

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE
REPUBLIC OF KAZAKHSTAN

M.Auezov SOUTH KAZAKHSTAN UNIVERSITY

APPROVED BY»

Chairman of the Board - Rector

D.Zh. Ahmed - Zaki

2025

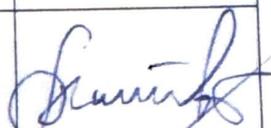
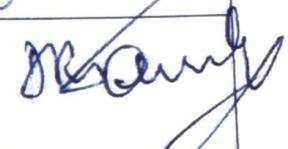


EDUCATION PROGRAMME

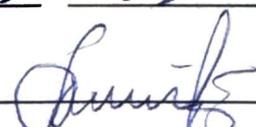
7M07170 - «Chemical technology of organic substances»

Registration Number	7M07100004
Code and Classification of Education	7M07-Engineering, manufacturing and construction industries
Code and Classification of Areas of Training	7M071- Engineering and engineering practice
Group of educational programs (EP)	M097 Chemical Engineering and processes
Type of EP	Acting
ISCE level	7
NQF level	7
IQF level	7
Language of learning	Kazakh, russian
The complexity of EP,	120 credits
Distinctive features of EP	-
Partner University (JEP) -	-
University partner (DDEP) -	-

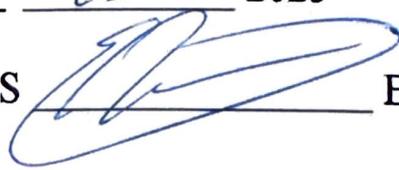
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The EP was reviewed at a meeting of the Committee on Academic Quality of the Higher School of Chemical Engineering and Biotechnology, Protocol № 7 " 13 " 03 2025

Chairman of the AK  N.M. Daurenbek

Reviewed and recommended for approval at a meeting of the Educational and Methodological Council of the SKU named after M. Auezov, Protocol № 4 " 18 " 03 2025

Chairman of the UMS  E.I. Imangaliev

The EP was approved by the decision of the Academic Council of the University, Protocol № 10 « 27 » 03 2025.

CONTENT

1.	Concept of the educational program	4
2.	Passport of the educational program	6
3.	Competences of a graduate of the EP	8
3.1	Matrix of correlation of the EP learning outcomes in general with modules formed by competencies	9
4.	Matrix of the influence of modules and disciplines on the formation of learning outcomes and information on labor intensity	10
5	Summary table reflecting the volume of disbursed loans by EP modules	24
6.	Strategies, teaching methods and artificial intelligence, monitoring and assessment	25
7	Educational and resource support for EP	26
	Approval sheet	27
	Appendix 1. Review from the employer	
	Appendix 2. Expert opinion	

1 CONCEPT OF THE EDUCATIONAL PROGRAM

University Mission	Generating new competencies, training a leader who translates research thinking and culture.
University Values	<ul style="list-style-type: none">• Openness—open to change, innovation and cooperation.• Creativity – generates ideas, develops them and turns them into values.• Academic freedom – free to choose, develop and act.• Partnership – creates trust and support in a relationship where everyone wins.• Social responsibility – ready to fulfill obligations, make decisions and be responsible for their results.
Graduate Model	<ul style="list-style-type: none">• Deep subject knowledge, their application and continuous expansion in professional activity.• Information and digital literacy and mobility in rapidly changing conditions.• Research skills, creativity and emotional intelligence.• Entrepreneurship, independence and responsibility for their activities and well-being.• Global and national citizenship, tolerance to cultures and languages.
The uniqueness of the educational program	<p>EP is focused on the integration of the educational process, scientific-research and innovation activities, which contributes to the high competitiveness of graduates in the labor market.</p> <p>The study program focuses on the implementation of a master's dissertation commissioned by enterprises using material and intellectual resources, training from leading domestic and foreign specialists, production workers, the opportunity to work in research laboratories of relevant enterprises with unique equipment, participation in international scientific and educational projects, internships in leading Russian and foreign companies and universities</p>
Academic Integrity and Ethics Policy	<p>The university has taken measures to maintain academic integrity and academic freedom, protection from any type of intolerance and discrimination:</p> <ul style="list-style-type: none">• Rules of academic integrity (order No. 212 of October 10, 2022);• Anti-corruption standard (order No. 8 n/a dated 08/01/2025).• Code of Ethics (Order No. 212 of October 10, 2022).
Regulatory and legal framework for the development of EP	<ol style="list-style-type: none">1. Law of the Republic of Kazakhstan “On Education”;2. «Model Rules for the Activities of Organisations of Higher and Postgraduate Education», approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated June 24, 2024. No. 307;3. Standard rules for admission to training in educational organizations implementing educational programs of higher and postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 600 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 26, 2024. No. 372;4. State mandatory standards for higher and postgraduate education, approved by order of the Ministry of Education and Science of July 20, 2022 No. 2 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated March 04, 2025. No.

90;

5. Rules for organizing the educational process in credit technology of education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated April 29, 2024. No. 203;

6. Qualification reference book for positions of managers, specialists and other employees, approved by order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated December 30, 2020 No. 553 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated June 20, 2024. No. 207;

7. Methodological recommendations for introducing ECTS principles into the educational process and expanding academic freedom. Appendix to the order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated February 12, 2024 No. 57.

8. Guidelines for the development of educational programs for higher and postgraduate education, Appendix 1 to the order of the Director of the National Center for the Development of Higher Education of the Ministry of Education and Science of the Republic of Kazakhstan dated May 4, 2023 No. 601.

Organization of the educational process

- Implementation of the principles of the Bologna Process
- Student-centered learning
- Availability
- Inclusivity

Quality assurance of the Educational program

- Internal quality assurance system
- Involvement of stakeholders in the development of the Educational Program and its evaluation
- Systematic monitoring
- Actualization of the content (updating)

Requirements for applicants

They are established in accordance with the Standard Rules for admission to training in educational organizations implementing educational programs of higher and postgraduate education by order of the Ministry of Education and Science of the Republic of Kazakhstan No. 600 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 26, 2024. No. 372.

Conditions for the implementation of educational programs (EP) for persons with disabilities and special educational needs (SSN)

For students with SEN (special educational needs) and persons with disabilities (PSI), tactile PVC tiles, specially equipped toilets, a mnemonic diagram, and shower bars have been installed in educational buildings and student dormitories. Special parking spaces have been created. Crawler lift installed. There are desks for people with limited mobility (PLM), signs indicating the direction of movement, ramps. In the educational buildings (main building, building No. 8) there are 2 rooms with six working places adapted for users with disorders of the musculoskeletal system (DMS). For visually impaired users, the SARA™ CE Machine (2 pcs.) is available for scanning and reading books. The library website is adapted for the visually impaired. There is a special NVDA audio program with a service. The JIC website <http://lib.ukgu.kz/> is open 24/7.

An individual differentiated approach is provided for all types of classes and in the organization of the educational process.

2. PASSPORT of the Educational program

Purpose of the EP	Preparation of highly qualified personnel, owning modern approaches to the organization of production and enterprise management, technological design, capable of carrying out scientific and educational activities.
Tasks of the EP	<ul style="list-style-type: none">• providing conditions for the acquisition of a high intellectual level• development, mastery of logical and critical thinking and scientific skills• organization of labor in scientific and pedagogical activity;• formation of competitiveness of graduates in the field of chemical technology of organic substances to ensure the possibility of their fastest possible employment in their specialty or continuing their studies in doctoral studies• Creating conditions for the formation of in-demand knowledge and skills, a conscious attitude towards improving the well-being of the population and protecting the planet in the context of the SDGs.
Harmonization of EP	<ul style="list-style-type: none">• 6 level of the National Qualifications Framework of the Republic of Kazakhstan;• Dublin descriptors of the 6th level of qualification;• 1 cycle of a Framework for Qualification of the European Higher Education Area);• 6th Level of European Qualification Framework for Life long Learning).
Connection of the EP with the professional sphere	Professional standard: Teacher (faculty) of higher and (or) postgraduate education organizations 20.11.2023. Management of production and implementation in the oil and gas refining and petrochemical industries 12.06. 2022. - Production technology 06.12.2022.
Name of the degree awarded	After successful completion of this EP, the graduate is awarded the degree of Master of Technical Sciences in the educational program 7M07170 – "Chemical technology of organic substances".
List of qualifications and positions	Masters in the educational program can continue their education in doctoral studies, occupy the positions of managing director, development director, department director, chief of production, chief engineer, chief technologist, chief mechanic, general manager, research worker, teacher without making any requirements for with the qualification requirements of the "Qualification directory of positions of managers, specialists and other employees", approved by order the Minister of Labor and Social Protection of the Republic of Kazakhstan dated December 30, 2020 No. 553.
Field of professional activity	The sphere of professional activity are enterprises for the production of organic substances, for the processing of petroleum, gas, coal and polymers, elastomers, paints and varnishes, research and project branch institutes, institutions, etc.
Objects of professional activity	The objects of professional activity are equipment, technological processes and industrial systems for the production of substances, materials, products, as well as their management and regulation systems; chemicals and materials; methods and devices for determining

Subjects of professional activity	<p>the composition and properties of substances and materials, methods and tools for assessing the state of the environment.</p> <p>The subjects of professional activity are products of basic and fine organic synthesis, devices and equipment for the chemical technology of production and processing of organic substances and materials, various types of raw materials and auxiliary materials, petroleum, gas, coal, polymers, monomers, elastomers, chemical reagents and reagents, research instruments and equipment, educational and methodical documentation, technical means of training.</p>
Types of professional activity	<ul style="list-style-type: none"> -scientific and research; -production and technology; -organizational and managerial; -project; - pedagogical.
Learning outcomes	<p>LO1 Analyzes and summarizes scientific and technical information with the involvement of information resources, using knowledge of a foreign language; summarizes the results of research work in the form of a scientific article, report.</p> <p>LO2 To design and conduct comprehensive and interdisciplinary research based on a holistic systematic scientific worldview using knowledge in the field of history and philosophy of science.</p> <p>LO3 Performs scientific and pedagogical activities using the scientific and pedagogical activities using the scientific organization of pedagogical activities in higher education, innovative and digital learning technologies, effective teaching methods in the field of chemical technology of organic substances.</p> <p>LO4 They lead a team of specialists using the principles and methods of management psychology, showing creativity and logical thinking in non-standard production situations.</p> <p>LO5 Coordinates technological processes of processing of hydrocarbon raw materials, production of organic substances, assess the economic efficiency of technological processes and their environmental safety in order to comply with the safety of life and environmental cleanliness.</p> <p>LO6 Develops a proposal for the modernization and reconstruction of existing installations that ensure the production of products that meet environmental quality standards.</p> <p>LO7 Implements independent scientific developments into production; conducts marketing of high-tech technologies.</p> <p>LO8 Designs new technological equipment and its elements for deep processing of hydrocarbon raw materials, synthetic fibers, production of sulfur from natural gas using application software packages.</p> <p>LO9 Using neural networks, the skills of using special products, additives, selecting and regulating the properties of technical liquids, and preparing recipes for polymer compositions are mastered.</p> <p>L10 Solves problems in interdisciplinary related fields of knowledge, having skills in learning; skills in making informed decisions and a responsible attitude to issues of environmental protection, ensuring economic viability and a fair foundation for the existence of society in the interests of present and future generations.</p>

3 COMPETENCES OF A GRADUATE OF THE EP

SOFTSKILLS. Behavioral skills and personality qualities

GC 1. Competence in managing one's literacy	GC 1.1. Strive for professional and personal growth throughout life. GC 1.2. Constantly update their knowledge within the chosen trajectory and in the conditions of interdisciplinarity, carry out further training with a high degree of independence and self-regulation. GC 1.3. Be capable of reflection, objective assessment of their achievements, awareness of the need to form new competencies and continue their education in doctoral studies.
GC 2. Language competence	GC 2.1. The ability to possess a sufficient level of communication in the professional field in the state, Russian and foreign languages for negotiations and business correspondence. GC 2.2. The ability to possess mediation skills and inter-cultural understanding.
GC 3. Mathematical competence and competence in the field of science	GC 3.1. The ability to interpret methods of mathematical analysis and modeling to solve applied problems in the field of study. GC 3.2. The ability to plan scientific experiments, integrate and implement the results of scientific research in the professional field. GC 3.3. The ability to analyze and comprehend modern methods of pedagogical and psychological science and apply them in pedagogical activity.
GC 4. Digital competence, technological literacy	GC 4.1. The ability to confidently use modern information and digital technologies, artificial intelligence systems for work, leisure and communication. GC 4.2. Proficiency in the use, recovery, evaluation, storage, production, presentation and exchange of information in a wide range of digital devices. GC 4.3. The ability to confidently use global information resources and apply technological literacy in research and computational and analytical activities.
GC 5. Personal, social and educational competencies	GC 5.1. Knowledge of the norms of business ethics, social and ethical values and focus on them in professional activities. GC 5.2. Formation of a personality capable of mobility in the modern world, critical thinking and physical self-improvement. GC 5.3. The ability to work in a team, correctly, clearly and argumentatively defend their position during discussions and make professional decisions. GC 5.4. The ability to adequately navigate in various social spheres of activity and in conditions of uncertainty. GC 5.5. The ability to find compromises, correlate your opinion with the opinion of the team.
GC 6. Entrepreneurial competence	GC 6.1. Manifestation of leadership qualities and the ability to have a positive impact on others, to lead a team. GC 6.2. The ability to create conditions for the development of

creative and entrepreneurial skills of the team.

GC 6.3. The ability to work in the mode of uncertainty and rapid change of task conditions, make decisions, respond to changes in working conditions, allocate resources and manage your time.

GC 6.4. Ability to work with consumer requests.

GC 7. Cultural awareness and the ability to express oneself

GC 7. Cultural awareness and the ability to express oneself

GC 7.1. The ability to show ideological, civic and moral positions.

GC 7.2. The ability to be tolerant of the traditions and culture of the peoples of the world, to possess high spiritual qualities.

PROFESSIONAL COMPETENCIES (HARD SKILLS).

Theoretical knowledge and practical skills specific to this field

(PC1) the ability to improve chemical-technological processes, introduce new advanced technologies in production, develop measures for the integrated use of raw materials, replace scarce materials and find ways to recycle production waste, evaluate their economic efficiency and innovative-technological risks;

(PC2)) the ability to synthesize chemical engineering materials using artificial intelligence, study their structure and properties, and use modern equipment and instruments in the field of research;

(PC3) the ability to develop and manage the implementation of research and technical projects, new energy- and resource-saving ecologically safe technologies with the achievement of maximum production efficiency.

(PC4) the ability to quickly and efficiently develop business plans and conduct preliminary marketing research to commercialize the products of activities in the field of chemical technology of organic substances.

3.1 Matrix of correlation of EP learning outcomes in general with modules formed by competencies

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
GC 1	+		+				+			
GC 2			+			+	+			+
GC 3				+	+	+				+
GC 4	+	+	+			+	+			+
GC 5	+	+	+							+
GC 6		+				+			+	
GC 7		+			+			+		+
PC1				+	+	+	+			
PC2		+				+	+	+		
PC3				+	+	+	+		+	
PC4				+		+	+			+
PC5		+					+	+		+

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

	The name of the module	CYC-LE	UC/OC	The component name	Brief description of the discipline	Numb.of cred.	The generated LO (codes)											
							LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10		
1	Module of Scientific and Pedagogical Training	BD	HsC	History and Philosophy of Science	<p>Purpose -formation of undergraduates' in-depth knowledge about the stages of development of the history and philosophy of science, the place and role of scientific knowledge, cognitive models, principles and methods of scientific knowledge.</p> <p>Content: Philosophy and science (problems of interaction). The fundamental foundations of science. Science and its role in modern civilization History of science. The emergence of science and the main stages of its historical evolution. Russian science: traditions, problems, prospects. Methods of scientific cognition and their classification. Scientific traditions and scientific revolutions. Types of scientific rationality science. Philosophical problems of engineering and technical sciences. Ethics of scientific and engineering activities.</p>	4		+										
2		BD	HsC	Foreign Language (Professional)	<p>Purpose -formation of foreign language competence in the field of professional communication.</p> <p>Content: Mastering a foreign language at the level of international standards C1 and C2. Listening to messages of informational and professional content. The specifics of oral speech and pronunciation norms: the orthoepic norm of the English language. Semantic, structural and communicative integrity of the text, its units. Lexico-grammatical features of scientific style genres and presentation in oral and written varieties.</p>	4	+											
3		BD	HsC	Psychology of management	<p>Purpose - study of the specifics and basic psychological patterns of managerial activity; formation of skills for analyzing managerial activity</p> <p>Contents: Theoretical and methodological foundations of management psychology. Properties of control</p>	3				+								

				systems. Psychological features of organizational management structures. Perceptual and mnemonic processes in management activities. Motivation of the manager's activity. Psychological components of control systems. A small group as a management object. Personality as an object and subject of management. Internal management factors. Psychological zones of determining effective management. Psychological analysis of the effectiveness of management styles. The psychological essence of conflicts and their types. Conflicts in the field of management. Psychological strategies and principles of conflict resolution												
4		BD	HsC	Pedagogy and Psychology of Higher School	<p>The purpose of the course is to develop undergraduates' skills and abilities to effectively organize professional and pedagogical activities at a university based on modern psychological and pedagogical knowledge.</p> <p>Course content: Modern paradigms of higher education. History, trends and strategies of higher education development in Kazakhstan. The subject, tasks, and categories of higher school pedagogy and psychology. Methodological foundations of higher school pedagogy and psychology. Professional competence of a university teacher. The communicative competencies of a university teacher. Higher school didactics. Psychological features of student age. The university learning process and its patterns. The content of education at the university. Forms of organization of the educational process at the university. Technologies of organization and implementation of the educational process at the university. Features of the credit training system. Methods and methods of teaching.</p>	5			+							
5		BD	HsC	Pedagogical Practice	<p>Purpose - formation of practical skills of teaching and learning methods. At the same time, undergraduates are involved in conducting undergraduate classes at</p>	4	+		+	+			+			

					oxime to caprolactam. Modern technologies for the production of oxygen-containing compounds, halogen and nitro derivatives, synthetic detergents, rubbers, plastics and fibers. Using artificial intelligence to predict the properties of petrochemical products.													
7		Ch.D	EC	Innovative Technologies of Oil Refining and Petrochemistry	<p>Goal- deepening the knowledge of undergraduates in the field of innovative technologies of oil refining and petrochemistry, aimed at increasing the depth of oil refining, improving the quality of petroleum products, for the modernization and improvement of oil refining and petrochemistry technologies.</p> <p>Content: Trends in the development of world and Kazakhstan oil refining and petrochemistry. New technologies underlying the production of products that meet international standards. The structure of secondary processes and an increase in the depth of oil refining. Alternative options for the modernization and reconstruction of existing installations that ensure the production of products that meet environmental quality standards.</p>		+		+			+						
8		Ch.D	EC	Chemistry and Technology of Biologically Active Additives	<p>Purpose: to study in-depth the chemical nature, methods of synthesis, isolation, analysis and industrial production of biologically active additives (dietary supplements) used in medicine, food and chemical industries.</p> <p>Contents: Classification of biologically active substances: vitamins, antioxidants, amino acids, polyphenols, fatty acids, prebiotics, probiotics, etc. The chemical structure and properties of dietary supplements, their metabolic pathways and mechanisms of action in the human body. Sources of dietary supplements: natural (vegetable, animal, microbiological raw materials) and synthetic. Methods of synthesis, modification and extraction of biologically active compounds: organic synthesis, biotechnological approaches, extraction by supercritical fluids,</p>	6	+		+			+						

				chromatographic purification. Technological processes of dietary supplements production, including formulation development, carrier selection, methods of encapsulation, microcapsulation and stabilization of active components. Physico-chemical methods of quality control of dietary supplements, including spectroscopy, chromatography, titrimetry and thermal analysis. Standardization, registration and certification of dietary supplements in accordance with international and national regulations (GMP, ISO, TR CU). Environmental and resource-saving technologies for the production of dietary supplements. Current areas of development: creation of functional food products, personalized supplements, nanotechnology in the field of delivery of active substances															
9		Ch.D	EC	Potential processes for producing sulfur from hydrocarbon gases	<p>Goal: deepening knowledge on promising processes for producing sulfur from hydrocarbon gases; and using the acquired knowledge to solve practical problems to improve production.</p> <p>Contents: The current level of development of processes for processing sulfur-containing hydrocarbon gases in world practice and the Republic of Kazakhstan. Features of the modern raw material base for sulfur production. Analysis of the main problems of gas sulfur production, desulfurization of natural gas and the release of acid gases. The main problems of sulfur production using the Claus method. Issues of increasing the efficiency of the thermal and catalytic stages of the Claus plant, Mechanisms of conversion of hydrogen sulfide and other organosulfur compounds into elemental sulfur. Technological diagrams of sulfur production plants, range of resulting products. Selecting a method and conducting sulfur analysis.</p>												+	+	
10		Ch.D	EC	Selected chapters of petrochemistry	<p>Goal: deepening the knowledge of undergraduates in the field of industrial petrochemical processes to solve</p>	7												+	+

					practical problems to improve production. Contents: Development trends of the petrochemical industry. Involvement of alternative raw materials in the production of basic organic synthesis and petrochemical products. System regularities of petrochemical processes. Creation of models of technological installations and industrial production complexes. Technological design of industrial petrochemical processes. Analysis of the operating mode of technological objects.													
11		Ch.D	EC	Chemical reactor design	Goal: expanding the knowledge of undergraduates in the design of chemical reactors in order to prepare for creative work on the creation of modern chemical reactors. Contents: Modern chemical processes. Analysis of reactors by design features, models of chemical reactors. Design of continuous (catalytic), batch (autoclaves, stirrer systems) and semi-batch reactors (catalytic reforming). Design of reactors with adiabatic and isothermal media. Design of columns, reaction chambers, heat exchangers.					+		+						
12		Ch.D		Research scientific training	Goal: The goal is to acquire professional skills in applying theoretical and practical knowledge acquired during the training period, collecting, analyzing and summarizing materials for writing a research report with its subsequent use in writing a master's thesis Contents: Design and implementation of complex and interdisciplinary research, analysis and synthesis of scientific and technical information using information resources; carrying out experimental research, summarizing the results of research in the form of a report, scientific article and presentation to a wide audience.	6	+			+								+
13	Prospects of Developm	Ch.D	EC	Resource-Saving Technologies	Purpose: to study modern methods of increasing the efficiency of the use of raw materials, energy and materials in the chemical technology of organic substances, with an emphasis on sustainable development	6							+		+			

15		Ch.D	EC	Scientific basis of creating polymer composite materials	<p>Goal-deepening of knowledge on the technology of composite polymer materials for the formation of the principles of engineering approach for undergraduates to assess the possibilities of creating new composite polymer materials.</p> <p>Contents: Scientific basis for the creation of polymer composite materials (PCM). Chemical properties and chemical transformations of VMS during their processing into CPM. Rheology of polymer systems in the production of composite polymer materials. Plastic masses as multicomponent systems. Modern methods of thermoplastics processing in CPM. Modern technologies of composite materials production. Types of PCM. Filled polymers. Mixtures of polymers. Foamed polymers. Other types of composite materials. Optimization of composites composition using neural networks.</p>	7		+									+	
16		Ch.D	EC	Modern tire manufacturing processes	<p>Goal: expanding the knowledge of undergraduates about the current state and development trends of tire production to develop alternative options for the modernization and reconstruction of existing technological lines and equipment for tire production</p> <p>Contents: Current state and development trends of tire production; scientific-theoretical and chemical-technological foundations for the production of tires for various purposes, environmental aspects of the tire production industry. Management of modern technological processes for tire production. Elastomeric materials for the production of tires with specified properties; development of alternative options for modernization and reconstruction of existing equipment.</p>					+							+	
17	Petrochemical	BD	EC	Nanostructured Polymer Materials	<p>Purpose: to study methods of synthesis, structure, properties and application of polymer materials with</p>	6						+					+	+

	Processes			<p>nanostructures for the creation of new high-performance products and coatings.</p> <p>Contents: The concept of nanostructured polymers: definition, classification, principles of formation of nanostructures in polymer systems. Methods for obtaining nanostructured polymers: self-assembly, polymerization in limited volumes, the use of nanosystems (nanoparticles, nanotubes, graphene structures) as fillers. Physico-chemical bases of nanostructuring: phase transitions, interaction at the interphase boundary, mechanisms of morphology formation. Types of nanostructured polymer materials: nanocomposites, block copolymers, polymer membranes, polymer nanogels. Methods of studying the structure and properties: electron and atomic force microscopy, X-ray diffraction, spectroscopy, thermal analysis.</p> <p>Functional properties of nanostructured polymers: high mechanical strength, barrier properties, conductivity, selectivity. Applications: medical implants and drug delivery systems, protective coatings, filtration membranes, electronics, packaging materials. Prospects for the development of nanostructured polymer technologies, environmental and economic aspects of their use.</p>														
18		BD	EC	<p>Ways of stimulation of production and processing of elastomers</p>	<p>Goal: deepening the knowledge of undergraduates on the practical fundamentals of elastomer technology, acquiring skills in creating elastomeric materials with specified properties</p> <p>Contents: Ways to intensify the production and processing of elastomers. Modern requirements for the ingredients of rubber compounds. Modern processes and equipment for the production and processing of elastomers. Obtaining elastomeric materials with specified properties. New ingredients to improve the properties of elastomers.</p>					+								+

19		BD	EC	General Chemical Technology of Synthetic Fibers	<p>Goal-expansion of modern ideas about chemical and physico-chemical processes underlying the technology of chemical fibers. acquisition of skills in synthesis and research of special fibers with special properties.</p> <p>Contents: Modern chemical fibers, the basic principles of their production and research. Modern technologies for the production of polyester, polyamide and polyolefin synthetic fibers and other synthetic fibers. Modern devices and methods of testing synthetic fibers. Obtaining special fibers with special properties. The chemical modifications of textile materials modification processes.</p>	5										+		+	
20		BD	EC	Rational Ways of Processing Heavy Oils and Oil Residues	<p>Goal: expanding the knowledge of undergraduates on rational methods of processing heavy oils and oil residues to develop new approaches to the processing of heavy oils and oil residues.</p> <p>Contents: Problems of residue-free processing of petroleum raw materials; basic principles of advanced and advanced oil refining. Products of processing of heavy oils and oil residues. Kinetics, thermodynamics and mechanism of chemical reactions underlying industrial processes for the processing of heavy oils and oil residues.</p>											+	+		+
21	Deep processing of hydrocarbon raw materials	Ch.D	EC	Development and application of additives to modify the fuel and oil property	<p>Goal: expanding knowledge on the development and use of additives for modifying the properties of fuels and oils; formation of skills for obtaining and researching additives for petroleum products.</p> <p>Contents: The main directions of work in the development of modern additives for various types of oils and petroleum fuels, based on the characteristics of their functional purpose and mechanism of action. Ways to modify detergent-dispersant, viscosity and depressant additives. Alloying the properties of lubricating oils. Anti-corrosion additives. Antioxidant additives. Research in the field of additive package creation and composition.</p>	5											+	+	

					The mechanism of action of additives.														
22		Ch.D	EC	Scientific Bases of Elastomeric Compositions Compounding	<p>Goal: to develop in master's students in-depth knowledge about the scientific and practical fundamentals of formulating elastomeric compositions, to acquire practical skills for master's students in the manufacture and testing of elastomeric materials and products.</p> <p>Contents: Scientific basis for formulating rubber compounds. Modern understanding of the compatibility of recipe ingredients. Innovative technologies for the production of reinforced elastomeric composites. Latest achievements in the field of creating new plasticizers for rubber compounds. Vulcanization of elastomers: new developments and directions for improving vulcanizing systems for various types of elastomeric materials. Development of elastomeric compositions. Environmental aspects of the elastomeric materials industry.</p>														
23		BD	EC	Special oil refining and petrochemical products	<p>Goal: expanding the knowledge of undergraduates about the current state and prospects of production, quality improvement, application of technical fluids and special products, generate ideas for continuous improvement of product quality.</p> <p>Contents: Technical fluids. Special oil products. Lubrication and cooling technological means (LCTS). Process oils (plasticizer oils and softener oils). Preservative and protective lubricants. Solid petroleum products. Technical, economic and environmental problems of production and practical use of technical fluids and special products, their impact on the reliability and efficiency of equipment operation. Selection of promising varieties and brands of fuel, lubricants and special liquids.</p>	5													
24		Ch.D	EC	Industrial Ecology of Hydrocarbon	<p>Goal: deepening of knowledge about scientific and technical problems of oil refining; world achievements</p>														

				Systems	<p>in the field of oil refining technology in the world and in Kazakhstan allowing to carry out a complex of economic, organizational, engineering and technical measures for reduction and storage of waste, as well as obtaining additional economic effect from obtaining useful products.</p> <p>Contents: Analysis of environmental problems of processing of hydrocarbon systems, environmental monitoring, production of hydrocarbon systems with improved environmental characteristics, environmental quality management, industrial and environmental safety in the processing of hydrocarbon systems. Management of technological processes of processing of hydrocarbon raw materials, production of organic substances in compliance with the safety of life and environmental cleanliness.</p>												
25		BD	EC	Modeling of chemical and technological processes of oil refining in MatLab and ChemCad	<p>Goal-teaching undergraduates the skills of using MatLab and ChemCad software tools for modeling and analyzing chemical and technological processes of oil refining.</p> <p>Content:The principles of working in the MatLab environment: basic commands, plotting, creating functions. Modeling of oil refining processes in MatLab environment: modeling of distillation, cracking, hydrotreating and other processes. Principles of operation in the ChemCad environment: creation of flowcharts, creation of block diagrams, modeling of oil refining processes. Comparison of simulation results in MatLab and ChemCad. Optimization of oil refining processes: optimization of process parameters, search for optimal process conditions.</p>	5						+		+			
26		BD	EC	Biodispersions	<p>Goal: to train graduate students in the basic principles and techniques used in the biodispersions production process.</p> <p>Content: Structure and properties of biodispersions.</p>			+		+							

				their classification and application. Chemical and biological processes used in the production of biodispersions. Methods of biodispersions analysis: physico-chemical methods, spectroscopic methods, microscopic methods Modern methods of biodispersions production: cvxoe and wet grinding, homogenization, emulsification, microencapsulation. Quality assessment of biodispersions: physicochemical and biological methods, quality standards and regulations. Areas of use of biodispersions.													
27		BD	EC	Organic Gas chemistry	<p>Goal: expansion of knowledge, skills and abilities of undergraduates in the field of organic gas chemistry. to realize highly efficient technological processes of gas chemistry.</p> <p>Contents: Raw material base of gas processing in RK. Research of composition and properties of natural gases and gas condensates and directions of their processing. Transportation of natural gases. Primary processing of hydrocarbon gases. Sulfur production from hydrogen sulfide-containing gases. Chemistry and technology of the process "Claus". Separation of hydrocarbon gases. Stabilization and processing of gas condensates. Chemical processing of hydrocarbon gases. Oxidative transformations of gaseous hydrocarbons.</p>	5					+						+
28		Ch.D	EC	Production of Soot from Gas Raw Materials	<p>Goal- deepening of theoretical and practical knowledge about the processes of carbon black production from gas raw materials of solving practical problems to improve production.</p> <p>Contents: The most important properties of soot. Modern ideas about the mechanism of soot formation process. Thermal decomposition of hydrocarbons as a method of soot production. Laminar and turbulent diffusion combustion. Interaction of carbon black with reaction products. Modern technologies of carbon black production. Reception and preparation of raw</p>						+						+

					materials. Furnace methods of production. Production of carbon black by precipitation from diffusion flame. Production of carbon black by thermal decomposition without access to air. Production of active, low-active and semi-active furnace soot. Modern methods and equipment for soot recovery. Granulation and compaction of carbon black. Industrial waste treatment. Application of carbon black.													
29	Module of Scientific-Research Work and Final Certification			Research Work of a Master Student, Including Passing an Internship and Completing a Master's Thesis (RWMS)	<p>Goal: to prepare a master's student for independent research work and for conducting scientific research as part of a creative team.</p> <p>Content: Drawing up a plan for conducting research. Definition and description of the object and subject of research. Justification of the relevance of the chosen topic. Collection and analysis of literature data on the research topic. Preparation of the methodological part of scientific research in accordance with the topic of the master's thesis. Conducting experimental research work. Collection, generalization and processing of the results of scientific research obtained within the framework of the conducted research work in the semester. Work on the preparation of the final text of the master's thesis</p>	24	+							+				+
30				Execution and Defense of Master's Thesis	<p>Goal: demonstration of the level of research qualification of a master's student, the ability to independently conduct scientific research, testing the ability to solve specific scientific and practical problems, presentation of skills for public discussion and defense of scientific ideas, proposals and recommendations,</p> <p>Content: Generalization and systematization of research results in the form of a master's thesis, presentation to a wide audience.</p>	8	+											+

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

Course of Study	Semester	The number of mastered modules	The number of studied disciplines		Number of KZ credits					Total hours	Total credits KZ	The number of	
			HSC	EC	Theoretical training	Teaching practice	Research practice	SRWMS	Final examination			exam	dif. offset
1	1	4	4	2	28	-	-	1	-	870	29	5	2
	2	5	1	4	24	4	-	3	-	930	31	4	2
2	3	4	-	5	26	-	6	3	-	1050	35	5	2
	4	1	-	-	-	-	-	17	8	750	25	-	1
Total		6	5	11	78	4	6	24	8	3600	120	14	7

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

<p>Learning strategies</p>	<p>Magistrantt–centered learning: The student is the center of teaching/learning and an active participant in the learning and decision-making process. Practice-oriented training: orientation to the development of practical skills.</p>
<p>Teaching methods</p>	<p>Conducting lectures, seminars, various types of practices with:</p> <ul style="list-style-type: none"> • the use of innovative technologies; • problem-based learning; • case study; • work in a group and creative groups; • discussions and dialogues, intellectual games, olympiads, quizzes; • reflection methods, projects, benchmarking; • Bloom's taxonomies; • presentations; • rational and creative use of information sources: • multimedia training programs; • electronic textbooks; • digital resources. <p>Organization of independent work of students, individual consultations.</p>
<p>Monitoring and evaluation of the achievability of learning outcomes</p>	<p>Current control on each topic of the discipline, control of knowledge in classroom and extracurricular classes (according to syllabus). Assessment forms:</p> <ul style="list-style-type: none"> • survey in the classroom; • testing on the topics of the discipline; • * control works; • protection of independent creative works; • discussions; • trainings; • colloquiums; • essays, etc. <p>Boundary control at least twice during one academic period within the framework of one academic discipline. Intermediate certification is carried out in accordance with the working curriculum, academic calendar. Forms of holding:</p> <ul style="list-style-type: none"> • exam in the form of testing; • oral exam; • written exam; • combined exam; • project protection; • protection of practice reports. <p>Final state certification.</p>

7. EDUCATIONAL AND RESOURCE SUPPORT FOR EP

<p>Information Resource Center</p>	<p>The structure of the JRC has 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The basis of the network infrastructure of the OIC consists of 180 computers with Internet access, 110 automated workstations, 6 interactive whiteboards, 2 video doubles, 1 videoconferencing system, 3 scanners of A-4 format, 3. The software of the OIC – AIBS "IRBIS-64" for MSWindows (a basic set of 6 modules), an autonomous server for uninterrupted operation in the IRBIS system.</p> <p>The library fund is reflected in the electronic catalog available to users on the website http://lib.ukgu.kz is on-line 24 hours 7 days a week.</p> <p>Thematic databases of their own generation have been created: "Almamater", "Works of scientists of SKSU", "Electronic Archive". Online access from any device 24/7 via an external link http://articles.ukgu.kz/ru/ppp.</p> <p>Working with catalogs in electronic form. The EC consists of 9 databases: "Books", "Articles", "Periodicals", "Works of the teaching staff of SKSU", "Rare books", "Electronic Fund", "SKSU in print", "Readers" of "SKU".</p> <p>The JIC provides its users with 3 options for accessing its own electronic information resources: from the Electronic Catalog terminals in the catalog hall and divisions of the JIC; through the university's information network for faculties and departments; remotely on the library's website http://lib.ukgu.kz /.</p> <p>Access to international and republican resources is open: "SpringerLink", "Envoy", "Web of Science", "EVSSO", "Epigraph", to electronic versions of scientific journals in open access, "Zan", "RMEB", "Adebiet", Digital library "Akpigress", "Smart-kitar", "Kitar.kz", etc.</p> <p>For people with special needs and disabilities, the library's website has been adapted to the work of visually impaired users in the JRC.</p>
<p>Material and technical base</p>	<p>The department has all the necessary conditions for conducting fundamental, applied, research, development work, as well as for innovative activities. The material and technical base of the Department "Oil Refining and Petrochemistry" includes 7 laboratories: "7 laboratories: "Petrochemical synthesis" (213B) "Research of petroleum products" (214B), laboratory of undergraduates and doctoral students (216B), "Research of petroleum and petroleum products" (414B), scientific laboratory "Petrochemistry and polymer composite materials"(418B), "Destructive processes of oil refining, petroleum products and physico-mechanical testing of elastomers" (121A), "Elastomer technology" (123A), Also, teachers and students have the opportunity to conduct research in certified laboratories of the University "SAPA" and "IRLIP". The laboratories are equipped with modern equipment and devices, which allows the educational process to keep up with the times</p>

AGREEMENT SHEET
according to the Educational program

7M07170- "Chemical technology of organic substances"

Director of DAA _____ Naukenova A.S.

Director of DAsc _____ Nazarbek U. B.

Director of DE&C _____ Bazhirov T. S,