NJSC "Satbayev University"
Chemical and Biological Technology Institute

CURRICULUM PROGRAM

ENGINEERING AND ENGINEERING BUSINESS

Master of Engineering in «7M07109 -Hydrocarbon Engineering»
(Specialized area (1,5 years)

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

Almaty 2020

Программа составлена и подписана сторонами:

от КазНИТУ им К.Сатпаева:

1. Заведующий кафедрой ХТОВиП _____ Елигбаева Г.Ж.

2. Директор Института ХиБТ _____ Туйебахова З.К.

От работодателей:

ТОО "Независимый центр экспертизы нефтепродуктов «Organic», Директор _____ А.А. Калмуратова

Утверждено на заседании Учебно-методического совета Казахского национального исследовательского технического университета им К.И. Сатпаева. Протокол №3 от 19.12.2019 г

Квалификация:
Уровень 7 Национальной рамки квалификаций:
7М07 – Инженерные, обрабатывающие и строительные отрасли
7М071 – Инженерия и инженерное дело (магистр)

Профессиональная компетенция: владение современными методами научных исследований, постановка и формулирование задач научных исследований на основе результатов поиска, обработки и анализа научно-технической информации, разработка новых технических и технологических решений при создании продукций нефтехимической отрасли с учетом технико-экономических и экологических требований, организация работы коллектива исполнителей, принятие управленческих решений в условиях различных мнений, применение интерактивных форм и инновационных методов обучения в современном вузе.

Brief description of the program:

1 Purpose

- the formation of general cultural, professional and special competencies, allowing the graduate to independently set and solve production, technological and experimental research tasks in the field of modern production of chemical materials;

- training of specialists who are proficient in modern methods of organizing and managing petrochemical processes and the production of chemical materials, capable of solving managerial problems and taking responsibility for the decisions made;

- preparation of masters with leadership qualities, capable of self-education, fluent in a foreign language at a professional level.

2 **Types of work.**A graduate of the educational program "Chemical Engineering of Hydrocarbon Compounds" in the profile area of training 7M071 - Engineering and Engineering business is preparing for the following professional activities:

- production;
- design;
- organizational and managerial.

3 **Objects of professional activity**: hydrocarbon compounds and materials; methods and devices for determining and studying the composition and properties of substances and materials; technological processes and industrial systems for the processing of hydrocarbon compounds and the production of chemicals and materials, as well as systems for their management and regulation.

Subjectsofprofessionalactivity: petrochemical enterprises and production of various profiles, research and engineering companies, research and design industry institutes; research laboratories.

EDUCATION PROGRAM PASSPORT

1 The scope and content of the program

The term of study in the master's program is determined by the amount of acquired academic credits. Upon mastering the established amount of academic credits and achieving the expected learning outcomes for obtaining a master's degree, the master's educational program is considered fully mastered. In a specialized master's program with a typical study period of 1.5 years, at least 90 academic credits for the entire period of study, including all types of educational and scientific activities of the master's student.

The planning of the content of education, the method of organizing and conducting the educational process is carried out by the university and the scientific organization independently on the basis of credit technology of education.

The master's degree in the profile direction implements educational programs of postgraduate education for the training of management personnel with in-depth professional training.

The content of the Master's degree program consists of:

1) theoretical training, including the study of cycles of basic and major disciplines;

2) practical training of undergraduates: various types of practices, scientific or professional internships;

3) experimental research work, including the implementation of a master's thesis - for a specialized master's degree

4) final appraisal.

Regulatory documents for the development of the educational program

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

- The Education Act of the Republic of Kazakhstan, with changes and additions as part of legislative changes to increase the autonomy and autonomy of universities from 04.07.18, No. 171-VI.
- Kazakhstan's Law on Amending and Amending Some Laws of the Republic of Kazakhstan on the Expansion of Academic and Management Autonomy of Higher Education Institutions" from 04.07.18 No.171-VI;

- Order of the Minister of Education and Science of the Republic of Kazakhstan dated 30.10.18 No. 595 "On the approval of the Model Rules of The Educational Organizations of the Respective Types";

- State general standard of postgraduate education (annex 8 to the order of the Minister of Education and Science of the Republic of Kazakhstan from 31.10.18, No.604;

- Order of the Minister of Education and Science of the Republic of Kazakhstan dated 20.01.15 No. 19 On the approval of the Rules of Translation and Recovery of Students by Types of Education Organizations with changes and additions on order No.601 of 31.10.18;

Working curriculum of the educational program "ChemicalEngineering of Hydrocarbon Compounds"for 2019-2020, approved by the rector of Kazakh National Research Technical University named after K.I. Satbayev;

- Documents of the SMC system (quality management system) on the organization of the educational process at Kazakh National Research Technical University named after K.I. Satbayev.

EPContent: "Chemical engineering of hydrocarbon compounds" is implemented by KazNRTU named after K.I. Satbayev in the specialized direction of training 7M071 - engineering and engineering business with a training period of 1.5 years and presents a system of documentation regulating the goals, expected results, content and implementation of the educational process in the field of chemical engineering and the production of chemical materials.

The EP provides an opportunity to obtain in-depth knowledge, key skills and abilities of a graduate and their further development in the field of petrochemical engineering and the production of chemical materials. This EP is built taking into account the possibility of providing a master's student with a choice of an appropriate educational trajectory or a specific specialization based on the main educational program, but containing its own individual competencies, reflecting the specifics of a particular specialization within the framework of a single educational direction 7M071 - engineering and engineeringbusiness (master's degree).

Objectives of the educational program:

Master in the field of training 7M071 - engineering and engineering should be prepared for the solution of the following professional tasks in accordance with the direction of the EP "Chemical Engineering of Hydrocarbon Compounds" and types of professional activities:

1. Project activities

- calculate material and heat balances of petrochemical processes;
- draw up an instrumental and technological scheme of the process;
- calculate the main structural and technological parameters of the main and auxiliary equipment;
- to develop or select drawings of equipment, buildings and structures;
- to develop simulation models of chemical technological processes.

2. Production activity

- to develop chemical-technological processes for obtaining new substances and materials;
- to improve technological schemes of existing production facilities with substantiation of the main parameters and indicators of the process;
- possess the skills of technical analysis and production control, process management and technology optimization;
- on the basis of existing standards, be able to formulate technical requirements for specific types of finished products, own modern methods of testing them, use state and international standards in professional activities;
- draw up a business plan for a petrochemical project;
- apply innovations in the field of activity, develop energy and resource-saving technologies in the field of production of chemical materials;
- to develop measures to protect the environment for petrochemical enterprises.

3. Organizational and managerial activities.

- to carry out information support of production, labor and management;
- to carry out activities for the organization of production in accordance with the regulations;
- develop and draw up the necessary documentation;
- organize the activities of the team, draw up work plans and set production goals.
- resolve issues of material and technical support, control the execution of tasks.

2 Requirements for applicants

The previous level of education of applicants (first cycle) is higher professional education (bachelor's degree). The applicant must have a diploma of the established sample and confirm the level of knowledge of the English language with a certificate or diplomas of the established sample.

The procedure for admitting citizens to a magistracy is established in accordance with the "Standard rules for admission to training in educational organizations that

implement educational programs of postgraduate education."

The formation of a contingent of undergraduates is carried out by placing a state educational order for the training of scientific and pedagogical personnel, as well as paying for training at the expense of citizens' own funds and other sources. The state provides citizens of the Republic of Kazakhstan with the right to receive, on a competitive basis, in accordance with the state educational order, free postgraduate education, if they receive education of this level for the first time.

At the "entrance", a master's student must have all the prerequisites necessary for mastering the corresponding educational master's program. The list of required prerequisites is determined by the higher education institution independently.

In the absence of the necessary prerequisites, the master student is allowed to master them on a paid basis.

3 Requirements for completing studies and obtaining a diploma

Awarded degree / qualifications: The graduate of the educational program "Chemical Engineering of Hydrocarbon Compounds" in the profile direction is awarded the academic degree "Master of Engineering and Technology".

A graduate who has mastered a specialized master's program must have the following general professional competencies:

• the ability to independently acquire, comprehend, structure and use new knowledge and skills in professional activities, develop their innovative abilities;

• the ability to independently formulate research goals, establish a sequence for solving professional problems;

• the ability to apply in practice knowledge of fundamental and applied disciplines that determine the focus (profile) of the master's program;

• the ability to professionally choose and creatively use modern scientific and technical equipment for solving experimental and practical problems;

• ability to critically analyze, represent, defend, discuss and disseminate the results of their professional activities;

• possession of skills in the preparation and execution of scientific and technical documentation, reviews, reports and articles;

• willingness to lead a team in the field of their professional activities, tolerantly perceiving social, ethnic, confessional and cultural differences;

• readiness for communication in oral and written forms in a foreign language for solving problems of professional activity.

A graduate who has mastered the master's program must have professional competencies corresponding to the types of professional activity that the master's program is focused on:

production activity:

• the ability to independently carry out production, field and laboratory and interpretation work in solving practical problems;

• the ability to professionally operate modern field and laboratory equipment and instruments in the field of the mastered master's program;

• the ability to use modern methods of processing and interpreting complex information to solve production problems;

project activity:

• the ability to independently compose and present projects of research and development work;

• readiness to design complex research and development work in solving professional problems;

organizational and management activities:

• readiness to use the practical skills of organizing and managing scientific research and scientific production work in solving professional problems;

• readiness for the practical use of normative documents in planning and organizing scientific and industrial work.

When developing a master's program, all general cultural and general professional competencies, as well as professional competencies related to those types of professional activities that the master's program is focused on, are included in the set of required results of mastering the master's program.

4 Working curriculum of the educational program "Hydrocarbon Engineering "

4.1. Study period 1.5 years

Year of study	Code	Discipline name	Component	Loans		Lk/brow/p	Prerequisites	Code	Discipline name	Component	Loans		Lk/brow/p	Prerequisites
				ECTS	RK						ECTS	RK		
1	1 semester							2 semester						
	LNG205	Foreign language (professional)	BD VK	5	3	0/0/3		CHE268	Chemotology of petroleum products	PD VK	5	3	2/0/1	
	MNG230	Project Management (Management + Management Psychology)	BD VK	3	2	1/0/1		CHE264	Technology of heterolytic and homolytic processes	PD VK	5	3	2/0/1	
		Optional component	BD KV	5	3				Optional component	PD KV	5	3		
		Optional component	BD KV	4	2				Optional component	PD KV	5	2		
		Optional component	PD KV	5	3				Optional component	PD KV	5	2		
		Optional component	PD KV	5	3				Experimental research work of a master student	NIRM	6	2		
		Experimental research work of a master student	NIRM	6	4									
		Total:		**33**	**20**				**Total:**		**31**	**19**		
2	3 semester													
		Experimental research work of a master student	NIRM	6	4									
		Internship	PD	10	6									
		Registration and defense of a master's thesis (OiZMD)	IA	12	7									
		Total:		**28**	**17**									
		Total:		92	56									

4.2. Catalogue of Elective Disciplines

Hydrocarbon Engineering

Term: 2 years

Component of choice					
	Code	**Discipline name**	**credits**	**Lc/lb/pr**	**semester**
DB Component of Choice –5 credits					
	CHE282	*Chemicals in the processes of oil treatment and oil production	3	1/2/0	1
	CHE230	*Gas processing technological processes	2	1/0/1	
PDComponent of Choice –13credits					
	CHE272	*Industrial reactors for large-scale chemical production	3	2/0/1	1
	CHE254	Computer modeling of petrochemical plants	3	0/3/0	
	CHE188	Chemical technology of solid fossil fuels	2	1/0/1	2
	CHE706	Problems of waste disposal of petrochemical industries	3	2/0/1	
	CHE280	Polyolefin production and processing technology	2	1/0/1	
		Total:	**13**		

*Interdisciplinary disciplines

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

The requirements for the level of preparation of a master's student are determined on the basis of the Dublin descriptors of the second level of higher education (master's) and reflect the acquired competencies, expressed in the achieved learning outcomes.

Learning outcomes are formulated both at the level of the entire educational program of the master's program, and at the level of individual modules or academic discipline.

Descriptors reflect learning outcomes that characterize the student's abilities:

1) demonstrate developing knowledge and understanding in the field of study of petrochemical processes and the production of petrochemical synthesis products, based on advanced knowledge of chemical science and engineering in the development and / or application of ideas in the context of research;

2) apply at a professional level their knowledge, understanding and ability to solve problems in a new environment, in a broader interdisciplinary context;

3) collect and interpret information to form judgments, taking into account social, ethical and scientific considerations;

4) clearly and unambiguously communicate information, ideas, conclusions, problems and solutions, both to specialists and non-specialists;

5) demonstrate the learning skills necessary to independently continue further education in the field of chemical engineering and engineering.

6 Completion Competencies

6.1 Requirements for key competencies of graduates of a specialized magistracy. The graduate must:

1) have an idea:

• about current trends in the development of scientific knowledge;

• on topical methodological and philosophical problems of natural (social, humanitarian, economic) sciences;

• about the contradictions and socio-economic consequences of the processes of globalization;

• on the current state of the economic, political, legal, cultural and technological environment of the global business partnership;

• on the organization of strategic enterprise management, innovation management, leadership theories;

• on the main financial and economic problems of the functioning of enterprises.

2) know:

• methodology of scientific knowledge;

• the main driving forces behind changes in the structure of the economy;

• features and rules of investment cooperation;

• at least one foreign language at a professional level, allowing for scientific research and practical activities.

3) be able to:

• apply scientific methods of cognition in professional activities;

• critically analyze existing concepts, theories and approaches to the study of processes and phenomena;

• integrate the knowledge gained in different disciplines, use it to solve analytical and managerial problems in new unfamiliar conditions;

• conduct a microeconomic analysis of the economic activity of the enterprise and use its results in the management of the enterprise;

• to apply in practice new approaches to the organization of marketing and management;

• make decisions in difficult and non-standard situations in the field of organization and management of economic activities of an enterprise (firm);

• to apply in practice the norms of the legislation of the Republic of Kazakhstan in the field of regulation of economic relations;

• creatively think and be creative in solving new problems and situations;

• to carry out information-analytical and information-bibliographic work with the involvement of modern information technologies;

• generalize the results of experimental research and analytical work in the form of a master's thesis, article, report, analytical note, etc.

4) have skills:

• solving standard scientific and professional problems;

• scientific analysis and solution of practical problems in the organization and management of economic activities of organizations and enterprises;

• research of problems in the field of management and marketing and use the results obtained to improve the methods of enterprise management;

• professional communication and intercultural communication;

• oratory, correct and logical design of their thoughts in oral and written form;

• expanding and deepening knowledge necessary for daily professional activities and continuing education in doctoral studies;

• use of information and computer technologies in the field of professional activity.

5) be competent:

• in the field of research methodology in the specialty;

• in the field of contemporary problems of the world economy and the participation of national economies in world economic processes;

• in the organization and management of the enterprise;

• in the implementation of industrial relations with various organizations, including public service bodies;

• in ways to ensure constant updating of knowledge, expansion of professional skills and abilities.

B - *Basic knowledge, abilities and skills*

B1 - the ability to apply scientific methods of knowledge in professional activities;

B2 - the ability to conduct a microeconomic analysis of the economic activity of an enterprise and use its results in enterprise management;

B3 - the ability to apply in practice new approaches to the organization of marketing and management.

P - *Professional competencies:*

P1 - the ability to independently carry out information-analytical and information-bibliographic work with the involvement of modern information technologies;

P2 - the ability to use the knowledge gained in different disciplines to solve analytical and managerial problems in new conditions;

P3 - possess the skills of technical analysis and production control, process management and technology optimization, apply innovations in the field of activity, ensure safe working conditions and environmental standards of production;

P4 - the ability to professionally apply in practice the norms of the legislation of the Republic of Kazakhstan in the field of regulation of economic relations;

P5 - readiness to carry out industrial relations with various organizations, including with the bodies of the State Service;

P6 - the ability to organize and manage the activities of a chemical enterprise and be responsible for the decisions made, have the qualities of a leader, be able to work in a team, adapt to new conditions in professional activity;

P7 - possession of skills in solving standard scientific and professional problems, professional communication and intercultural communication.

O - *Human, socio-ethical competences*

O1 - knowledge of contemporary social and political problems;

O2 - the ability to perceive intercultural differences, the ability to comply and maintain ethical norms and rules;

O3 - communication skills in a foreign language, the ability to work in an international context;

C - *Special and managerial competencies*:

C1 - the ability to lead the work team and ensure industrial safety measures;

C2 - to master the theoretical and technological achievements of international advanced experience, modern science for the development of innovative, energy-saving and environmentally friendly production of chemical materials;

C3 - readiness to act in non-standard situations, to bear social and ethical responsibility for the decisions made.

6.2 Requirements for the experimental research work of a master student in a specialized master's program.

The experimental research work of a master student should:

1) correspond to the profile of the master's educational program, according to which the master's project is carried out and defended;

2) be based on modern achievements of science, technology and production and contain specific practical recommendations, independent solutions to management problems;

3) be carried out using advanced information technologies;

4) contain experimental and research (methodological, practical) sections on the main protected provisions.

6.3 Requirements for organizing practices:

The educational program of the profile magistracy includes industrial practice in the PD cycle.

Industrial practice in the PD cycle is carried out with the aim of consolidating the theoretical knowledge gained in the learning process, acquiring practical skills, competencies and experience of professional activity in the taught educational program of the magistracy, as well as mastering advanced experience.

7 ECTS Diploma Supplement

The application was developed according to the standards of the European Commission, Council of Europe and UNESCO / CEPES. This document is for academic recognition only and is not an official proof of education. Not valid without a university degree. The purpose of completing the European Annex is to provide sufficient information about the holder of the diploma, the qualification obtained, the level of this qualification, the content of the study program, the results, the functional purpose of the qualification, as well as information about the national education system. The application model that will be used to translate grades uses the European Credit Transfer or Transfer System (ECTS).

The European Diploma Supplement provides an opportunity to continue education at foreign universities, as well as to confirm national higher education for foreign employers. When going abroad for professional recognition, additional legalization of the educational diploma is required. The European Diploma Supplement is completed in English upon individual request and is issued free of charge.

FOREIGN LANGUAGE (PROFESSIONAL)
CODE – LNG205
CREDITS – 3
PRE-REQUISIT –Academic English, Business English, IELTS 5.0-5.5

PURPOSE AND OBJECTIVES OF THE COURSE
With this course, you will master specific terminology, be able to read specialized literature, gain the knowledge necessary to implement effective oral and written communications in a foreign language in your professional activities.
SHORT DESCRIPTION OF THE COURSE
In the process of training, students acquire knowledge of a foreign language, including mastery 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 role-playing games, dialogues, discussions, presentations, listening tasks, working in pairs or in groups, completing various written tasks, grammar tasks and explanations.
KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
As a result of mastering the discipline, the student expands the professional lexical vocabulary, possess the skills of effective communication in a professional environment, the ability to competently express thoughts in oral and written speech, understand specific terminology and read specialized literature.

PROJECT MANAGEMENT

CODE - MNG230
CREDITS- 2
PRE-REQUISIT
PURPOSE AND OBJECTIVES OF THE COURSE
The purpose of the course is to form students' knowledge in the field of project management to promote high-tech scientific and technical developments to the market.
SHORT DESCRIPTION OF THE COURSE
The course content reflects the issues of studying the mechanisms for the development of innovative activities, financing of scientific and technical projects, innovation management, methods for assessing the economic efficiency of innovations, strategies

for entering a new business, and the specifics of intellectual property management.**KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE**
A master student who has studied the course "Project Management" must know: terminology, basic concepts and definitions; mechanisms for organizing innovative activities; mechanisms for financing scientific and technical projects; specifics of intellectual property management; features and strategies for entering a new business; be able to: draw up a business plan for the implementation of a high-tech project; have skills: work with literature on relevant topics.

CHEMOTOLOGY OF PETROLEUM PRODUCTS

CODE - CHE 268
CREDITS - 3
PRE-REQUISIT: organic chemistry, oil and gas processing technologies.

PURPOSE AND OBJECTIVES OF THE COURSE
The purpose of the discipline:study of scientific and applied foundations of the effective use of fuels, lubricants and technical fluids in various types of technology.
SHORT DESCRIPTION OF THE COURSE
Methods for qualifying fuels, oils and special fluids. Requirements for the quality of fuels and lubricants. System and methods for assessing the quality of fuels and lubricants. Metrology, standardization and certification of fuels and lubricants. Studying the scientific and applied foundations of the effective use of fuels, lubricants and technical fluids in various types of technology. Formation of general ideas and understanding of the theoretical foundations of the composition of oil, production of fuels, oils, greases, technical fluids used in road transport, a methodology for determining the quality indicators of FCM.
KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
Expected results: instilling practical skills for solving a variety of problems related to the development of methods for qualifying the properties of fuels and lubricants; acquisition of skills for modernization and improvement of technical requirements for commercial petroleum products; the ability to formulate technical proposals.

TECHNOLOGY OF HETEROLYTIC AND HOMOLYTIC OIL REFINING PROCESSES
CODE - CHE 264

CREDITS - 3

PRECISION:organic chemistry, physical chemistry

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course "Technology of Heterolytic and Homolytic Oil Refining Processes" is to provide a scientific basis and master the basic technological principles of catalytic oil refining processes.

Course objectives:

- Creation of the basics of theoretical training for undergraduates for solving practical problems;
- laying the scientific foundations of chemistry, kinetics and technology of hydrocarbon processing;
- instilling practical skills for the development of energy- and material-saving environmentally friendly technological production;
- Acquisition of skills in technological and structural calculation of equipment for oil refining and petrochemical industries;

SHORT DESCRIPTION OF THE COURSE

The discipline "Technology of heterolytic and homolytic oil refining processes" is intended for master students to study the theoretical foundations for solving practical problems, laying the scientific foundations of chemistry, kinetics and technology of hydrocarbon processing processes, instilling practical skills for the development of energy and structural calculation of equipment for oil refining and petrochemical industries, the formation of students' scientific thinking, in particular, understanding the logical connection of the structure and reactivity of organic compounds, about the compounds themselves and methods of their production, instilling practical skills in the synthesis and identification of compounds, applying the knowledge gained in economy, everyday life and in solving problems of environmental protection.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

The study of this discipline will allow the undergraduate to solve practical problems, to form scientific thinking, in particular, to correctly understand the limits of applicability of knowledge about the chemical nature, composition and basic physical properties of organic compounds and methods of their processing, to understand the relationship between the chemical nature, composition and physicochemical properties of various classes of compounds, apply the knowledge gained in economics, everyday life and solving problems of environmental protection.

CHEMICAL REAGENTS IN THE PROCESSES OF OIL TREATMENT AND OIL PRODUCTION

CODE - CHE 282
CREDITS - 3
PRE-REQUISIT- Organic and petrochemical production technology, Basic processes and apparatuses of chemical technology, Hydrocarbon processing technology

PURPOSE AND OBJECTIVES OF THE COURSE
The main goal of the course - Discipline "Chemicals in the processes of oil treatment and oil production" aims to familiarize students with the practical and theoretical foundations for the use of reagents in the oilfield and oil refining industry.
Objectives of the course: formation of students' professional competencies necessary for professional activities in the field of applied scientific research on the problems of oilfield chemistry, initiating the creation, development and experimental testing of innovative technologies in the development and implementation of chemical reagents for various purposes in oil and gas production; improvement and development of new methods of experimental research of physical and chemical processes in oil and gas production, testing of chemical reagents for oil and gas production; acquiring a new qualification "process engineer"
SHORT DESCRIPTION OF THE COURSE
The course "Chemicals in the processes of oil treatment and oil production" is dedicated to the actual problems of oilfield chemistry associated with the production, transportation and primary treatment of oil. Generalized and explained from a scientific point of view, the main problems arising in the extraction and transportation of crude oil, as well as in its primary treatment, which can be solved by using chemical reagents. The ways and methods of solving these problems are stated, practical recommendations are given for the selection of the necessary reagents for oilfield chemistry.
KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
After mastering the program of this discipline, the student must:
- to apply in practice the principles of rational use of chemical reagents in the processes of oil treatment and oil production;
- to carry out and correct technological processes during the construction, repair and operation of wells for various purposes and the profile of the wellbore on land and at sea, transport and storage of hydrocarbons;

- operate and maintain technological equipment used in the construction, repair, reconstruction and restoration of oil and gas wells, oil and gas production, collection and preparation of well products, transportation and storage of hydrocarbons;
- assess risks and determine measures to ensure the safety of technological processes in oil and gas production;
- participate in the study of technological processes, improvement of technological equipment and reconstruction of production;
- to draw up technological and technical documentation for the operation of oil and gas field equipment;

TECHNOLOGICAL PROCESSES OF GAS PROCESSING

CODE - CHE 230
CREDITS - 2
PRE-REQUISIT- organic and petrochemical production technology.

PURPOSE AND OBJECTIVES OF THE COURSE
The purpose of studying the discipline: is the formation of undergraduates' knowledge, skills and the acquisition of skills in conducting a technological process in the field of gas processing and gas chemistry.
SHORT DESCRIPTION OF THE COURSE
The discipline "Technological processes of gas processing" is intended for the professional training of specialists in oil and gas chemistry. The assimilation of this course contributes to a deep understanding by students of chemistry and technology of hydrocarbon gas processing, the acquisition of theoretical knowledge necessary to develop an economically viable and environmentally safe technology for processing oil and natural gases and engineering calculation skills; prospects for the development of gas processing and gas chemistry.
KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE. Development of the professional skills of future undergraduates and the laying of scientific foundations of the technology for the preparation and processing of hydrocarbon gases and the principles of conducting the technological process and structural calculation of equipment

INDUSTRIAL REACTORS FOR LARGE-SCALE PETROCHEMICAL PRODUCTIONS

CODE - CHE 225
CREDITS - 3 (2/0/1)
PRE-REQUISIT Physical chemistry, General chemical technology, Basic processes and devices of chemical technology.

PURPOSE AND OBJECTIVES OF THE COURSE
The main goal of the course is to study the basic laws of chemical processes occurring in reactors and the theoretical foundations of calculating chemical reactors, as well as the design of industrial chemical reactors.
Course objectives: to form the foundations of technological thinking, to reveal the relationship between the development of chemical science and chemical engineering, to prepare graduates for active creative work on the creation of modern chemical reactors.**SHORT DESCRIPTION OF THE COURSE**
The course "Industrial reactors for large-scale chemical processes" contains a presentation of the sections: 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 apparatus; interactions between the processes of chemical transformations and transport phenomena at all scale levels, the methodology for selecting a reactor and calculating the process in it, optimization of chemical processes and reactors; structural elements of chemical reactors; schemes and designs of industrial chemical reactors.
KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
Calculate the main characteristics of a chemical process; select the type of reactor and calculate the technological parameters for a given process; determine the parameters of the best organization of the process in a chemical reactor; methods for determining the optimal and rational technological modes of equipment operation; methods of calculation and analysis of processes in chemical reactors; determination of technological indicators of the process; methods of choosing chemical reactors.

COMPUTER MODELING OF PETROCHEMICAL PRODUCTIONS
CODE - CHE 254
CREDITS - 3
PRE-REQUISIT- processes and devices of chemical technology, chemical technology of organic substances.

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of studying the discipline "Computer modeling of petrochemical industries" is the in-depth development by doctoral students of the main approaches to computer modeling of chemical-technological processes for the synthesis of organic substances, methodology of calculations and construction of mathematical models of typical processes of chemical technology, their identification using experimental data and solutions to optimization problems.

SHORT DESCRIPTION OF THE COURSE: the discipline "Computer modeling of petrochemical industries" is intended for general professional training of specialists in the synthesis and processing of organic substances. The assimilation of this course develops and strengthens the skills in the detection and solution of specific problems inherent in the chemical-technological processes of the synthesis of organic compounds, the solution of computational and technological design problems, the development of modern computer simulation programs.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Expected results: formation of a system of knowledge and methodology for the development of technological processes in oil refining and petrochemistry among undergraduates. Master's student should know: principles and methodology of computer modeling of chemical-technological processes of petrochemical synthesis; must be able to: apply modern methods of computational and technological design, manage a package of modeling programs for solving specific problems of oil and gas processing.

CHEMICAL TECHNOLOGY OF SOLID COMBUSTIBLE FOSSILS

CODE - CHE 188
CREDIT - 2
PRE-REQUISIT Organic chemistry

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline: the formation of students' knowledge about the scientific foundations and general methods of constructing technological schemes for the processing of solid fossil fuels, the relationship of various processes of their processing, the main methods and stages of fuel processing, the principles of creating and designing optimal technologies, the prospects for the development of the industry.

SHORT DESCRIPTION OF THE COURSE: Preparation of solid fossil fuels for processing. Characteristics of solid fossil fuels and the main processes occurring during their thermal processing. Basic methods of thermal processing of solid fossil fuels.

Low-temperature and energy-technological processing of fuels. High temperature coking. Coking technology. Capture of volatile products formed during thermal processing of solid fossil fuels. Gasification of solid fossil fuels.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

The expected results are the formation of students' fundamental knowledge of the chemical technology of processing solid fossil fuels, the main methods of fuel processing, the principles of creating and designing optimal technologies. The student should know: principles of construction of technological schemes and design of technological processes; the state and prospects of the raw material base of the by-product coke industry; requirements for production efficiency, quality of raw materials and products; The student must be able to: develop a technology for processing solid fossil fuels for the production of various types of fuels; master the methods of chemical and instrumental analysis of coal, peat, shale and solid, liquid, gaseous products and control of their quality; creatively use general scientific and engineering disciplines to control the processes of chemical processing of solid fossil fuels; understand and explain the complex phenomena that one has to face in the diverse processes of processing solid fossil fuels, and make the best decisions on this basis.

PROBLEMS OF DISPOSAL OF PETROCHEMICAL PRODUCTION WASTE

CODE - CHE 706

CREDIT - 3

PRE-REQUISIT- processes and devices of chemical technology, chemical technology of organic substances.

PURPOSE AND OBJECTIVES OF THE COURSE

Цельюпреподаваниядисциплины"Problems of waste disposal in petrochemical industries" is the formation of master's students' competencies that allow them to carry out a complex of economic, organizational, engineering and technical measures carried out in order to reduce the volume of waste generation and storage in the oil-extracting industry, as well as to obtain additional economic effect from obtaining useful products.

SHORT DESCRIPTION OF THE COURSE

An increase in oil production, an increase in the volume of its processing and transportation is accompanied by an increase in the discharge of oil pollution and other toxic waste. The main sources of environmental pollution with oil products are both mining enterprises and oil refineries and companies involved in the transportation of oil products. Losses occur during pumping, transportation of oil and oil products at oil

terminals and oil depots. The inevitable loss of petroleum products occurs on the routes of railway transport, river and sea oil tankers, as well as at gas stations or stations, and at car repair enterprises. Waste oil products and oil sludge are generated during wastewater treatment, in the system of circulating water supply, drilling, oil preparation, during equipment repair, during cleaning of tanks. The environmental characteristics of oil pollution, general characteristics, composition and properties, the impact of oil sludge on the environment, methods of disposal of oil sludge and their classification, the use of oil sludge and products of their disposal as secondary material resources are the basis of the discipline "Utilization and processing of waste from industry enterprises".

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Expected results. The main objective of the discipline "Utilization and recycling of waste from industry enterprises" is to master the methodology for studying industrial waste in the oil and gas industry, substantiate their environmental hazard and develop methods of disposal to minimize anthropogenic impact on the environment.

For what the undergraduate must know: characteristics of waste, methods of their disposal, methods of analysis and control of waste and disposal products. The undergraduate must be able to: identify objects of the oil and petrochemical industry that pose an environmental hazard, apply the methodology for the disposal of industrial waste in the oil and gas industry, determine the environmental hazard of disposal products.

TECHNOLOGIES FOR PRODUCTION AND PROCESSING OF POLYOLEFINS

CODE - CHE 280

CREDIT - 2

PRE-REQUISIT- chemistry and physics of polymers

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of studying the discipline is to develop the ability to understand the physicochemical essence of polymer processing processes and the use of theoretical knowledge in complex engineering activities.

SHORT DESCRIPTION OF THE COURSE.

Introduction. The intensity of the use of plastics is the further development of scientific and technological progress. Classification of plastics processing methods. Technical properties of plastics. The main technological properties of plastics and their importance

for the choice of processing method and calculation of technological parameters. Manufacturing of plastic products by extrusion. Manufacturing of parts by injection molding. Pressing thermosetting materials.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

When studying these disciplines, the "input" knowledge, skills, experience and competencies necessary for the successful mastering of the discipline "Certain aspects of plastics processing technology" are formed. As a result of mastering the disciplines, the undergraduate must know: specific chemical technology, processes and devices; basic principles of organization of chemical production, its structure, methods for assessing production efficiency; general laws of chemical processes; the master's student must be able to: carry out the technological process in accordance with the regulations and use technical means to measure the main parameters of the technological process, properties of raw materials and products; calculate the main characteristics of a chemical process, choose a rational scheme for the production of a given product, evaluate the efficiency of production;

PROTECTION OF THE MASTER'S DISSERTATION

CODE - ECA2013

CREDIT –12

GOAL AND TASKS

The purpose of the master's thesis is: to demonstrate the level of scientific / research qualifications of a master's student, the ability to independently conduct scientific research, test the ability to solve specific scientific and practical problems, knowledge of the most general methods and techniques for their solution.

SHORT DESCRIPTION

A master's thesis is a final qualifying scientific work, which is a generalization of the results of an independent study by a master student of one of the urgent problems of a specific specialty of the corresponding branch of science, which has internal unity and reflects the course and results of the development of the chosen topic.

The master's thesis is the result of the research / experimental research work of the master's student, carried out during the entire period of the master's student's training.

Master's thesis defense is the final stage of master's preparation. A master's thesis must meet the following requirements:

- in the work, research should be carried out or urgent problems in the field of chemical technology of inorganic substances should be solved;

- the work should be based on the definition of important scientific problems and their solution;

- decisions must be scientifically grounded and reliable, have internal unity;

- the thesis should be written individually.

Content

СӘТБАЕВ УНИВЕРСИТЕТІ SATBAYEV UNIVERSITY

МҰНАЙ ӨНІМДЕРІН СЫНАЙТЫН ТӘУЕЛСІЗ ОРТАЛЫҒЫ
НЕЗАВИСИМЫЙ ЦЕНТР ЭКСПЕРТИЗЫ НЕФТЕПРОДУКТОВ

ЖШС «МӨСТО «ORGANIC»
Қазақстан Республикасы
050028, Алматы қ-сы,
Первомайский бұр., 38
Тел.: 8 727 246 65 42, 380 51 58
E-mail: organic.oiltest@mail.ru

ТОО «НЦЭН «ORGANIC»
Республика Казахстан
050028, г. Алматы,
пер. Первомайский, 38
Тел.: 8 727 246 65 42, 380 51 58
E-mail: organic.oiltest@mail.ru

Рецензия
на образовательную программу магистратуры «Химическая инженерия углеводородных соединений»

Образовательная программа (ОП) «Химическая инженерия углеводородных соединений» квалификации «8М071 - Инженерия и инженерное дело» Национальной рамки квалификации, разработана на основе Государственного общеобязательного стандарта высшего образования Республики Казахстан.

Содержание и структура ОП по направлению подготовки «8М071 – Инженерия и инженерное дело» отвечает основным требованиям стандарта и содержит следующую информацию: цели и задачи ОП, характеристику профессиональной деятельности выпускника, академические требования к поступающим, требования для завершения обучения, рабочий учебный план, дескрипторы уровня и объёма знаний, умений, навыков.

В программе предусмотрено углублённое изучение дисциплин по нефтехимии, химии газов и угля, современным методам их исследования.

Образовательная программа «Химическая инженерия углеводородных соединений» магистратуры предполагает подготовку специалистов владеющих современными методами научных исследований, способных ставить и формулировать задачи научных исследований на основе результатов поиска, обработки и анализа научно-технической информации, разработки новых технических и технологических решений при создании продукций нефтехимической отрасли с учётом технико-экономических и экологических требований, способных организовывать работу коллектива исполнителей, принимать управленческие решения в условиях различных мнений, применять интерактивные формы и инновационных методов обучения в современном вузе.

Считаю, что образовательная программа «Химическая инженерия углеводородных соединений» магистратуры отвечает потребностями рынка труда, задачам индустриально-инновационного развития страны и может быть рекомендована к внедрению в учебный процесс.

Директор
ТОО «Независимый центр экспертизы нефтепродуктов «ORGANIC» **А. Калмуратова**