

**NJSC «Satbayev University»
Chemical and Biological Technology Institute**

**CURRICULUM PROGRAM
ENGINEERING AND ENGINEERING BUSINESS**

**PhD in education program
«8D07107 - HYDROCARBON ENGINEERING»**

1st Edition

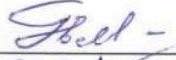

in accordance with the State Educational Standard of Higher Education, 2018

Almaty 2020

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The program is compiled and signed by the parties:

From KazNRTU named after K.Satpayev:

1. The Head of the ChTOS&P Department  G.Zh. Yeligbayeva
2. Director of the Ch&BT Institute  Z.K. Tuiebakhova

From employers:

- 1 LLP "Independent Center of Expertise
 Petroleum Products "Organic", Director  A.A. Kalmuratova



Approved at the meeting of the Educational and Methodological Council of the Kazakh National Research Technical University named after KI. Satpayev. Minutes number 3 of 12/19/2019

Qualification:

- Level 8 National Qualifications Framework:
- 8D07 - Engineering, manufacturing and construction industries
 - 8D071 - Engineering and Engineering business (PhD)

Professional competence: organization of innovation activities in the field of synthesis and production of organic compounds, organization and provide of scientific, educational, experimental research and management activities in the field of chemical products.

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Brief description of the program:

The goal of the program: the training of highly qualified specialists with fundamental educational, methodological and research training in the field of chemical technology of organic substances, hydrocarbons and their products that are competitive both within the country and on the international labor market.

Types of employment. PhD in engineering and engineering business can perform the following professional activities: educational (pedagogical); technological; social and pedagogical; research; organizational and managerial.

The objects of professional activity of doctoral graduates are the most advanced positions in higher and special educational institutions of the state and non-state sectors, research institutes and production corporations of the organic substances and materials production, domestic and foreign enterprises of chemical, petrochemical, gas and coal profile.

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EDUCATIONAL PROGRAM PASSPOR

1. Volume and content of the program

The educational program for the doctor of philosophy (PhD) has a scientific and pedagogical orientation and assumes fundamental educational, methodological and research preparation and profound studying of disciplines in the corresponding directions of Sciences for system of the higher and postgraduate education and the scientific sphere.

Doctoral educational programs in terms of professional training are developed on the basis of studying the experience of foreign universities and research centers that implement accredited training programs for doctors of PhD or doctors in the profile.

The content of the educational program profile doctoral established by the University itself.

The main criterion for the completion of the educational process for the preparation of doctors of philosophy (PhD) (doctor of profile) is the development of doctoral at least 180 academic credits, including all types of educational and scientific activities.

The period of study for doctoral degree is determined by the volume of mastered academic credits.

The educational program of doctoral studies for the degree of doctor of philosophy (PhD) or the profile is considered fully in case when the established volume of academic credits are learnt and the expected results of training are achieved.

Training in doctoral studies is carried out on the basis of master's degree programs in two directions:

- 1) scientific and pedagogical with term of training of not less than three years;
- 2) profile with a period of training of at least three years.

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The content of the educational program "Chemical processes and production of chemical materials" involves in-depth study of the English language, specialization disciplines that provide a high level of professional training, in-depth training on the topic of dissertation research, interdisciplinary training, the formation of teaching skills in higher education. The program also as a mandatory component includes teaching practice, the implementation of research work of the doctoral student. For the development of the educational component of the educational program of doctoral studies and/or research doctoral student conducts field trips to foreign education and science institutions.

The objectives of the program are: harmonization of technology training of scientific and pedagogical specialists of higher qualification with international standards, as well as advancing the issues of their scientific, methodological, legal, financial and economic, personnel and material&technical support; implementation of the educational process in accordance with the principles of the international practice of training highly qualified scientific and pedagogical personnel, ensuring the implementation of an independent original scientific research, characterized by considerable relevance and practical significance.

2 Requirements for applicants

The doctoral program accepts persons who have a master's degree and work experience of at least 1 (one) year or have completed training in residency.

Admission to the number of doctoral students is carried out by the admission commissions of Universities and scientific organizations on the basis of the entrance exam for groups of educational programs of doctoral studies and a certificate confirming foreign language proficiency in accordance with the common European competence (standards) of foreign language proficiency.

In admission case to universities doctoral students independently choose the educational program of the corresponding group educational programs.

Enrollment of persons for targeted training of doctors of philosophy (PhD) on the

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state educational order is carried out on a competitive basis.

The procedure for admission of citizens to doctoral studies 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 the contingent of doctoral students is carried out through the placement of the state educational order for the training of scientific and pedagogical personnel, as well as payment for training at the expense of citizens' own funds and other sources. The state shall ensure to citizens of the Republic of Kazakhstan the right to receive free postgraduate education on a competitive basis in accordance with the state educational order, if they receive this level of education for the first time.

At the "entrance" the doctoral student must have all the prerequisites necessary for the development of the relevant professional doctoral program. The list of necessary prerequisites is determined by the higher education institution independently.

In the absence of the necessary prerequisites, the doctoral student is allowed to master them on a fee basis. In this case, training in doctoral studies begins after the full development of the doctoral prerequisites.

3 Requirements for completion of studies and diploma

Persons who have carried out the educational program of doctoral studies and defended their doctoral dissertation with a positive decision of the dissertation councils of the University, which has a special status or the Committee for control in the field of education and science of the Ministry of education and science of the Republic of Kazakhstan on the results of the examination, are awarded the degree of doctor of philosophy (PhD) or doctor in profile and issued a state diploma with the application (transcript).

Persons who have received a PhD degree, to deepen scientific knowledge, solve scientific and applied problems on a specialized topic performs a postdoctoral program or conduct research under the guidance of a leading scientist of the selected University.

3.1 Requirements for key competencies of doctoral graduates:

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1) have a performance:

- on the main stages of development and paradigm shift in the evolution of science;
- on the subject, ideological and methodological specifics of natural (social, humanitarian, economic) Sciences;
- about scientific schools of the corresponding branch of knowledge, their theoretical and practical developments;
- on scientific concepts of world and Kazakhstan science in the relevant field;
- on the mechanism of implementation of scientific developments in practice;
- norms of interaction in the scientific community;
- pedagogical and scientific ethics of the researcher;

2) know and understand:

- current trends, trends and patterns of development of domestic science in the context of globalization and internationalization;
- methodology of scientific knowledge;
- achievements of world and Kazakhstan science in the relevant field;
- (to realize and accept) social responsibility of science and education;
- perfect foreign language for scientific communication and international cooperation;

3) be able:

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- organize, plan and implement the research process;
- analyze, evaluate and compare different theoretical concepts in the field of research and draw conclusions;
- analyze and process information from various sources;
- to conduct independent scientific research, characterized by academic integrity, on the basis of modern theories and methods of analysis;
- generate your own new scientific ideas, communicate your knowledge and ideas to the scientific community, expanding the boundaries of scientific knowledge;
- choose and effectively use modern research methodology;
- plan and forecast your further professional development;

4) have the skills:

- critical analysis, evaluation and comparison of different scientific theories and ideas;
- analytical and experimental scientific activities;
- planning and forecasting the results of the study;
- public speaking and public speaking at international scientific forums, conferences and seminars;
- scientific writing and scientific communication;
- planning, coordination and implementation of research processes;
- systematic understanding of the field of study and demonstrate the quality and effectiveness of the chosen scientific methods;
- participation in scientific events, fundamental scientific domestic and international projects;

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- leadership management and team management;
- responsible and creative attitude to scientific, scientific and pedagogical activity;
- carrying out patent search and experience in the transfer of scientific information using modern information and innovative technologies;
- protection of intellectual property rights to scientific discoveries and developments;
- free communication in a foreign language;

5) be competent:

- in the field of scientific and scientific-pedagogical activity in the conditions of rapid updating and growth of information flows;
- in conducting theoretical and experimental research;
- in the formulation and solution of theoretical and applied problems in scientific research;
- professional and comprehensive analysis of problems in the relevant field;
- in matters of interpersonal communication and human resource management;
- in matters of University training;
- in the examination of scientific projects and research;
- in ensuring continuous professional growth.

3.2 Requirements for RWD student program doctor of philosophy (PhD):

- 1) compliance with the main problems of the educational program of doctoral studies, on which the doctoral dissertation is defended;
- 2) relevant and contains scientific novelty and practical significance;
- 3) based on modern theoretical, methodological and technological achievements of science and practice;

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- 4) based on modern methods of data processing and interpretation using computer technology;
- 5) performed using modern methods of scientific research;
- 6) contain research (methodical, practical) sections on the basic protected provisions.

3.3 Requirements for the organization of practices:

The practice is carried out in order to develop practical skills of scientific, scientific, pedagogical and professional activities.

The doctoral education program includes:

- 1) teaching and research practice - for students under the program of doctor of philosophy;
- 2) practical training – for students on the profile of doctoral program.

In the period of pedagogical practice, doctoral students, if necessary, are involved in conducting classes in bachelor's and master's degrees.

Research practice of the doctoral student is carried out in order to study the latest theoretical, methodological and technological achievements of domestic and foreign science, as well as the consolidation of practical skills, the use of modern methods of scientific research, processing and interpretation of experimental data in the dissertation research.

Practical training of doctoral students is carried out in order to consolidate the theoretical knowledge gained in the learning process, and improve the professional level.

The content of research and production practices is determined by the theme of the doctoral dissertation.

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4 Curriculum of the educational program "Hydrocarbon engineering"

4.1 Study duration: 3 years

year of study	Code	Name of course	Component	Academic credits	lecture/ lab/ prac/DSIW	Prerequisites	Code	Name of course	Component	Academic credits	lecture/ laboratory/ practice	Prerequisites
1	1 semester						2 semester					
	ME321	Research methods	BD IC	6	2/0/1/3		AAP345	Doctoral student research work, including internships and doctoral dissertations	DSRW	24		
	LNG304	Academic writing	BD IC	6	2/0/1/3		AAP350	Pedagogical practice	BD	10		
		Elective	BD OC	6								
		Elective	PS OC	6								
		Elective	PS OC	6								
	In total			30			In total			34		
2	3 semester						4 semester					
	AAP345	Doctoral student research work, including internships and doctoral dissertations	DSRW	24			AAP346	Doctoral student research work, including internships and doctoral dissertations	DSRW	25		
	AAP349	Research scientific training	PS	10								
	In total			34			In total			25		
3	5 semester						6 semester					
	AAP346	Doctoral student research work, including internships	DSRW	25			AAP346	Doctoral student research work, including internships and doctoral	DSRW	25		

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		and doctoral dissertations						dissertations				
						ECA303		Writing and defending doctoral dissertation	FA	12		
		In total		25				In total		37		
								In all		185		

4.2 Elective discipline for 2020-2021 academic year admission

Study duration: 3 years

№	Code	Name of discipline	Credits	lec/lb/prac	semester
PD Components of choice - 6 credits					
1	BIO 315	Oil dispersion systems	6	2/0/1/3	1
2	BIO 314	Green chemistry in the production of chemical substances and materials	6	2/0/1/3	1
BPD Components of choice - 6 credits					
3	BIO 316	*GTL technology	6	2/0/1/3	1
		Total:			

*Interdisciplinary disciplines

Modular curriculum

The cycle	code	Name of disciplines	Semester	Acad. credits	lec.	lab.	prac	IWS	Type of control	Chair
Profile training module										
Basic disciplines (BD) (6 credits)										
University component (UC 6 credits)										
BD 1.1.1	MET321	Research methods	1	6	2	0	1	3	Exam	M

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BD 1.2.1	LNG304	Academic writing	1	6	2	0	1	3	Exam	EL
Choice component (CC 6 credits)										
BD	BIO 316	*GTL technologies	1	6	2	0	1	3	Exam	CBE
BD	BIO 320	Complex processing of hydrocarbon raw materials								
Practice-oriented module										
	AAP350	Pedagogical practice	2	10					Report	CBE
Major disciplines (MD) (6 credits)										
Choice component										
MD		<u>Chemical Engineering Disciplines Module</u>								
MD	BIO 315	Oil dispersion systems	1	6	2	0	1	3	Exam	CBE
MD	BIO 318	Molecular design of catalysts								
MD	BIO 314	Green chemistry in the production of chemical substances and materials	1	6	2	0	1	3	Exam	CBE
MD	BIO 319	Heat and mass transfer in challenging refining conditions								
Practice-oriented module										
MD	AAP349	Research scientific training	3	10					Report	CBE
Research Module (123 credits)										
DSRW	AAP345	Doctoral student research work, including internships and doctoral dissertations	2	24					Report	CBE
DSRW	AAP345	Doctoral student research work, including internships and doctoral dissertations	3	24					Report	CBE
DSRW	AAP346	Doctoral student research work, including internships and doctoral dissertations	4	25					Report	CBE

DSRW	AAP346	Doctoral student research work, including internships and doctoral dissertations	5	25					Report	CBE
DSRW	AAP346	Doctoral student research work, including internships and doctoral dissertations	5	25					Report	CBE
Final attestation module										
FA	ECA303	Writing and defending doctoral dissertation	6	12					Defending dissertation	Dissertation council
Total				185						

*Interdisciplinary disciplines

5 Descriptors of level and scope of knowledge, skills and competences

Descriptors of the third level within the Comprehensive framework of qualifications of the European higher education area (EHEA) reflect the learning outcomes that characterize the ability of the student:

- 1) demonstrate a systematic understanding of the field of study, skills and research methods used in the field of chemistry of organic compounds;
- 2) demonstrate the ability to think, design, implement and adapt an essential research process with a scientific approach;
- 3) contribute with their own original research to the expansion of the boundaries of the scientific field, which deserves publication at the national or international level;
- 4) critically analyze, evaluate and synthesize new and complex ideas;
- 5) communicate their knowledge and achievements to colleagues, the scientific community and the General public;
- 6) to promote, in the academic and professional context, the technological, social or cultural development of a knowledge-based society.

6 Supplement to the diploma according to the standard ECTS

The application is developed according to the standards of the European Commission, the Council of Europe and UNESCO/CEPES. This document serves only for academic recognition and is not an official confirmation of the document on education. Without a diploma of higher education is not valid. The purpose of completing the European Annex is to provide sufficient data on the holder of the diploma, the qualification he / she obtained, the level of this qualification, the content of the training program, the results, the functional purpose of the qualification, as well as information on the national education system. The application model that will translate the estimates uses the European credit transfer or credit transfer system (ECTS).

The European diploma Supplement provides an opportunity to continue education in foreign universities, as well as to confirm the national higher education for foreign employers. When traveling abroad for professional recognition will require additional

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legalization of the diploma of education. The European diploma Supplement is completed in English upon individual request and is issued free of charge.

INNOVATIVE TECHNOLOGIES OF OIL PROCESSING AND PETROCHEMISTRY

CODE-270

Credit – 5

PREREQUISITES-organic chemistry, physical chemistry

THE PURPOSE AND OBJECTIVES OF THE COURSE

The main objective of the course is to update theoretical and practical knowledge and skills on modern technology of oil refining, intensification of oil refining processes, and in the development of oil refining as the main source of raw materials for petrochemical synthesis.

Course objective:

- familiarization of undergraduates with the basics of oil chemistry, theory and technology of the main processes of oil refining and petrochemical industries;
- skills in determination of physico-chemical and performance properties of petroleum and petroleum products;
- application of the knowledge gained in the course of studying the discipline for independent work in order to acquire additional knowledge in the field of technologies of oil refining and petrochemistry.

BRIEF DESCRIPTION OF THE COURSE

The discipline "Innovative technologies in petrochemical production" is designed to study the basics of the magistrates of oil refining and petrochemical processes, their types, the acquisition of skills of technological and structural calculation of equipment of this type of production, the formation of students ' scientific thinking, the application of knowledge in the economy, everyday life and in solving environmental problems.

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KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

The study of this discipline will allow undergraduates to solve practical problems, to form scientific thinking, in particular, to 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 physico-chemical properties of different classes of compounds, to apply this knowledge in the economy, everyday life and solving environmental problems.

GTL TECHNOLOGIES

CODE – CHE278

CREDIT – 5

PREREQUISITE – organic chemistry, physical chemistry

THE PURPOSE AND OBJECTIVES OF THE COURSE

The main purpose of the course – to acquaint students with the basic laws of chemical reactions in the production and processing of synthesis gas; solution of various technological problems arising in the management of technological installations; properties of raw materials, products, catalysts used in the industry.

Course objectives: the discipline "GTL technologies" is intended for professional training of specialists in chemical technology of organic substances and petrochemicals. Mastering this course contributes to a deep understanding of the chemistry and technology of the C_1 molecule, the technology of alternative synthetic fuels, the production of many chemical and petrochemical products based on GTL technology, the prospects of the GTL industry

BRIEF DESCRIPTION OF THE COURSE

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In the course of "GTL technologies" is the presentation of the sections: the Trend of development of gas chemistry. The role of the synthesis gas in the process gas chemistry. Biogas, biomass. The production of synthesis gas from biomass. Plasma thermal method for production of synthesis gas from coal. Processing of heavy oil residues to produce synthesis gas. Production of liquid hydrocarbons by utilization of low-pressure and flare associated gases of oil and gas fields. Characteristics of compressed air, the production technology of compressed air. Fischer-Tropsch Synthesis. Processing of synthesis gas into liquid fuels. Preparation of aldehydes and alcohols by oxosynthesis. Perspective directions of production of methanol. Three-phase methanol synthesis. Synthesis of dimethyl ether. Production of formic and acetic acids..

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

- to apply in practice knowledge from the field of oil and gas processing and petrochemistry;
- to solve specific problems from various fields of chemistry used in the industry;
- to use the accumulated knowledge for the design and calculation of technological installations.

CHEMICAL REAGENTS IN THE PROCESS OF OIL PREPARATIONS AND OIL PRODUCTION

CODE – CHE282

CREDIT– 5

Prerequisite –Technology of organic and petrochemical production, Physics and chemistry of petrochemical industries, Basic processes and devices of chemical technology, Technology of processing of hydrocarbon raw materials

PURPOSE AND TASKS OF THE COURSE

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The main objective of the course - the Discipline "Chemical reagents in the processes of oil preparation and oil production" aims to familiarize undergraduates with practical and theoretical fundamentals on the use of reagents from the oilfield and refining industries.

Course objectives: Formation of professional competencies among students, necessary for professional activities in the field of applied research on the problems of oilfield chemistry, initiating the creation, development and experimental verification of innovative technologies in the development and implementation of various types of chemical reagents in oil and gas production; improvement and development of new methods for experimental research of physical and chemical processes in oil and gas production, testing of chemical reagents for oil and gas production; acquiring new qualifications "engineer-technologist"

BRIEF DESCRIPTION OF THE COURSE

The course "Chemical reagents in the processes of oil preparation and oil production" is dedicated to the urgent problems of oilfield chemistry related to the production, transportation and primary preparation of oil. The main problems arising during the extraction and transportation of crude oil, as well as during its initial preparation, which can be solved by using chemical reagents are summarized and explained from a scientific point of view. The ways and methods of solving these problems are outlined, practical recommendations are given on the choice of the necessary reagents for oilfield chemistry.

KNOWLEDGE, ABILITIES, SKILLS TO COMPLETE COURSE

A student after mastering the program of this discipline must:

- to apply in practice the principles of rational use of chemicals in the processes of oil preparation and oil production;
- carry out and correct technological processes in the construction, repair and operation of wells for various purposes and the profile of the trunk on land and at sea, transport and storage of hydrocarbons;
- to operate and maintain technological equipment used in the construction, repair, reconstruction and rehabilitation of oil and gas wells, oil and gas production,

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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, the improvement of technological equipment and the reconstruction of production;

- draw up technological and technical documentation for the operation of oil and gas equipment;

MODERN INSTRUMENTAL METHODS OF RESEARCH

CODE – CHE271

CREDIT – 5

PREREQUISITE – Organic chemistry

THE PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is to give the future specialist a fundamental basis for the study of oil and petrochemical products. To acquaint students with the theoretical foundations for the construction of the basic physical concepts underlying modern methods of analysis of the structure and properties of hydrocarbons, allowing to carry out a reasoned prediction of the physical properties of petroleum products based on the chemical properties of the original oil.

Course objective: acquisition of knowledge necessary for effective use in the field of rapidly developing modern instrumental methods of research; possession of the fundamental foundations for the study of oil and petrochemical products necessary to solve research and practical problems in the professional field.

BRIEF DESCRIPTION OF THE COURSE

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In the course on "Modern instrumental methods of research" is a statement of the sections: the present state of the representations underlying physical and physico-chemical studies of organic matter; methodology of application of the main physical regularities inherent to the oil system for metrological purposes; the relationship between the chemical structure of hydrocarbons and their physico-chemical parameters; establishing details of the chemical structure of the obtained compounds on the basis of quantitative data on its physical properties; the solution of problems; practical use of tools, allowing to implement, debug, and run in practice all types of the studied algorithms; the principles of interpretation of the results obtained on the basis of data obtained by physical - chemical methods of research and the existing knowledge about the Association of the structure of oil and its individual fractions of their physical parameters; a comprehensive approach to selecting a method, apparatus and methodology of the study the hydrocarbon composition of the oil.

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

The study of this discipline will allow the student to gain **knowledge** and develop the **skills** necessary for solving simple practical problems, to find tools sufficient for their research, to obtain numerical results in some standard situations. Knowledge can be used in the laboratory of chemical, environmental, petrochemical, gas and coal profile.

OIL DISPERSED SYSTEMS

CODE - CHE284

CREDITS - 5

PREREQUISITE– Physics, Physical Chemistry.

PURPOSE AND OBJECTIVES OF THE COURSE

The main purpose of the course is to form students’

- knowledge about the dispersed state of a substance, about the peculiarities of molecular-kinetic, optical, surface, electrochemical properties of oil dispersed systems;

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- concepts of the general laws of the physical chemistry of oil dispersed systems and surface phenomena,
- the concept of surface forces and adsorption;
- knowledge of the stability of oil disperse systems;
- the ability to use the general laws of physical chemistry of oil disperse systems and surface phenomena in the integrated production and technological activities;
- the ability to perform calculations of the parameters of oil dispersed systems based on physical chemistry methods;
- creative thinking, the ability to apply fundamental knowledge of the dispersed state of a substance to solve production problems, with subsequent processing and analysis of research results;
- skills of independent carrying out theoretical and experimental research of properties of oil dispersed systems.

The main tasks of the studying this discipline include the following items:

- the study of the main sections of the colloidal chemistry of oil disperse systems — the thermodynamics of surface phenomena, the molecular kinetic and optical properties of oil disperse systems, the stability of oil disperse systems, surface phenomena involving oil, adsorption on solid surfaces, the regulation of the stability of oil disperse systems using surfactants , capillary pressure in porous bodies;
- providing students with creative thinking, combining the fundamental knowledge of the basic laws and methods of conducting physical and chemical research, with the subsequent processing and analysis of the results.
- finding the relationship between chemical and physical processes.

BRIEF DESCRIPTION OF THE COURSE

In the course of discipline the following aspects will be considered: dispersed (colloidal) state of matter; methods for the preparation and purification of oil disperse systems; molecular kinetic, surface and optical properties of oil dispersed systems; basics of thermodynamic description of surface phenomena; adsorption at various phase boundaries; the phenomenon of wetting and spreading of fluid (oil); electric double

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layer and electro-surface phenomena in oil dispersed systems; stability and structural-mechanical properties of oil dispersed systems; properties of oil emulsion; surfactants and micellar systems; colloid-chemical bases of environmental protection.

TECHNOLOGY OF HEAVY OIL REFINING

CODE - CHE 279

CREDIT - 5

PREREQUISITE- Physical chemistry, General chemical technology, Technology of hydrocarbon refining, The main processes and apparatus of chemical technology.

PURPOSE AND TASKS OF THE COURSE

The main objective of the course is to study the general trend of the oil industry in the refining of heavy viscous sulfur dioxide.

Course tasks: to form the basis of technological thinking, to reveal the relationship between the development of chemical science and chemical engineering, to prepare graduates for active creative work.

BRIEF DESCRIPTION OF THE COURSE

In the course "**Technology of heavy oil refining**", the following sections are presented: the contribution of technologies based on traditional processes to the world refining of heavy oil feedstock, new technologies in the form of pilot plants, primary treating of heavy oils, thermal and extraction processes, hydrocatalytic processes, and natural hydrocatalytic processing. bitumen, physico-chemical and technological aspects of the refining of heavy hydrocarbons, especially the composition of heavy and bituminous oils. Natural bitumens, their rheological properties.

KNOWLEDGE, SKILLS AFTER COMPLETION OF A COURSE

Develop new approaches to the refining of heavy oils; calculate the technological parameters of the processes of heavy oils refining; determine the parameters of the best

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organization of the process, amended to the specificity of raw materials; methods for determining the optimal and rational technological modes of operation of equipment for the refining of heavy hydrocarbon raw materials.

DEFENSE OF DOCTORAL DISSERTATION

CODE – ECA302

CREDIT -12

The purpose of the doctoral dissertation is to assess the scientific-theoretical and research-analytical level of the doctoral student, formed professional and managerial competencies, readiness for independent implementation of professional tasks and compliance of its preparation with the requirements of the professional standard and the educational program of doctoral studies.

BRIEF DESCRIPTION

Doctoral dissertation is a scientific work of a doctoral student, which is an independent study, in which theoretical provisions are developed, the totality of which can be qualified as a new scientific achievement, or a scientific problem is solved, or scientifically substantiated technical, economic or technological solutions are presented, the introduction of which makes a significant contribution to the development of the country's economy.

Doctoral dissertation-the result of research / experimental research work of the doctoral student, conducted during the entire period of doctoral studies.

The defense of the doctoral dissertation is the final stage of the master's degree. Doctoral dissertation should meet the following requirements:

- The theme of the dissertation should be related to the priority directions of development of science and/or state programs or programs of fundamental or applied research.

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- The content of the dissertation, goals and objectives, scientific results should strictly correspond to the topic of the dissertation.

- The thesis is carried out in compliance with the principles of independence, internal unity, scientific novelty, reliability and practical value.

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Рецензия
на образовательную программу PhD докторантуры
«Химическая инженерия углеводородных соединений»

Образовательная программа «Химическая инженерия углеводородных соединений» PhD докторантуры предполагает фундаментальную образовательную, методологическую и исследовательскую подготовку высококвалифицированных специалистов, обладающих глубокими научными знаниями и профессиональными педагогическими навыками, для нефтегазохимической отрасли экономики, сферы науки и образования.

Образовательная программа (ОП) «Химическая инженерия углеводородных соединений» квалификации «8D071 - Инженерия и инженерное дело» Национальной рамки квалификации, разработана на основе Государственного общеобязательного стандарта высшего образования Республики Казахстан. Содержание и структура ОП по направлению подготовки «8D071 – 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 объема знаний, умений, навыков.

Структура Учебного плана ОП «Химическая инженерия углеводородных соединений» логична и последовательна. Дисциплины учебного плана раскрывают сущность актуальных на сегодняшний день проблем. В программе предусмотрено углублённое изучение дисциплин по органической химии и химии углеводородных материалов, современным методам их исследования, а так же ряд специальных дисциплины, которые способствуют формированию управленческих навыков выпускников, таких как, разработка и организация безотходного производства, комплексной подход при решении научных проблем в области производства и переработки органических веществ и материалов с минимизацией вредного воздействия на окружающую среду, *способность ориентироваться в больших объемах информации, действовать в условиях неопределённости.* Эти качества позволяют выпускникам программы PhD докторантуры быть конкурентоспособными в современных условиях развития экономики страны.

Считаю, что образовательная программа «Химическая инженерия углеводородных соединений» PhD докторантуры отвечает потребностями рынка

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