



**Geology and Oil-gas Business Institute named after K. Turyssov
Department of Chemical and Biochemical Engineering**

Education Program

7M07142 - "Chemical Technology of Organic substances"

Code and classification of the field of education: **7M07** Engineering, manufacturing and construction areas

Code and classification of areas of study: **7M071** Engineering

Group of educational programs: **M097** - " Chemical engineering and processes "

Уровень по НРК: 7

Уровень по ОРК: 7

Time of study: 2

Volume of credits: 120

Almaty 2025

The educational program 7M07142 - "Chemical Technology of Organic substances" was approved at the meeting of the Scientific Council of KazNTU named after K.I.Satpayev

Protocol №10 from «06» 03 2025y

Reviewed and recommended for approval at a meeting of the Educational and Methodological Council of K.I.Satpayev KazNTU

Protocol №3 from «20» 12 2024y

The educational program 7M07142 - "Chemical Technology of Organic substances" was developed by the academic committee in the direction M097 «Chemical engineering and processes»

Name	Academic degree/ academic	Post	Place of work	
Chairman of the Academic Committee:				
Selenova Bagadat Samatovna	Doctor of Chemical Sciences	Professor	Kazakh National Research Technical University named after K.I.Satpayev	
Teaching staff:				
Mangazbaeva Rauash Amantaevna	Candidate of Chemical Sciences	Associate Professor	Kazakh National Research Technical University named after K.I.Satpayev	
Aitkalieva Gulzat Slyashevna	Doctor PhD	Associate Professor	Kazakh National Research Technical University named after K.I.Satpayev	
Employers				
Seitenova Gaini Zhumagalievna	Candidate of Chemical Sciences, Associate Professor	Head of the Project Office	Petro Gas Chemical Association,	
Students:				
Bogdanova Violetta	-	Student	Kazakh National Research Technical University named after K.I.Satpayev	

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1. Description of the educational program

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

The production of the main organic and petrochemical synthesis is based on fossil organic raw materials: oil, natural gas, coal. Using modern processes of their processing (cracking, pyrolysis, reforming, rectification, conversion, coking and semi-coking) and various methods of separation of starting materials, the most important compounds are obtained, which are direct raw materials for organic synthesis.

The formation of such a complex of technologically related industries will allow the production of high-tech and science-intensive types of products, which, in turn, will cause the accelerated development of other sectors of the real sector of the economy of the Republic of Kazakhstan. Kazakhstan, within the framework of its innovation and industrial policy, covers a wide range of petrochemical development, which will undoubtedly accelerate the accelerated development of the economy of the Republic of Kazakhstan in the future.

The EP is based on the state educational standard for higher professional education in the relevant field.

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

The EP includes the curriculum, the content of disciplines, learning outcomes and other materials to ensure quality education for undergraduates.

2. Purpose and objectives of the educational program

EP goals:

- formation on the basis of the scientific school of the national research university of general cultural, professional and special competencies that allow the graduate to successfully work in the field of organic and petrochemical synthesis enterprises and be competitive in the labor market;
- development of undergraduates' personal qualities such as creativity, responsibility, tolerance, the desire for self-development and disclosure of their creative potential;

- development of research qualities, the ability to plan, set up, perform and generalize experimental research according to the chosen program, the formation

of a critical understanding of the existing fundamental scientific theories and concepts, and the explanation of the results obtained from the standpoint of modern chemical science and technology;

- development and implementation of active learning methods for the formation of a creative, innovative approach to understanding professional activities, the development of independent thinking and the ability to make optimal decisions in a particular situation;
- development of educational and methodological documentation, methods for monitoring the knowledge of students and multimedia materials for the educational process.

Tasks of the OP:

- improvement and implementation of the educational process using advanced teaching methods;
- involvement in the educational process of high-class scientific personnel of international level and specialists in the production sector;
- use of modern equipment and instruments to improve the efficiency and level of scientific research;
- development of international cooperation for the implementation of joint scientific projects and master's programs for double-diploma education.

3. Requirements for evaluating the learning outcomes of an educational program

The educational program has been developed in accordance with the State mandatory Standards of Higher and Postgraduate Education, approved by the Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2 (registered in the Register of State Registration of Regulatory Legal Acts under No. 28916) and reflects the learning outcomes on the basis of which curricula are developed (working curricula, individual curricula of students) and working curricula in disciplines (syllabuses).

Formed learning outcomes: applies knowledge of natural science, socioeconomic and profile disciplines of chemical technology to solve practical and professional tasks of the technological industry.

Evaluation of learning outcomes is carried out according to the developed test tasks within the educational program in accordance with the requirements of the state mandatory standard of higher and postgraduate education.

When evaluating learning outcomes, uniform conditions and equal opportunities are created for students to demonstrate their knowledge, skills and abilities. To use modern information technologies for the collection, processing and dissemination of scientific information in the field of production of organic

substances, processing of oil, gas, coal and polymers, elastomers, paints and varnishes.

4. Passport of the educational program

4.1. General information

№	Field name	Note
1	Code and classification of the field of education	7M07 Engineering, manufacturing and construction areas
2	Code and classification of areas of study	7M071 Engineering and Engineering
3	Group of educational programs	M097 - "Chemical Engineering and Processes"
4	Name of the educational program	Chemical technology of organic substances
5	Brief description of the educational program	The EP regulates the educational process of training specialists in the field of chemical engineering in the field of organic and petrochemical synthesis enterprises. The program is built taking into account the possibility of providing the undergraduate with the choice of the appropriate educational trajectory, containing their own individual competencies, reflecting the specifics of a particular specialization within the framework of a single educational direction 7M071 - Engineering and Engineering.
6	Purpose of the OP	The purpose of the EP is to train highly qualified and competitive specialists in the labor market, focused on solving the problems of innovative development of the most important areas in the field of organic and petrochemical industries, with creativity, formed critical understanding of fundamental scientific theories and concepts and the ability to interpret the results obtained from the standpoint of modern chemical science and technology .
7	OP type new	OP type new
8	The NRK level	7
9	The ORK level	7
10	Distinctive features of the OP	The EP was developed taking into account the Atlas of new professions and competencies of Kazakhstan in the field of oil refining and petrochemistry.

11	List of competencies of the educational program:	KK1.Communication - Fluent monolingual oral, written and communication skills - The ability to use communicative communication in various situations KK 2. Basic literacy in natural science disciplines - basic understanding of the scientific picture of the world with an understanding of the essence of the basic laws of science KK3.General engineering competencies - basic general engineering skills and knowledge, the ability to solve general engineering tasks and problems KK4.Professional competencies - a wide range of theoretical and practical knowledge in the professional field; - the ability to carry out the technological process in accordance with the regulations and use technical means to measure the main parameters of the technological process, the composition and properties of raw materials and finished products;
		KK5. Engineering and computer competencies - basic skills of using computer programs and software systems to solve general engineering tasks KK6.Engineering and working competencies - skills and abilities of using technical means and experimental devices to solve general engineering tasks KK7. Socio-economic competencies - Critical understanding and cognitive ability to reason on contemporary social and economic issues KK8. Specially-professional competencies for the perception of information, setting goals and choosing ways to achieve it; - the ability to independently organize the work of performers, find and make management decisions in the field of labor organization and implementation of environmental measures; - knowledge of the principles of management, control and correction of activities in the context of teamwork, improving managerial and executive professionalism.

12	Learning outcomes of educational program:	PO1 Know the classification of chemical-technological processes and describe the instrumentation, calculate typical apparatuses for chemical production and justify the choice of standard equipment;; RO2 Select modern scientific and technical equipment for solving scientific and practical problems based on the use of in-depth theoretical and practical knowledge in the field of chemical materials production, chemical engineering and engineering; PO3 Analyze and explain the principles of constructing technological schemes for the production and processing of organic substances and the choice of technological equipment for oil refineries and petrochemical enterprises; PO4 To develop functional schemes of automation of chemical-technological processes, to get an idea about the modeling of production and technological processes, the transfer of information about digital models for further processing and decision-making; PO5 Plan and organize the staging of scientific experiments and research in the field of production and processing of oil and gas, polymers, process, interpret, critically analyze the results obtained and have the learning skills necessary to independently continue further education in the field under study; RO6 Present conceptual knowledge in the field of scientific methods for studying the properties of a system, interpret the mechanisms of ongoing reactions, know the chemistry and physics of polymeric materials and methods for their synthesis, depending on the scope, as well as knowledge in the field of planning, organization and control of chemical and technological processes; PO7 Interpret information to form judgements taking into account social, ethical and scientific considerations, applying communication skills, including in a foreign language, to manage teamwork and projects, as well as processes. RO8 Apply knowledge of the physicochemical fundamentals of hydrodynamic, thermal, mass-exchange, thermal and catalytic processes for their modelling, in the development and application of ideas in the study of chemical technology of polymer production and processing, oil and gas processing and their interrelationship with related industries;
		PO9 Organise the operation of technological lines of new enterprises with justification of conditions and mode of operation of technological equipment, based on the principles and fundamentals of chemical engineering; PO10 To assess the environmental risks of technological installations for the production of basic organic and petrochemical synthesis products with the proposal of measures to reduce the harmful impact on the environment and the recommendation of methods for wastewater treatment of the enterprise;; PO11 t Organise and conduct lectures, seminars and practical classes, taking into account the integration of education, science and innovation in the profession and based on the principles of student-centred learning and assessment
13	Form of study	full-time
14	Training period	2 years
15	Volume of loans	120
16	Languages of instruction	Kazakh, Russian, English
17	Awarded	Master of Engineering

	Academic Degree	
18	Developer(s) and authors:	Selenova B.S, Mangazbayeva R.A, Aitkaliyeva G.S

4.2. The relationship between the achievability of the formed learning outcomes in the educational program and academic disciplines

№	Name of discipline	Brief description of discipline	Number of credits	PO1	Formed learning outcomes (codes)									
					PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
Cycle of basic disciplines University component														
1	English (professional)	In the process of learning, students acquire knowledge of a foreign language, including the possession of specialized vocabulary, necessary for the implementation of effective oral and written communications in a foreign language in their professional activities. Practical tasks and methods for developing the required language skills in the learning process include: case method and roleplaying games, dialogues, discussions, presentations, listening tasks, work in pairs or groups, various written tasks, grammar tasks and explanations.	5							√				
2	Psychology of management	The course is designed to provide a balanced coverage of all the key elements that make up the discipline. It will briefly review the origins and development of the theory and practice of organizational behavior and then review the main roles, skills and functions of management with a focus on management effectiveness,	3					√				√		

		illustrated with real life examples and case studies.												
3	History and philosophy of science	The subject of philosophy of science, the dynamics of science, the specifics of science, science and prescience, antiquity and the formation of theoretical science, the main stages of the historical development of science, the features of classical science, non-classical and post-nonclassical science, the philosophy of mathematics, physics, engineering and technology, the specificity of engineering sciences, the ethics of science , social and moral responsibility of a scientist and engineer.	3					V					V	
4	Pedagogy of higher education	In the course of studying the course, undergraduates get acquainted with the didactics of higher education, the forms and methods of organizing education in higher education, the psychological factors of successful learning, the characteristics of psychological influence, the mechanisms of educational influence, pedagogical technologies, the characteristics of pedagogical	3		V					V			V	

		communication, the mechanisms for managing the learning process. They analyze organizational conflicts and ways to resolve them, psychological destruction and deformation of the teacher's personality.												
5	Teaching practice	In the course of teaching practice, undergraduates are involved in undergraduate studies at the discretion of the university. At the same time, undergraduates apply the knowledge of pedagogy and psychology of students' cognitive activity in the learning process, undergraduates form an idea of the professional competence of a teacher of higher education.	6					V	V					
Cycle of basic disciplines Selection component														
6	Modern methods for studying the properties of oil and oil products	The content of the discipline assumes consideration of modern methods of scientific research in petrochemistry and oil refining: chemical (gravimetric, titrimetric) and physico-chemical (optical, electrochemical, chromatographic) methods of analysis; consideration of modern means of scientific research, the principles of scientific knowledge. The assimilation of this course contributes to a deep understanding by undergraduates of the scientific foundations, terms and concepts	5	V	V	V			V					

		when planning and conducting scientific research in petrochemistry and oil refining, the acquisition of theoretical knowledge necessary for the development of research skills and the implementation of research work.													
7	Modern aspects of the production of polymer products	The purpose of the course is to characterize plastics as highly efficient materials in technological, consumer and economic terms. Modern methods of polymer processing, features of molding methods, energy intensity of the processing process are considered. Particular attention is paid to the equipment used in the processing of plastics. Casting under pressure. extrusion plants. Calendering, casting, direct pressing, foaming, reinforcement, fiber production.													
8	Industrial reactors for large-scale chemical production	Within the framework of the course, a presentation of the sections is given: the basics of the theory of the process in a chemical reactor, mathematical modeling of reactors, the design of modern chemical reactors, new trends in the development of the theory of processes and apparatuses; interactions between chemical transformation processes and transport phenomena at all scale levels, a method for choosing a reactor and calculating the process in it, optimizing	5	V	V	V						V			

		chemical processes and reactors; structural elements of chemical reactors; schemes and designs of industrial chemical reactors.												
9	Industrial water treatment and wastewater treatment methods	The aim of the course is to provide an understanding of water consumption in the chemical industry. The characteristic of natural waters and indicators of their quality are given. The main technological operations of industrial water treatment are considered: coagulation plants, mechanical water filtration, filter materials. Basic structural elements and types of mechanical filters. Operation of mechanical filters. Water treatment by precipitation methods. Ion exchange water filtration. Water desalination. Water degassing. Schemes of water treatment plants are presented. Local and general schemes for wastewater treatment of industrial enterprises. Classification of chemical pollutants of industrial waters and their behavior in water. Wastewater treatment from heavy metals. Thermal-oxidative methods for the neutralization of organic impurities in wastewater. The role of microorganisms in wastewater treatment processes. Methods for biological wastewater treatment.	5	V	V	V						V		

10	Sustainable development strategies	Purpose: To train graduate students in sustainable development strategies to achieve a balance between economic growth, social responsibility, and environmental protection. Content: Graduate students will study the concepts and principles of sustainable development, the development and implementation of sustainable development strategies, the evaluation of their effectiveness, and international standards and best practices. Cases and examples of successful sustainable development strategies are included.,	5										V	
11	Intellectual property and research	The purpose of this course is to provide undergraduates with the knowledge and skills necessary to understand, protect and manage intellectual property (IP) in the context of scientific research and innovation. The course is aimed at training specialists who can effectively work with IP, protect the results of scientific research and apply them in practice.,	5					V		V			V	

12	Mechanisms of organic reactions	The aim of the course is to consider the mechanisms of various organic reactions. A general classification of mechanisms and the concept of a transition state are given. The stages of studying the reaction mechanism are considered: material balance, kinetics, stereochemical correlations, isotopic and structural labels, the influence of substituents, solvent, catalysts, and the search for unstable intermediates. Thermodynamic parameters of reactions. The value of the entropy of activation for reactions of different types. The concept of kinetic and thermodynamic control of reactions. Hammett's equation. steric effects. Taft equation. Linearity relation of free energies in the study of the transition state.	5	V	V	V						V		
13	Industrial organic chemistry	The course is devoted to the consideration of the characteristic features and characteristics of the industry of basic organic synthesis (OOS). The relationship between basic organic synthesis and specialized (branch) synthesis is shown. The raw material base of industrial organic chemistry is given. Basic chemical processes of industrial organic chemistry. Review of the main directions of processing of methane and olefinic hydrocarbons, acetylene and carbon monoxide in the industry. Halogenation and dehalogenation of chlorine	5	V	V	V						V		

		derivatives. Hydration of olefins and acetylene. Dehydration. Alkylation and hydroxyethylation. hydrogenation and dehydrogenation. Oxidation. Carbonylation and oxosynthesis.												
The cycle of profile disciplines The university component														
14	Chemistry and physics of polymer composite materials	The purpose of studying the course is to give an in-depth understanding of the principles of creating polymer composite materials (PCM) with an improved complex of physical and chemical properties. As a result of studying the course, the undergraduate should know the basic physical and mechanical properties of polymer composite materials; principles of creating new filled PCMs with a complex of valuable properties; basic technologies for obtaining PCM; be able to choose various factors leading to improvement of the complex of PCM properties.	5		V								V	

15	homogeneous catalysis	The discipline is intended for the acquisition by undergraduates of systematic knowledge about catalysts and catalytic synthesis methods used in organic synthesis, about the basics of the general theory of the mechanisms of catalytic reactions, about the features of the flow of homogeneous catalytic reactions catalyzed by metal complexes. The main problems of using metal complex homogeneous catalysis in technological processes in industrial and fine organic synthesis, the influence of the reaction medium on the properties of catalysts and the kinetics of the process are considered. The assimilation of this course contributes to a deep understanding by undergraduates of the mechanisms of the most important industrial reactions, the main features of homogeneous metal complex catalysts and the difference between homogeneous catalysis and heterogeneous catalysis.	5			V	V				V			
16	Calculation and modeling of mass transfer processes and apparatuses	Within the framework of the course, the methods of technological calculation and the basics of designing devices for mass transfer processes are considered, which make it possible to master the main approaches to modeling mass transfer processes using mathematical models, modeling systems and modern application programs. Skills and practical skills will be formed to determine the main parameters of the technological regime and the main dimensions of the apparatus, as well as to create models of mass	5			V	V					V		

		transfer processes for solving problems of computational and technological design.												
17	Ionic liquids, methods for their synthesis and their applications	During the course, attention was paid to the study of the structural features of ionic liquids, which explain their peculiar physical and chemical properties, which led to their prospects in various fields of application and the creation of environmentally and economically acceptable technologies based on them; methods for the synthesis of ionic liquids are considered: an exchange reaction using halogen-containing compounds, a quaternization reaction, and a reaction exchange on ion-exchange resins.	5								V		V	

18	Medical grade polymers	The course is devoted to the study of the impact of polymers on the human body. The origin and danger to health of low-molecular compounds migrating from polymers are considered; polymers and static electrification; toxicology of polymeric materials. The biomedical characteristics of the most important polymeric materials are given: biocompatibility, functionality, chemical composition, hemocompatibility, cytotoxicity. The use of polymeric materials in the treatment of humans. Polymer materials introduced into the body: prostheses, fillings, artificial organs, polymer implants. Polymeric suture and dressing materials. Polymer medical adhesives. Polymer plasma and blood substitutes, detoxifiers, interferonogens, antidotes; drugs made on the basis of polymers. Bases for ointments and suppositories. Solvents for injectable dosage forms, aerosols, drops. Fillers (diluent) for tablets, granules and pills. Binders for tablets, granules and pills. Protective covers for tablets, granules, pills, capsules and suppositories.	5							V	V		V	
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19	Chemistry of natural compounds	The purpose of the discipline is to study the structure, chemical transformations of natural organic compounds, which are the main components of the cells of living organisms; the formation of knowledge and skills among undergraduates, allowing planning the synthesis of various classes of natural compounds and predicting their possible biological activity. The key roles of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids in the functioning of a living cell are considered; basic biological functions of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids. The interrelation of different levels of structural organization of amino acids, peptides and proteins, nucleosides, nucleotides and nucleic acids with their biochemical and biological properties has been established. Topical trends in modern chemistry of natural compounds are presented.	5		V					V	V			
20	DATA Science	As part of the study of the Data Science discipline, students master theoretical and practical knowledge, acquire skills in the field of search, critical analysis and synthesis of information using the Python programming language. The discipline provides knowledge about the capabilities of modern information systems in various subject areas and to form skills in working with the most common application programs, knowledge of intelligent information systems (IIS), the structure of IIS,	5									V	V	

		components and types, and logical programming.												
21	Environmental aspects of the production of organic substances	The purpose of the course is to review and analyze the main environmental problems associated with the production of organic substances. The course covers the main ways to control and reduce the level of environmental hazards. The production of hydrocarbon systems with improved environmental characteristics, technological processes for the processing of hydrocarbon systems that improve the environmental quality of gasoline are presented. The assimilation of this course allows you to expand your understanding of the features of technology, dangers and risks in the processes of organic and petrochemical synthesis..	5											V
22	Automation and control systems for organic production	Study of methods for constructing effective systems for automatic and automated control of technological processes using SCADA software and hardware systems. The main task is to acquire professional skills by a master student in building automatic and automated control systems and the means necessary for their implementation, to master and study the principles of operation of SCADA systems, controllers and actuators operating under the control of SCADA systems.	5							V		V		

23	Bitumen production technology	The purpose of studying the discipline: to form ideas about the composition and structure of oil road bitumen, to consider the technology for preparing various types of modified bitumen. Course description: Theoretical ideas about the structure of road bitumen and polymer-bitumen binders are outlined, the types and properties of polymer and adhesive modifying additives are considered, the physical and mechanical properties of modified bitumen are described and the technology for their production is given, methods for determining the properties of polymer-bitumen binders are considered, normative requirements for them, the areas of application of polymer-bitumen binders in the construction and repair of asphalt-concrete pavements are indicated. Tasks: In the course of studying the discipline, the following tasks will be considered: - modern ideas about the structure of petroleum bitumen and polymer-bitumen binders; polymer modifying additives to bitumen; - technologies for the preparation of modified bitumen.	4		V	V	V		V				V	
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24	Research practice	During the research practice, undergraduates get acquainted with the latest theoretical, methodological and technological achievements of domestic and foreign science, modern methods of scientific research, processing and interpretation of experimental data. At the same time, undergraduates, performing experimental research on the topic of a master's thesis using modern instrumental methods and computing tools, learn to be responsible for the quality of research and the scientific reliability of the results obtained, professionally draw up, present and report the results of research work.	4					V			V			
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5 Curriculum of the educational program



«APPROVED»
Decision of the Academic Council
NPJSC «KazNRTU»
named after K.Satbayev»
dated 06.03.2025 Minutes № 10

WORKING CURRICULUM

Academic year: 2025-2026 (Autumn, Spring)
Group of educational programs: M097 - "Chemical engineering and processes"
Educational program: 7M07142 - "Chemical technology of organic substances"
The awarded academic degree: Master of Technical Sciences
Form and duration of study: full time (scientific and pedagogical track) - 2 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	lek/lab/pr Contact hours	in hours SIS (including TSIS)	Form of control	Allocation of face-to-face training based on courses and semesters				Prerequisites
									1 course		2 course		
									1 sem	2 sem	3 sem	4 sem	
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)													
CYCLE OF BASIC DISCIPLINES (BD)													
M-1. Module of basic training (university component)													
LNG213	Foreign language (professional)		BD, UC	3	90	0/0/30	60	E	3				
HUM214	Psychology of management		BD, UC	3	90	15/0/15	60	E	3				
CHE789	Modern methods of studying the properties of oil and petroleum products	1	BD, CCH	5	150	30/0/15	105	E	5				
CHE788	Modern aspects of production of plastic products	1	BD, CCH	5	150	30/0/15	105	E	5				
HBI200	Industrial reactors for large-scale chemical production	2	BD, CCH	5	150	30/0/15	105	E	5				
MNG782	Sustainable development strategies	2	BD, CCH	5	150	30/0/15	105	E	5				
CHE759	Industrial water treatment and methods of sewage treatment	2	BD, CCH	5	150	30/15/0	105	E	5				
HUM212	History and philosophy of science		BD, UC	3	90	15/0/15	60	E		3			
HUM213	Higher school pedagogy		BD, UC	3	90	15/0/15	60	E		3			
CHE779	Mechanisms of organic reactions	1	BD, CCH	5	150	30/0/15	105	E			5		
MNG781	Intellectual property and research	1	BD, CCH	5	150	30/0/15	105	E			5		
CHE778	Industrial Organic Chemistry	1	BD, CCH	5	150	30/0/15	105	E			5		
M-3. Practice-oriented module													
AAP273	Pedagogical practice		BD, UC	8				R			8		
CYCLE OF PROFILE DISCIPLINES (PD)													
M-2. Module of professional activity (university component, component of choice)													
CHE793	Chemistry and physics of polymer composite materials		PD, UC	5	150	30/0/15	105	E	5				
CHE783	Homogeneous catalysis		PD, UC	5	150	30/0/15	105	E	5				
CHE777	Calculation and modeling of mass transfer processes and devices		PD, UC	5	150	30/0/15	105	E		5			
CHE784	Ionic liquids, synthesis methods and applications		PD, UC	5	150	30/0/15	105	E		5			
CHE794	Chemistry of natural compounds.		PD, UC	5	150	30/0/15	105	E		5			
CHE782	DATA Science		PD, UC	5	150	30/0/15	105	E		5			
CHE787	Polymers for medical purposes.		PD, UC	5	150	30/0/15	105	E			5		

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CHE795	Ecological aspects of the petrochemical industry	PD, UC	5	150	30/0/15	105	E			5		
CHE781	Automation of control systems for organic synthesis production	PD, UC	5	150	30/0/15	105	E			5		
HBI219	Bitumen production technology	PD, UC	4	120	30/0/15	75	E				4	
M-3. Practice-oriented module												
AAP256	Research practice	PD, UC	4				R				4	
M-4. Experimental research module												
AAP268	Research work of a master's student, including internship and completion of a master's thesis	RWMS	4				R	4				
AAP268	Research work of a master's student, including internship and completion of a master's thesis	RWMS	4				R		4			
AAP251	Research work of a master's student, including internship and completion of a master's thesis	RWMS	2				R			2		
AAP255	Research work of a master's student, including internship and completion of a master's thesis	RWMS	14				R				14	
M-5. Module of final attestation												
ECA212	Registration and protection of the master thesis	FA	8								8	
Total based on UNIVERSITY:								30	30	30	30	
								60		60		

Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			
		Required component (RC)	University component (UC)	Component of choice (CCH)	Total
GED	Cycle of general education disciplines	0	0	0	0
BD	Cycle of basic disciplines	0	20	15	35
PD	Cycle of profile disciplines	0	53	0	53
Total for theoretical training:		0	73	15	88
RWMS	Research Work of Master's Student				24
ERWMS	Experimental Research Work of Master's Student				0
FA	Final attestation				8
TOTAL:					120

Decision of the Educational and Methodological Council of KazNRTU named after K.Satpayev. Minutes № 3 dated 20.12.2024

Decision of the Academic Council of the Institute. Minutes № 3 dated 28.11.2024

Signed:

Governing Board member - Vice-Rector for Academic Affairs

Uskenbayeva R. K.

Approved:

Vice Provost on academic development

Kalpeyeva Z. B.

Head of Department - Department of Educational Program
Management and Academic-Methodological Work

Zhumagaliyeva A. S.

Director - Geology and Oil-gas Business Institute named after
K. Turyssov

Auyelkhan Y. .

Department Chair - Chemical and biochemical engineering

Mangazbayeva R. A.

Representative of the Academic Committee from Employers

Seytenova G. Z.

____ Acknowledged ____

