

NON-COMMERCIAL JOINT STOCK COMPANY
KARAGANDA TECHNICAL UNIVERSITY NAMED AFTER ABYLKAS SAGINOV

«AGREED»

BY « IOCS RK » LLP, Academician of the
National Academy of Sciences RK

Z.M.M. Idahmetov

" 2 " 04 2024



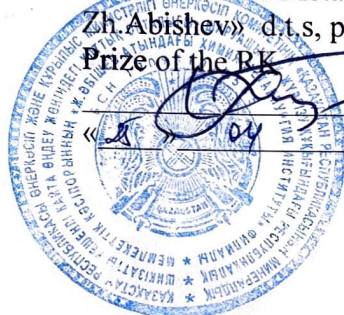
«AGREED»

Director
of the branch «RSE KPMS RK»

«Chemical and Metallurgical Institute named after
Zh. Abishev» d.t.s, professor, laureate of the State
Prize of the RK

S. Baisanov

" 2 " 04 2024



«APPROVED»

By the decision of the Academic Council

No. 10 dated 04/04/2024

Acting Member of the Management Board – Vice-
Rector for Academic Affairs of Abylkas Saginov
K.P. NISC

G. Samashova



«AGREED»

BY « Als Kazlab » LLP
DIRECTOR

K.S. Karagayev

" 2 " 04 2024



MODULAR EDUCATIONAL PROGRAM

in the direction of preparation M097 «Chemical engineering and processes»

7M07108 «Chemical technology of organic substances»

Level: Master

Academic degree – «Master of Technical Sciences»

2 years

Karaganda 2024

CONTENT

Modular educational program

7M07108 " Chemical technology of organic substances"

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Introduction

Modular educational program 7M07108 "Chemical technology of organic substances" was developed on the basis of the following regulatory documents:

Law of the Republic of Kazakhstan "On Education" dated July 27, 2007 No. 319-III ZRK, with amendments and additions dated June 25, 2020 No. 347-VI.

Model rules for the activities of educational organizations of the relevant types (Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595, with amendments and additions dated May 18, 2020 No. 207).

State Compulsory Education Standards (SCES) for all levels of education (Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 604, with amendments and additions dated May 5, 2020 No. 182).

Rules for organizing the educational process on credit technology of education (Order of the Minister of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152, with amendments and additions dated October 12, 2018 No. 563).

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 May 21, 2012 No. 201-θ-m, with amendments and additions dated April 17, 2013 No. 163-θ-m.

A modular educational program is a comprehensive document that defines the goals, objectives and results of education, the structure and content of working curricula and programs, ways and methods of their implementation, educational, methodological and resource support for the educational process and criteria for assessing students' educational achievements.

1 Objectives of the Modular Educational Program

The application of this Modular Educational Program provides for the achievement of the following goals :

- in practice to implement the democratic principles of managing the educational process, to expand academic freedom and opportunities for higher education institutions;
- to ensure the adaptation of higher education in the specialty and scientific research to the changing needs of society and the achievements of scientific thought;
 - ensure recognition of the level of training of specialists in other countries;
 - to ensure higher mobility of graduates in the changing conditions of the labor market.

2 Passport of the Modular Educational Program

2.1 List of qualifications and positions

A graduate under this Modular Educational Program is awarded the academic degree "**Master of Technical Sciences**" in OP 7M07108 "**Chemical Technology of Organic Substances**".

Qualifications and positions are determined in accordance with the "Qualification Guide for the 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 May 21, 2012 No. 201-ø-m

2.2 Qualification characteristics of the graduate

2.2.1 Area of professional activity

The sphere of professional activity of graduates is science, education and research institutes, industrial enterprises, mining and metallurgical complex.

2.2.2 Objects of professional activity

The objects of professional activity of graduates are enterprises for the production of organic substances, for the processing of oil, gas, coal and polymers, elastomers, paints and varnishes, gunpowder, solid and liquid rocket fuels, for the preparation, extraction and transportation of hydrocarbon raw materials and their rational use; research and design industry institutes; secondary technical educational institutions; defense enterprises, mining industries.

2.2.3 Subjects of professional activity

subjects of the professional activity of the Master of Technical Sciences in the educational program **7M07108 " Chemical Technology of Organic Substances "** are: products of basic and fine organic synthesis, polymers, apparatus and equipment for the chemical technology of production and processing of organic substances and materials, various types of raw and auxiliary materials and substances (including oil, gas, coal, vegetable raw materials), polymers, monomers, elastomers, chemicals and reagents, research instruments and equipment.

2.2.4 Types of professional activity

" **Master of Technical Sciences** " in the educational program **7M07108 " Chemical Technology of Organic Substances "**, in accordance with fundamental and special training, can perform the following types of professional activities:

- organizational and technological;
- production and management;
- design;
- research;
- educational, pedagogical.

Specific activities are determined by the content of educational and professional training developed by universities.

2.2.5 Functions of professional activity:

The main functions of the professional activities of graduates are:

Organizational and technological activities:

- organization and implementation of input control of raw materials from the standpoint of the possibility of production and processing of organic substances;
- assessment of the composition and properties of the feedstock in order to develop new technological processes that ensure high quality;
- analysis of ways to improve and modernize technological research, equipment in order to conduct highly efficient technological processes for the production and processing of organic substances;

Production and management:

- organization of the work of the team in the conditions of the current production;
- implementation of technical control;
- conducting a technical and economic analysis of production.

Project activity:

- design of new and modernization of existing technological schemes, selection of technological parameters, calculation of equipment selection;
- development of design estimates that ensure the effectiveness of design solutions;

- analysis and evaluation of alternative options for the technological scheme of individual nodes based on the widespread use of mathematical models.

Research activities:

- planning and conducting scientific research in the field of chemical technology of organic substances;
- modeling and optimization of production plants and technological schemes;
- analysis of scientific and technical literature and conducting a patent search.

Educational (pedagogical) activity:

- training of youth in chemistry and technology of processing organic substances;
- education of the younger generation in pedagogical and production activities.

2.2.6 Areas of professional activity:

Professional activity can be realized in the following areas:

- production and management;
- engineering and technical;
- organizational and technological;
- design and technological;
- design;
- organizational and managerial;
- research;
- educational and pedagogical.

3. Map of the Modular Educational Program

Module code and name	Code and name of discipline	Cycle/component	form of control	Semester	Volume of loans ECTS	Formed competencies
<i>BD-Basic disciplines</i>						
<i>UC-University component</i>						
PsiP 01 Module of psycho-pedagogical	HPS 5201 History and philosophy of science FL (Prof) 5102 Foreign language (professional) PHE 5103 Pedagogy of higher education	BD/UC	Exam	1	12	Know : main directions, problems, theories and methods of the philosophy of science; methods of philosophical analysis of the problems of science and other spheres of culture; forms and methods of scientific knowledge; main patterns and trends in the development of world science; the content of modern philosophical discussions on controversial issues of the relationship between science and society; functional and stylistic characteristics of the scientific presentation of the material in the studied foreign language; general scientific terminology and terminological sublanguage of the relevant specialty in a foreign language; basics of business correspondence in the framework of international cooperation; the basis for writing business papers, paperwork, to conduct office work in the state language, lexical and grammatical, spelling norms, the language system of types of documents in the Kazakh language; processes of development of intellectual functions in the course of educational and professional activities; about the professional development of the personality of the teacher and student; psychological aspects of vocational training and education; psychological features of the organization of labor activity of students and teachers; psychology of the personality of a university teacher; psychological foundations of active methods of teaching and educational work at the university; psychology of pedagogical communication; the main patterns of development of the psychological characteristics of the teaching process; principles, methods and forms of organization of education in a higher educational institution; the specifics of the subject; algorithm for developing a methodology for teaching a subject; actual problems of pedagogical science; the essence of the pedagogical activity of a university teacher; the role of subject education in the professional training of a future specialist; the formation of a research culture of the future specialist and methodological ideas about the patterns and principles of studying pedagogical phenomena; the formation of scientific ideas about the categorical and terminological apparatus of pedagogy, approaches, principles of development and formation of personality; essence of management; goals, objectives, concepts, stages of management ; modern approaches to management; principles, methods and functions of the management process; types of management: administrative management; strategic management; production management; innovation management; marketing management; personnel management; classification of firms; factors of the internal and

					<p>external environment of firms; elements of social responsibility and ethics of firms; components of the communication process; interpersonal communications; organizational communications; bases of acceptance of administrative decisions; factors influencing the process of making managerial decisions; models and methods of decision-making; foundations of leadership, effective motivation and conflict resolution.</p> <p>Be able to : use the provisions and categories of philosophy to assess and analyze various trends in the development of modern social and humanitarian knowledge; to argue their views on various problems of the philosophy of science and technology; objectively and independently analyze the state of science and apply them in their scientific and professional activities; evaluate and determine their needs for philosophical knowledge necessary for scientific work; freely read, translate original literature in the chosen specialty with subsequent analysis, interpretation and evaluation of the extracted information; explicate in writing (abstract, annotation, summary) scientific information; participate in professional discussions, scientific debates, discussions, conversations; make a presentation of scientific research; study the language material, conduct business papers in the state language, be able to conclude contracts, know the rules for writing business letters, convey your thoughts in the state language, consolidate vocabulary in filling out documents used in your profession; to develop educational, methodological and didactic support for the lesson and academic discipline; to single out from the surrounding reality pedagogical facts, phenomena, events and their description in the language of pedagogical science, based on the laws of pedagogical theories, explanations, forecasting and development; design the educational process, based on new concepts of education and upbringing; create a creative and developing environment in the process of education and upbringing ; analyze and evaluate the existing enterprise management system; develop a rational enterprise management structure; determine the optimal number and structure of employees of the management apparatus; to make well-founded and competent management decisions in a timely manner; show entrepreneurship in time, control the situation in the markets, take the initiative and actively redistribute the company's resources to the most profitable areas of activity; manage people.</p> <p>Have skills : oral communication in the specialty in the form of a monologue, dialogue / polylogue; preparation of written forms of presentation of information material in the specialty; work with lexicographic sources in a foreign language (traditional and on-line); translate texts from Kazakh into Russian and from Russian into Kazakh, improve the knowledge gained in the business Kazakh language in writing, use it in various situations, introduce the features of the types of documents, the tasks assigned to them, their improvement and vocabulary, the correct use of professional terms in conclusion of documents.</p>
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						<p>Be competent : the ability to navigate a variety of methodological approaches; the ability to independently formulate and solve complex theoretical and applied problems in a given branch of science; the ability to demonstrate and apply in-depth knowledge in the chosen field, taking into account modern principles of scientific research; possession of the research methodology of the branch of science and their application in research activities; in the use of a foreign language in foreign language communication for professional and academic purposes; in filling out documents in accordance with state standards, as well as writing styles and functions, in conducting business negotiations in the areas of business and scientific production; in the field of psychodiagnostics of personality and student group; development of profiessograms and psychograms of a specialist; in conducting various types of classes in basic and major disciplines, in solving the problems of higher pedagogical education and the prospects for its further development; in matters of applying effective university learning technologies, the main types of pedagogical communicative interaction, means and technologies of unsupervised learning; in solving actual psychological and pedagogical problems; in assessing the results achieved; in the organization and management of students' activities; in the formation of a new and improvement of the existing enterprise management structure; in decisions of economic situations; in the effective use of the principles and methods of management; in the field of planning, organization, motivation and control of the enterprise; in determining the effectiveness of production management.</p>
	MPsi 5104 Management psychology PP 5105 Pedagogical practice	BD/UC	Exam	2	8	<p>Know: development and education of professionally significant personality traits; formation of ideas about the influence of pedagogical ideas on social life; formation of skills and abilities of psychological and pedagogical analysis of reality, as well as interpersonal and business communication; formation of a meaningful, functional, professionally important system of knowledge; a package of applied computer programs used in various fields of chemical technology ; about UIRS, general information about the enterprise, its history, management scheme and structure of the enterprise, main and auxiliary workshops and their interaction, chemistry of the main technological process, arrangement and purpose of the main apparatus ; about the methods and progress of the analysis of oil, oil raw materials, oil products, petrochemical products in the laboratories of research institutes and central laboratory of oil refining and petrochemical enterprises. Production control, wastewater treatment and atmospheric emissions, interconnections of adjacent workshops (installations), process automation, economics, organization and planning of production, safety, labor protection and fire fighting equipment, research and rationalization work.</p> <p>Be able to: apply the methods of psychology in the study of the personality of the student and teacher; take into account socio-psychological factors in educational work with students; develop a methodology for conducting lectures, practical,</p>

						<p>laboratory and seminar classes in the main disciplines of the curriculum of a higher educational institution; carry out standard calculations using these programs, issue the results in the form of a practice report; to collect data characterizing production, technical, environmental, ergonomic, socio-economic and other indicators of production, on progressive methods for performing production processes ; acquisition of production experience.</p> <p>Have skills: work with analytical equipment, instrumentation, with current standards and technical specifications for raw materials and manufactured products ; work on technological installations ; drawing up reports, filling out diaries, performing basic technological schemes of installations and sketches of devices ; work with analytical equipment, control and measuring equipment, with current standards and technical specifications for raw materials and manufactured products in the laboratories of research institutes and central laboratory of oil - refining and petrochemical enterprises.</p> <p>Be competent: psychological counseling for students and teachers; methods of psychological research; psychological support of the pedagogical process; in the design, development and conduct of classes of various types; in the development of didactic and educational-methodical support of the lesson and academic discipline; when working with applied computer programs; in assessing the impact of an enterprise's activities on a person and the environment, knows the essence and social significance of his profession, the main problems of the sciences that determine the specific area of his activity.</p>
CCh-Component of choice						
MMPHRM 02 Module Modern methods of processing of hydrocarbon raw materials	TBSBAS 5106 Theoretical bases of synthesis of biologically active substances	BD/CCh	Exam	1	5	<p>Know: the basic concepts of the structure, properties and functions of organic compounds and the synthesis of biologically active compounds.</p> <p>Be able to: conduct theoretical research, use reference and monographic literature in the field of chemistry of biological substances; draw up a scheme of multi-stage synthesis of a given product and synthesize it according to known methods; apply an interdisciplinary approach to analyzing and solving problems in independently choosing technical means, a rational scheme for the production of a given product.</p> <p>Have skills: be able to conduct experimental research and analyze the results; know the rules of safe work; presentation with reports and messages, participate in discussions; methods of ecological support of production and engineering protection of the environment; evaluate the prospects of the process (technology) from the standpoint of environmental safety and efficiency.</p> <p>Be competent: in the synthesis of compounds and drugs with biological activity; methods of ecological support of production and engineering protection of the environment.</p>
	// TFEB 5106 Theoretical foundations of equipping bioprospect					

	ChSFBP 5107 Characteristics of solid fuels and basic processes	BD/CCh	Exam	1	5	<p>Know: the state and prospects of the raw material base of the coke industry, the requirements for production efficiency, the quality of raw materials and products; principles of construction of technological schemes and design of technological processes.</p> <p>Be able to: creatively use general scientific and engineering disciplines to control the processes of chemical processing of solid fossil fuels; to develop a technology for the processing of solid fossil fuels in order to produce various types of fuels; understand and explain the complex phenomena that one has to face in the diverse processes of processing solid fossil fuels, and make optimal decisions on this basis.</p> <p>Have skills: compliance with safety regulations; mastering the methods of chemical and instrumental analysis of coal, peat, shale and solid, liquid, gaseous products and their quality control, handling laboratory glassware and equipment, independent work on educational and special literature; planning and conducting an experiment with interpretation of the results, solving chemical problems of a calculated and theoretical nature.</p> <p>Be competent: in the development and implementation of chemical technology in the field of processing solid fossil fuels; in the prospects for the development of this industry; in the main methods of fuel processing.</p>
	// BMTPSF 5107 Basic methods of thermal processing of solid fuels					
	ITORP 5108 Innovative technologies of oil refining and petrochemistry	BD/CCh	Exam	1	5	<p>Know: classification and nomenclature of monomers, oligomers and polymers; features of their chemical structure; synthetic organic, organoelement, inorganic and natural polymers.</p> <p>able to: determine quality control, knowing the chemical properties of petroleum products, select technological parameters and production mode, optimize the production process, draw up chemical and technological flowcharts of production.</p> <p>Have skills: compliance with safety regulations; handling laboratory glassware and equipment, independent work on educational and special literature; planning and conducting an experiment, interpreting its results, solving chemical problems of a calculated and theoretical nature.</p> <p>Be competent: in planning and conducting chemical experiments, in processing their results and estimating errors, mathematical modeling of chemical processes and phenomena, in the main directions of development of the petrochemical industry; the main existing and promising technologies for obtaining raw materials used in the processes of organic and petrochemical synthesis.</p>
	// Chem 5108 Chemometry					

<i>PD-Profile disciplines</i>						
<i>UC-University component</i>						
MTM 03 The module Methods of teaching	K (R)L (Prof) 5201Kazakh (Russian) Language (professional)	PD/UC	Exam	2	5	<p>Know: scientific vocabulary and scientific constructions of a technical profile; rules for the production of a scientific text and language design; speech norms of the technical sphere of activity; basics of business communication.</p> <p>Be able to: generalize and interpret scientific and technical information; use the basic techniques of information processing of oral and written text; choose language means in accordance with the communicative intention and the situation of communication; use etiquette forms of scientific and professional communication; clearly express their point of view on a scientific problem in the Kazakh (Russian) language.</p> <p>Have skills: producing secondary scientific texts: annotations, theses, summaries, abstracts, reports; independent search for scientific and technical information as the basis of professional activity; free presentation of their thoughts orally and in writing on professionally significant topics; have the skills to prepare messages, reports on professional topics.</p> <p>Be competent: in the professional field, to master the language and speech norms of the modern Kazakh (Russian) language.</p>
	MTTD 5202 Methods of teaching technical disciplines	PD/UC	Exam	2	5	<p>Know: computer programs used in various fields of chemistry and chemical technology; about enterprises by profile.</p> <p>Be able to: carry out calculations, write reactions in chemistry, draw up the results of work to assess knowledge in various disciplines related to professional activities.</p> <p>Have skills: work with the ChemOffice 7.0 program and the knowledge acquired while studying the courses "Introduction to the specialty" and "Chemistry", preparing students for an in-depth study of special academic disciplines.</p> <p>Be competent: in knowledge when working with applied computer programs necessary for studying disciplines for use in various fields of chemistry and chemical technology.</p>
IMOS 04 Module Innovative methods of organic synthesis	PPM 6203 Production of polymeric materials	PD/UC	Course work	3	5	<p>Know: directions of organic synthesis of monomers and polymers, their representatives, physical and chemical bases of polymer processing, basic and specific technological schemes for the production of medicinal polymeric materials in industry and in laboratories, their areas of application.</p> <p>able to: identify the relationship between the structure and properties of polymers, use them in industrial methods for obtaining medicinal polymers, work on devices designed to assess the quality of polymeric materials, determine indicators of polymer properties,</p> <p>Have skills: in the pharmaceutical analysis of medicinal substances and dosage forms; orientation in a wide range of modern polymeric materials; selection of methods for the production and processing of medicinal polymers.</p>

						<p>Be competent: in choosing a rational method and technique for conducting pharmaceutical analysis of a medicinal substance, knowledge of the principles and patterns of chemical processes in the production of medicinal polymers, their use in practice.</p>
MMOS 5204 Modern methods of organic synthesis	PD/UC	Exam	2	6	<p>Know: chemical production: structure; criteria for evaluating efficiency, general patterns of chemical processes. General chemical technology of organic products based on gaseous, liquid and solid hydrocarbons and their differences, chemical reactors, industrial chemical reactors; chemical-technological systems (CTS), synthesis and analysis of CTS, raw materials and energy subsystem of CTS; energy in chemical production ; theoretical regularities of the main processes of chemical and engineering ; basics of physical modeling of processes; general patterns and calculated dependencies typical processes and devices; absorption, adsorption, rectification; familiarization with the methods of physical and mathematical modeling; familiarization with the basics of the theory of the phenomena of the transfer of momentum, mass and energy; criteria for assessing the quality of products and the efficiency of chemical production.</p> <p>Be able to: synthesize chemical compounds, conduct a qualitative and quantitative analysis of a chemical compound using chemical and physico-chemical methods of analysis; formation of the foundations of technological thinking, disclosure of the relationship between the development of chemical science and chemical technology.</p> <p>Have skills: calculation and determination of technological indicators of the process ; selection of standard equipment for carrying out processes under specified conditions , to calculate and design the installation for carrying out a given process ; the ability to quickly master progressive technologies and related specialties; methods of technical and economic analysis of engineering solutions; acquire practical skills in solving problems to determine the main sizes of devices and parameters of processes.</p> <p>Be competent: knows the essence and social significance of his profession, the main problems of the sciences that determine the specific area of his activity ; in the choice of technological equipment; selection of the main technological apparatus, design of the main chemical equipment and their application and; knows the methods of calculation, selection of the main technological apparatuses, design of the main chemical equipment and their application.</p>	
GCh 6205 Green chemistry	PD/UC	Exam	3	5	<p>Know: chemical production: structure; criteria for evaluating efficiency, general patterns of chemical processes; general chemical technology of organic products based on gaseous, liquid and solid hydrocarbons and their differences, familiarization with the fundamentals of the theory of momentum, mass and energy transfer phenomena; criteria for assessing the quality of products and the efficiency of chemical production.</p>	

						<p>Be able to: synthesize chemical compounds, conduct a qualitative and quantitative analysis of a chemical compound using chemical and physico-chemical methods of analysis.</p> <p>Have skills: in the technology of processing minerals and raw materials, secondary production processes, processing waste from various industries of organic and inorganic composition.</p> <p>Be competent: in the formation and knowledge of the general patterns of research on modern equipment , in the choice of technological equipment , criteria for assessing product quality and the effectiveness of chemical production.</p>
MMOMR 05 Module Modern methods of organic matter research	PChMIOC 6206 Physical and chemical methods of investigation of organic compounds	PD/UC	Exam	3	5	<p>Know: organic synthesis of saturated and unsaturated polymers, basic principles and patterns of chemical production processes, the history of the development of industrial organic synthesis.</p> <p>Be able to: assist in the study and analysis of the current state and development trends of the fine organic synthesis industry, providing health care, agriculture, technology and chemical life products.</p> <p>Have skills: work on instruments designed to assess the quality of organic materials, in determining the indicators of the properties of substances, identifying the relationship between the structure and properties of compounds.</p> <p>Be competent: in defining the field of activity; the ability to analyze a huge range of fine organic synthesis products and the dynamics of changes in market demand for them.</p>
	SCMOCh 5207 Standardization, certification and metrology in organic chemistry	PD/UC	Exam	2	5	<p>To know: normative documents, materials of equipment operation, technical requirements for indicators of raw materials and products, methods of metrological support of measurements, standards in the field of chemical engineering.</p> <p>able to: comply with the documentation requirements in the conditions of the technological process, ensure the operation of equipment, monitor the updating of regulatory and technical documentation on the indicators of raw materials and manufactured products, and use the state standardization system in practice.</p> <p>Have skills: in the measurement and certification procedure; using modern measuring technologies, which are a sequence of actions aimed at obtaining measuring information of the required quality.</p> <p>Be competent: in matters of metrology, standardization and certification in the field of CTO. Draw up technological and technical documentation in accordance with the current regulatory framework based on the use of the basic provisions of metrology, standardization and certification in production activities; apply quality system documentation.</p>
	MSIA 6208 Management of scientific and innovative activities	PD/UC	Course work		4	5

						<p>To be able to: plan scientific and innovative activities, process the experimental data of SDI/EID, analyze the experimental data of SDI/EID.</p> <p>Have skills: in the development of a feasibility study for research and development / EIA and study the commercialization of projects, monitoring the stages of scientific and innovative activities, the formation of a design solution for a scientific and innovative task.</p> <p>Be competent: in the preparation and publication of the results of scientific and innovative activities, the feasibility study of research and development / EIA and the commercialization of projects, the presentation of the results of scientific and innovative activities for public defense.</p>
	RP 6309 Research practice	PD/UC	Exam, report	3	12	<p>Know: theory, apply it in practice, rationally use the capabilities of modern technology, study and implement modern technologies.</p> <p>able to: collect and analyze materials for the final qualification work.</p> <p>Have skills: practical preparation for independent work as a process engineer, collection of necessary materials on the topic of diploma design, consolidation of acquired theoretical knowledge.</p> <p>Be competent: in mastering the practical conditions of the principles of organization and management of production, analysis of economic indicators of production, increasing the competitiveness of products.</p>
RWMS and Final certification						
FSW 06 Module Final and scientific work	RWMS 6401 Research work of a master student, including internship and master's thesis (RWMS)	FC	Exam, report	2,3,4	24	<p>Know: organization of the work of safety and environmental protection services at enterprises, enterprise systems that ensure the safety of equipment and technology for humans and the environment; organization and principle of work of safety and labor protection services, environmental protection, fire, radiation and other types of safety at the enterprise; requirements for the implementation, writing of a thesis (project), execution of an explanatory note and a graphic part; key and practically significant provisions on the disciplines of general professional and special training, the procedure for conducting the exam.</p> <p>Be able to : analyze the methods and means of organizing security services at the enterprise, indicators of the work they perform, production shortcomings and ways to eliminate them, reserves for improving the efficiency of equipment and technology security systems for humans and the environment; solve tasks independently; give answers that provide an opportunity for an adequate assessment of knowledge and professional training of future specialists.</p> <p>Have skills : work with legal documents on safety and environmental protection, communication skills in a work team; design, engineering, technological, cost estimate, reference and regulatory documentation for all safety sections of equipment and technology, statistical reporting forms for safety sections, prescriptions, office work and official correspondence between enterprises and controlling and inspecting services; work with literary sources, reference books, normative and technical documentation in the field of the Belarusian Railways</p>

						and AIA; use in your answer references to the relevant provisions of educational and scientific literature and show your own point of view. Be competent: in the organization and implementation of the work of environmental services and safety; in matters of life safety and environmental protection.
	DDMT 6402 Design and defense of master's thesis	FC	Defense of a dissertation or passing a comprehensive exam	4	8	Know: trends in the development of chemical technology, the main scientific and technical problems and development prospects in the field of chemical technology for the production and processing of polymers, oil, gas, coal processing and their relationship with related industries; principles for constructing technological schemes for the production of processing organic substances and the choice of technological equipment for oil and petrochemical enterprises, the principles for creating waste-free, environmentally friendly technologies; requirements for the implementation, writing of a thesis (project), execution of an explanatory note and a graphic part; key and practically significant provisions on the disciplines of general professional and special training, the procedure for conducting the exam. Be able to: collect and analyze materials for writing a final qualification work, carry out synthesis of organic compounds, use known methods of analysis to confirm the identification of the compounds obtained, carry out the necessary calculations of technological equipment and the yield of the target product; use knowledge on theoretical issues in preparation for passing a comprehensive exam. Have skills: knowledge of the basics of the theory of fundamental sections of chemistry and technology (in the chemical technology of biologically active substances, processing of vegetable raw materials and oil, chemistry of polymers, surfactants, film-forming agents); in applying the basic laws of chemistry when discussing the results of an experiment; conducting a chemical experiment, the main methods for obtaining and studying substances and chemical reactions; in the methods of registration and processing of the results of the experiment; mastery of methods for the safe handling of various chemicals. Be competent: in planning and conducting chemical experiments, processing their results and estimating the error, mathematical modeling of chemical processes and phenomena, the principles of constructing technological schemes for the processing of organic substances and the choice of technological equipment for oil and petrochemical enterprises, the principles of creating waste-free, environmentally friendly technologies; using knowledge on the properties of chemical elements, compounds and materials based on them to solve problems of professional activity; the study of scientific and technical information, domestic and foreign experience on the subject of research when writing a graduation project and passing a comprehensive exam on theoretical issues included in the specialty HTO.

4. Summary table showing the amount of loans disbursed by modules of the educational program:

Course of Study	Semester	Number of modules being mastered	Number of disciplines studied		Amount of credits							Total hours	Quantity	
			UC	OC	Theoretical education	Research practice	Teaching practice	Comprehensive exam	Registration and defense of a master's thesis	Research work of a master student, including the completion of a master's thesis	Total		Exam	Dif.test (KP, KR)
1	1	3	4	3	30						30	900	6	
	2		5		21		5			3	30	870	4	
2	3	3	4		15	12				3	30	900	2	1
	4		1		5				8	18	30	930		1
Total:		6	13	3	87	12	5		8	24	120	3600	12	2

1 DEVELOPED BY

Compiled by:

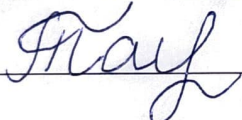
Takibayeva A.T. - Ph.D., Associate Professor of the Department of X and XT; Karilkhan A. senior teacher of the department Ch and ChT., master's student Akyldas A.

2 DISCUSSED

2.1 At the meeting of the Department of Chemistry and Chemical Technology Protocol dated "04" 03 2024 No. 7

Head of department  Takibayeva A.T.

2.2 At the meeting of the Quality Assurance Committee of the Faculty of Innovative Technologies
Protocol № 6 of «26» 03 2024.

Chairman  Tau A.G.