

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



EDUCATION PROGRAMME

7M07170 - «Chemical technology of organic substances»

RegistrationNumber	
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
Typeof EP	Acting
ISCE level	7
NQF level	7
IQF level	7
Language of learning	Kazakh, russian
The complexity of EP,	120 credits
Distinctivefeaturesof EP	-
PartnerUniversity (JEP) -	-
Universitypartner (DDEP) -	-

Developers:

Full Name	Position	Signature
S. Sakibaeva	Candidate of technical sciences, professor of the Department «Technology of Inorganic and Petrochemical Industries»	
G. Mamytova	Senior Lecturer of the Department «Technology of Inorganic and Petrochemical Industries»	
N. Daurenbek	Candidate of Technical Sciences, Associate Professor of the Department of «Technology of Inorganic and Petrochemical Industries»	
U. Zhantasova	Highly qualified specialist-engineer of the Department «Technology of Inorganic and Petrochemical Industries»	
G. Almurzayeva	Master's student of the MXT-24(1)-5hp group	
B. Aigenzhev	Director of «Eco-Shina» LLP	
I. Ospanov	Deputy Director of «Neftekhimstro Yug» LLP	
B. Eregenov	Production Director of «PetroKazakhstan Oil Products» LLP	

The EP was considered at a meeting of the Academic Quality Committee of the Higher School «Chemical Engineering and Biotechnology»,
Minutes # 7 «23» 02 2024 y.

Chairman of the Committee N. Daurenbek

The EP was considered and recommended for approval at a meeting of the Educational and Methodological meeting of the M. Auezov SKU,
Minutes # 4 «28» 02 2024 y.

Chairman of the EMM K. Sarykulov

The EP was approved by the decision of the Academic Council of the University
Minutes # 10 «28» 03 2024 y.

CONTENT

1.	Concept of the educational program	4
2.	Passport of the educational program	6
3.	Competences of the EP graduate	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	23
6.	Strategies, teaching methods and artificial intelligence, monitoring and assessment	24
7	Educational and resource support for EP	25
	Approval sheet	26
	Appendix 1. Review from the employer	
	Appendix 2. Expert opinion	

1 CONCEPT OF THE EDUCATIONAL PROGRAM

University Mission	We are focused on 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 kind of intolerance and discrimination:</p> <ul style="list-style-type: none">• Rules of academic integrity (Order No. 212-nk of 10.10.2022);• Anti-Corruption standard (Order № 221 n/k dated 07.12.2021).• Code of Ethics (order № 212 dated 10.10.2022).
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 educational organizations implementing educational programs of higher and (or) postgraduate education, approved by the order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 № 595 with amendment and additions dated December 29, 2021 № 614;3. Standard rules for admission to study in educational organizations implementing educational programs of higher and postgraduate education, approved by the order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 31, 2018 № 600 with amendments and additions dated 06/02/ 2023 № 2524. State mandatory standards of higher and postgraduate education, approved by the order of the Ministry of Higher Education and Science of the Republic of Kazakhstan dated July 20, 2022 №2;

5. Rules for organizing the educational process in credit technology of education, approved by the order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 № 152; with changes and additions from 09/23/2022 № 79

6. Qualification directory of 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 № 553.

7. Methodological recommendations for the introducing ECTS principles into the educational process and expanding academic freedom. Appendix to the order of the Minister of Science and Higher Education. Republic of Kazakhstan dated February 12, 2024 № 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 04.05.2023 № 601 n/k.

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 № 600 dated October 31, 2018, with changes and additions dated June 2, 2023 № 252.

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.
Harmonization of EP	<ul style="list-style-type: none">• 7th level of the National Qualifications Framework of the Republic of Kazakhstan;• Dublin descriptors of the 6th level of qualification;• 2 cycle of a Framework for Qualification of the European Higher Education Area);• 7thLevel of European Qualification Framework for Life long Learning).
Connection of the EP with the professional sphere	<p>The sectoral qualifications framework "Petroleum and gas, petroleum processing and petrochemical industries" was approved by the protocol of the Sectoral commission on social partnership and regulation of social and labor relations of the petroleum and gas industry dated June 28, 2019, № 2-2019.</p> <p>The sectoral qualifications framework "Chemical Production" was approved by the protocol of the session of the sectoral commissions on social partnership and regulation of social and labor relations for mining and smelting, chemical, construction industry and woodworking, light industry and mechanical engineering of August 16, 2016 № 1.</p> <p>- Professional standard: "Teacher (PPS OVPO)" Order of the Ministry of Higher Education № 591 of 11/20/2023</p>
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, deputy department director, 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,

Subjects of professional activity	<p>materials, products, as well as their management and regulation systems; chemicals and materials; methods and devices for determining 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 Designs and carries out complex 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 To possess skills of selection and regulation of properties of catalysts of processes of deep processing of oil raw materials, additives, technical liquids, development of formulations of polymer compositions.</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 THE GRADUATE OF EP

SOFTSKILLS. Behavioral skills and personality qualities

SS 1. Competence in managing one's literacy	SS 1.1. Strive for professional and personal growth throughout life. SS 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. SS 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.
SS 2. Language competence	SS 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. SS 2.2. The ability to possess mediation skills and intercultural understanding.
SS 3. Mathematical competence and competence in the field of science	OK 3.1. The ability to interpret methods of mathematical analysis and modeling to solve applied problems in the field of study. SS 3.2. The ability to plan scientific experiments, integrate and implement the results of scientific research in the professional field. SS 3.3. The ability to analyze and comprehend modern methods of pedagogical and psychological science and apply them in pedagogical activity.
SS 4. Digital competence, technological literacy	SS 4.1. The ability to confidently use modern information and digital technologies, artificial intelligence systems for work, leisure and communication. SS 4.2. Proficiency in the use, recovery, evaluation, storage, production, presentation and exchange of information in a wide range of digital devices. SS 4.3. The ability to confidently use global information resources and apply technological literacy in research and computational and analytical activities.
SS 5. Personal, social and educational competencies	SS 5.1. Knowledge of the norms of business ethics, social and ethical values and focus on them in professional activities. SS 5.2. Formation of a personality capable of mobility in the modern world, critical thinking and physical self-improvement. SS 5.3. The ability to work in a team, correctly, clearly and argumentatively defend their position during discussions and make professional decisions. SS 5.4. The ability to adequately navigate in various social spheres of activity and in conditions of uncertainty. SS 5.5. The ability to find compromises, correlate your opinion with the opinion of the team.
SS 6. Entrepreneurial competence	SS 6.1. Manifestation of leadership qualities and the ability to have a positive impact on others, to lead a team. SS 6.2. The ability to create conditions for the development of creative and entrepreneurial skills of the team. SS 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.

SS 7. Cultural awareness and the ability to express oneself

SS 6.4. Ability to work with consumers requests.

SS 7. Cultural awareness and the ability to express oneself

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

SS 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 expertly study the properties and real structure of materials of chemical technology, including the independent highly skilled operation of modern equipment and devices in the direction 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
SS 1	+		+				+			
SS 2			+			+	+			+
SS 3				+	+	+				+
SS 4	+	+	+			+	+			+
SS 5	+	+	+							+
SS6		+				+			+	
SS7		+			+			+		+
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>	4				+								

					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	Higher Education Pedagogy	Purpose - formation of professional and pedagogical competence through the development of a complex of theoretical knowledge about modern higher education, methods and forms of organization of the educational process at the university, development of psychological and pedagogical thinking of undergraduates.. Content: Higher school pedagogy: specifics and categories. Modern paradigms of higher education. The system of higher professional education in Kazakhstan. Methodology of pedagogical science. Professional competence of a high school teacher. Credit system of training. Competence-based approach in vocational education. New methods and forms of training in the training of future specialists. Technologies of professionally-oriented education in higher education.	4			+								
5	Methodical Fundamentals of Teaching	Ch.D	EC	Teaching Methods of Special Disciplines	Purpose -formation of teaching skills in specialized disciplines, development and updating of educational and methodological documentation. Content: Theory and methodology of teaching specialized disciplines as a branch of practice-oriented knowledge. Preparation of a teacher of specialized disciplines for the organization of the educational process. Modern pedagogical technologies	5	+		+	+							

					in the activity of a teacher of specialized disciplines. Methodological foundations of the organization of theoretical. laboratory and practical classes in specialized disciplines. Development of control and measuring materials for the organization of intermediate and final control in specialized disciplines. Innovative educational technologies in the teaching of specialized disciplines.												
6				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 the discretion of the EPHE.</p> <p>Content: Familiarization with the tasks and organization of the educational process at a higher educational institution; with the planning and organization of public and educational work at the department. The study of educational and methodological documentation at the department (educational and methodological work plan, working curricula and programs in the disciplines of the EP); age characteristics of students, the nature of the team, the study group and their fulfillment of the unified pedagogical requirements imposed on students; methodological experience, the system of educational work of the teacher in the relevant subject. Development of a comprehensive individual work plan for the entire period of pedagogical practice (a calendar plan, a work program on the topics studied, extracurricular work with students, research and development); lecture notes, laboratory and practical classes on the subjects of EP; didactic materials and visual aids for the classes conducted.</p>	4	+		+	+			+				
7	Prospects of Developm	Ch.D	EC	Innovative Technologies of Oil Refining and	Goal - deepening the knowledge of undergraduates in the field of innovative technologies of oil refining and petrochemistry, aimed at increasing the depth of oil	4	+		+			+					

	ent of Oil Refining Processes			Petrochemistry	refining, improving the quality of petroleum products, for the modernization and improvement of oil refining and petrochemistry technologies. 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.												
8		Ch.D	EC	Modern technologies of petrochemical synthesis	Goal: expansion and deepening of theoretical knowledge about current issues of petrochemical synthesis; instilling practical skills for the development of energy and material-saving environmentally friendly technological production. Contents: Petrochemistry as a field of modern chemical science. New methods for producing organic products from petrochemical raw materials. The significance and place of isomerization processes in the organic synthesis industry. Scientific basis of modern isomerization processes of paraffinic, C4-C6 olefinic and alkyl aromatic hydrocarbons. Scientific basis of oxime isomerization, basic principles of the process, resulting products. Scientific basis for the isomerization of cyclohexanone oxime to caprolactam. Modern technologies for the production of oxygen-containing compounds, halogen and nitro derivatives, synthetic detergents, rubbers, plastics and fibers.												
9		Ch.D	EC	Development and application of additives to modify the fuel and oil property	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. Contents: The main directions of work in the	5											

				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. The mechanism of action of additives.														
10		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>												+	+
11		Ch.D	EC	Selected chapters of petrochemistry	<p>Goal: deepening the knowledge of undergraduates in the field of industrial petrochemical processes to solve practical problems to improve production.</p> <p>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</p>	6					+							+

				industrial petrochemical processes. Analysis of the operating mode of technological objects.													
12		Ch.D	EC	Chemical reactor design	<p>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.</p> <p>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.</p>				+		+						
13				Research scientific training	<p>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</p> <p>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.</p>	6	+		+								+
14	Oil Refining Products	Ch.D	EC	Standard petroleum products. Standardization and certification	<p>Goal: expanding knowledge in the field of norms and requirements of international standards; generate ideas for continuous improvement of product quality.</p> <p>Contents: Legal and regulatory framework for standardization and certification of petroleum products, nomenclature, properties of petroleum products, modern control methods and ways to improve the quality of petroleum products, assessment of the physical, chemical and operational properties of commercial petroleum products.</p>	6						+		+			
15		Ch.D	EC	Development	<p>Goal: deepening the knowledge of undergraduates in the</p>											+	+

				<p>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.</p> <p>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>															
18	Deep processing of hydrocarbon raw materials	BD	EC	<p>Special oil refining and petrochemical products</p>	<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						+						+	+
19		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</p>						+							+	

					elastomers. Obtaining elastomeric materials with specified properties. New ingredients to improve the properties of elastomers.														
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.</p> <p>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>	5								+	+			+	
21		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 and physical processes of textile materials modification.</p>												+		+
22	Catalytic Processes of Oil Refining	Ch.D	EC	Industrial catalysis and catalysts in oil and gas refining	<p>Goal: expanding the knowledge of undergraduates about industrial catalysis and modern catalysts in oil and gas processing. acquiring skills in selecting, developing highly selective catalysts and studying their properties.</p> <p>Contents: The chemical nature of catalysis, the nature of the action of catalysts, principles and factors of catalytic processes; the possibility of directing chemical reactions towards production. Scientific basis for the development of highly selective catalysts and new technologies. Acid-</p>	4								+				+	

					base catalysis in the synthesis of hydrocarbons with a branched structure. Catalysis on transition metals in the synthesis of branched hydrocarbons. Catalytic reforming; isomerization; dehydrogenation of hydrocarbons; alkylation of hydrocarbons. Alkylating agents and catalysts.													
23		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.</p>		+											+
24		Ch.D	EC	Hydrocatalytic Refining Processes	<p>Goal-deepening knowledge in the field of hydrocatalytic oil refining processes to address issues of improving the efficiency of the use of hydrocarbon raw materials, the quality of products.</p> <p>Content: Hydrocatalytic processes of oil refining; studies of hydrocarbon transformations on various catalysts; the influence of process parameters on the yield and quality of the products obtained. Selection of a method for processing oil fractions of oil from new fields; selection of effective catalysts and operating mode of hydrocatalytic process units.</p>	6												+
25		Ch.D	EC	Industrial Ecology of Hydrocarbon Systems	<p>Goal: deepening of knowledge about scientific and technical problems of oil refining; world achievements in the field of oil refining technology in the world and in</p>						+	+						+

				<p>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>													
26		BD	EC	<p>Modeling of chemical and technological processes of oil refining in MatLab and ChemCad</p>	<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							+		+		
27		BD	EC	<p>Biodispersions</p>	<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. their classification and application. Chemical and</p>			+		+							

					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.												
28		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					+						+
29		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 materials. Furnace methods of production. Production of</p>						+						+

				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.														
30	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	+							+				+	
31			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/	5	5	2	29	-	-	1	-	900	30	6	2
	2/	6	-	4	22	4	-	4	-	900	30	4	2
2	/3	3	-	2	11	-	6	3	-	600	20	2	2
	/4	3	-	3	16	-	-	4	-	600	20	3	1
	/5	1	-	-	-	-	-	12	8	600	20	-	1
Total		7	5	11	78	4	6	24	8	3600	120	15	8

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

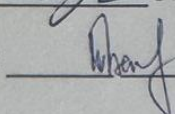
<p>Information Resource Center</p>	<p>The structure of the JRC has 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The basis of the network infrastructure of the OIC consists of 180 computers with Internet access, 110 automated workstations, 6 interactive whiteboards, 2 video 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
on 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.