the idea of the unity of the interrelationships of all natural processes occurring in the biosphere, their change under the influence of anthropogenic factors and the consequences of these factors.

KNOWLEDGE, ABILITY AND SKILLS FOR COMPLETION OF THE COURSE

Have an idea of: regulatory legal acts on industrial safety, labor protection and health of workers.

Know:

- basic methods and methods of restoration of natural environments;
- the main directions of rehabilitation of disturbed territories and landscapes.

be able to:

- to use modern research methods in the field of restoration of natural areas;

- carry out experiments and tests, process and analyze the results in the implementation of measures for the rehabilitation and restoration of natural environments

Own:

- practical skills in the field of restoration of natural environments, systemic ecological knowledge used to solve problems of environmental protection, in the rehabilitation of anthropogenic landscapes;

- the ability to use modern techniques, conduct experiments and tests, analyze their results.

Fundamentals of Radiation Ecology
CODE – CHE448
CREDITS – 5 (2/0/1/2)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose and objectives of the discipline "Fundamentals of Radiation Ecology" is to familiarize students with the physical foundations of radiation, the interaction of radioactive radiation with matter, the biological effect of radiation, control methods, principles of regulation and protection from ionizing radiation.

BRIEF DESCRIPTION OF THE COURSE

The course "Fundamentals of Radiation Ecology" is aimed at studying the fundamentals of radiation safety. The content of the discipline "Fundamentals of Radiation Ecology" sets out the objectives of the course, which make it possible to highlight the following issues: classification of protection against the main types of radiation (α, β, γ, n). Physical bases of registration and dosimetry of ionizing radiation. Scintillation, luminescent and photographic dosimetry methods. Devices and principle of operation of radiation monitoring devices.

Organization of work with sources of ionizing radiation. Work with sealed radiation sources. Work with radioactive substances in an open form. Accidents at radioactive waste. Deactivation. Legal aspects in the field of radiation safety.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of studying the course, the student should know:

- theoretical foundations of radiation and environmental safety of humans in the environment;
- legal and regulatory and technical consequences of radiation traumatic and damaging production factors;
- ways and means of increasing the stability of the functioning of the human body in the conditions of radiation emergencies;
- methods for predicting radiation emergencies and eliminating their consequences;
- basic methods and principles of protecting people at work from radiation.

The student must be able to:

- to develop measures to improve radiation and environmental safety in the course of production activities;
- to plan and implement measures to increase the resistance of the human body to radiation effects;
- plan measures to protect production personnel and the public in radiation emergencies.

Successful mastering by students of the course program "Fundamentals of Radiation Ecology" will contribute to the training of specialists for economic objects and organizations of all forms of ownership in the field of environmental protection.

Ecodesign and Ecodesign Basics

CODE – CHE440

CREDITS - 5 (2/0/1/2)

PREREQUISIT: General chemical technology, Basic processes and devices of chemical and biological technology

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PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is the acquisition by students of theoretical knowledge and skills in engineering calculations, in mastering the methods and basic stages of design, necessary for the implementation of the diploma project and independent professional activity. A chemical engineer-technologist must know the basics of design and be able to perform all the work necessary to develop an economically feasible and environmentally friendly technological part of a project, reconstruction or construction of a new enterprise.

Objectives of the course:

- study of the basic principles of designing chemical production;
- analysis of the operation of the existing equipment, the choice of ways to modernize and improve the equipment, the ability to formulate technical proposals;
- familiarization with the purpose, principle of operation and arrangement of chemical equipment for organic production;
- acquisition of skills in technological and structural calculation of equipment;
- the ability to work with regulatory and technical documents and select equipment in the appropriate catalogs, standards, reference books.

BRIEF DESCRIPTION OF THE COURSE

This discipline considers issues related to the development of new designs of machines and devices that have high productivity and provide higher economic indicators and improved product quality.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

The study of this discipline will allow the student to acquire theoretical knowledge and skills in engineering calculations, to master the methods and main stages of design necessary in the implementation of the diploma project and independent professional activity. A chemical engineer-technologist must know the basics of design and be able to perform all the work necessary to develop an economically feasible and environmentally friendly technological part of a project, reconstruction or construction of a new enterprise.

BAT in various industries
CODE - CHE449
CREDITS - 5 (2/0/1/2)
PREREQUISIT: no

PURPOSE AND OBJECTIVES OF THE COURSE

He will get acquainted with the technologies of production of products (goods), performance of work, provision of services, determined on the basis of modern achievements of science and technology and the best combination of criteria for achieving the goals of environmental protection, provided there is a technical feasibility of its application.

BRIEF DESCRIPTION OF THE COURSE

Relationship between BAT and environmental permits, elements of assessing the effectiveness of BAT policies, description of technological processes in various industries. Methodology for analyzing the dynamics of emissions at the facility level Contents of handbooks of the best available technologies in the field of environmental protection and their structure. Primary copper and aluminum production process, production of ammonia, building materials, etc.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- know the basic technologies for reducing emissions into the environment from various industries;
- to master the methodology for analyzing the dynamics of emissions at the installation level;
- be able to conduct case studies on emissions;
- know the basic data requirements for evaluating BAT-based policies;
- be able to assess the best available technologies (BAT) to determine the limit levels of emissions for industrial facilities, established on the basis of actual data on resource and environmental efficiency.

Defense of the thesis / thesis project
CODE - ECA103
CREDITS - 6
PREREQUISIT: professional practice

GOAL AND TASKS

The objectives of the implementation and defense of the thesis (project) are:

- systematization, consolidation and expansion of theoretical knowledge and practical skills in the specialty and their application in solving specific scientific, technical, economic and production problems;
- development of skills in conducting independent work and mastering the methodology of scientific research and experimentation in solving developed problems and issues;
- clarification of the student's readiness for independent work in the conditions of modern production, science, technology, the level of his professional competence.

SHORT DESCRIPTION

The diploma work (project) is a generalization of the results of independent study and research of an urgent problem in the field of chemical engineering and engineering, in the field of environmental protection and biotechnology.

KNOWLEDGE, SKILLS, SKILLS

- the ability to independently collect and analyze scientific and technical information, conduct experimental work and the necessary calculations to achieve specific goals of the thesis / project and solve engineering problems in the field of technology of organic and inorganic substances, in the field of environmental protection and biotechnology;
- skills in processing and generalization of the results obtained in the appropriate text, tabular and graphic forms that comply with the standards;
- the ability to formulate conclusions and conclusions on the results obtained, to emphasize the novelty and practical significance of the results;
- skills in the presentation of the results of the thesis / project in electronic and oral forms (presentation and report).

СӘТБАЕВ УНИВЕРСИТЕТІ 1934 SATBAYEV UNIVERSITY

Application 1

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«21» 04 2021 г.

№ 26/21

РЕЦЕНЗИЯ
на образовательную программу
“Инженерная экология»

Основной целью рецензируемой образовательной программы (далее-ОП) является формирование знаний, умений и навыков, необходимых для решения задач профессиональной деятельности, обеспечение контроля уровня освоения компетенций с предоставлением выпускникам возможности выбора области профессиональной деятельности и совершенствования личностных и профессиональных качеств.

Образовательная программа содержит информацию о квалификации выпускников, о профессиональных компетенциях, приведены описание программы и нормативные документы, перечень профессиональных навыков и умений, которыми должен обладать выпускник в результате освоения образовательной программы “Инженерная экология»

Качество рассматриваемой образовательной программы не вызывает сомнений. Включенные в ОП базовые и фундаментальные дисциплины раскрывают сущность актуальных на сегодняшний день проблем в области химической и биотехнологической инженерии, охраны окружающей среды и экологии. Выпускники на базе фундаментально-прикладных знаний инженерно-технического, химического и биологического профилей будут обладать глубокими знаниями теоретических и практических основ инженерии, защиты окружающей среды, экологического прогнозирования и мониторинга, оценки воздействия экологических факторов на окружающую среду.

Необходимо отметить, что образовательная программа повышает конкурентоспособность выпускников этой программы на рынке труда, а объектами возможного трудоустройства выпускников являются промышленные предприятия различных отраслей промышленности, включая предприятия химического и нефтехимического профилей различных форм собственности, предприятия биотехнологических производств, а также сектор экологического мониторинга и эколого-нормативного проектирования предприятий.

Директор ТОО «Институт инновационных исследовании и технологии»,
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Application 2

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Шығыс №_____«___»_____20__ж.
Кіріс №_____«___»_____20__ж.

Исход № 465 «19» 04 2021 г.
Вход №_____«___»_____20__ г.

РЕЦЕНЗИЯ
на образовательную программу
«Инженерная экология» в области Бакалавр естествознания

Рецензируемая образовательная программа (ОП) «Инженерная экология» квалификации «Экология» (бакалавр) Национальной рамки квалификации представляет собой описание образовательной подготовки, разработанной на основе Государственного общеобязательного стандарта высшего образования Республики Казахстан (бакалавриат).

Содержание и структура ОП по направлению подготовки «6В052 Окружающая среда» отвечает основным требованиям стандарта и содержит следующую информацию: цели и задачи ОП, характеристику профессиональной деятельности выпускника, академические требования к поступающим, требования для завершения обучения и получение диплома,, правила перезачета кредитов, дескрипторы уровня и объема знаний, умений, навыков и полный перечень общечеловеческих, социально-этических, базовых, профессиональных и специальных компетенций.

Структура Учебного плана ОП «Инженерная экология» логична, последовательна, содержательна. Дисциплины учебного плана раскрывают сущность актуальных на сегодняшний день проблем в области инженерной и промышленной экологии. Общая трудоемкость программы составляет 242 академических часа теоретического обучения (ECTS).

Сильными сторонами рецензируемой ОП являются:

- обеспечение фундаментальной подготовки студентов для успешного решения ими научных и инженерных задач в профессиональной области, о чем свидетельствует объем дисциплин базового цикла;
- развитие обучающихся через научно-исследовательскую деятельность, критическое мышление, приобретение профессионально-ориентированных навыков и умений;
- возможность выбора обучающимися различных видов профессиональной деятельности, что повышает их востребованность на рынке труда.

На основании вышесказанного считаю, что образовательная программа «Инженерная экология» направления подготовки «6В052 Окружающая среда» может быть рекомендована для внедрения в учебный процесс.

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Кіріс №_____ «__» _____ 20__ж.

Исход № 466 «19» 04 2021 г.
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Рецензия на образовательную программу бакалавриата «Инженерная экология»

Образовательная программа «Инженерная экология» бакалавриата предназначена для подготовки специалистов широкого профиля в области химической и биологической инженерии с фундаментальной подготовкой по таким базовым дисциплинам как: химия, физика, математика, биология, английский язык. Вместе с тем предусмотренные в образовательной программе общетехнические и инженерные дисциплины, а также специальные дисциплины способствуют успешному формированию у студентов-бакалавров профессиональных компетенций таких, управление природоохранными процессами для различных производств; осуществление производственного экологического контроля эмиссий на предприятиях, оценка эколого-экономической эффективности технологических процессов и эколого-технологических рисков при внедрении новых технологий.

Программа направлена на подготовку специалистов через триединство: образовательный процесс - наука - производство. Выпускники программы наряду с профессиональными компетенциями приобретают социально-гуманитарную подготовку на основе законов социально-экономического развития общества, истории, современных информационных технологий, государственного языка, иностранного и русского языков.

Считаю, что образовательная программа «Инженерная экология» уровня бакалавриата отвечает потребностям работодателей и рынка труда в области индустриальной экологии, задачам индустриально-инновационного развития страны и может быть рекомендована к внедрению в образовательный процесс.

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