



**Kazakh National Research Technical University named after K.I. Satpayev
K. Turysov Institute of Geology and Oil-Gas Business
Department of Chemical and Biochemical Engineering**

EDUCATION PROGRAM

**CHEMICAL ENGINEERING OF HYDROCARBON COMPOUNDS"
"7M07122 - Chemical Engineering of Hydrocarbon Compounds"
Master of Engineering and Technology**

1st Edition

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

Almaty 2021

The program is compiled and by the parties:

From KazNRTU named after K.Satpayev:

1. The Head of the ChTOS&P Department  A.A. Amitova
2. Director of the Ch&BT Institute  A.Kh. Syzdykov



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 K.I. satpayev.
Minutes number 3 of 25/06/2021

Qualification:

Level 7 National Qualification Framework:

- 7M071 – Engineering, manufacturing and construction industries
- 7MB07 - Engineering and engineering (master's degree)

Professional competencies: mastering modern methods of scientific research, setting and formulating the tasks of scientific research based on the results of the search for scientific and technical information, processing and analysis of scientific and technical information, development of new technical and technological solutions in the development of petrochemical products taking into account technical, economic and environmental requirements, Organization of work of the team of performers, making managerial decisions in the conditions of different opinions, application of interactive forms and innovative methods of training in modern universities.

BRIEF DESCRIPTION OF THE PROGRAM

1. Goals:

- formation of general cultural, professional and special competencies that allow graduates to independently set and solve production and technological and experimental research tasks in the field of modern production of chemical materials;
- training of specialists who know modern methods of organization and management of petrochemical processes and production of chemical materials, who are able to solve managerial tasks and be responsible for decisions taken;
- preparation of masters with leadership qualities, capable of self-education, proficient in a foreign language at a professional level.

2 Types of labor activity.

A graduate of the educational program "Chemical engineering of hydrocarbon compounds" in the profile direction of training 7M071 - Engineering and Engineering is preparing for the following types of professional activity:

- production;
- project;
- organizational and managerial.

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

Subjects of professional activity: petrochemical enterprises and production facilities of various profiles, research and engineering companies, research and design industry institutes; research laboratories.

PASSPORT OF THE EDUCATIONAL PROGRAM

1 Scope and content of the program

The duration of the master's degree is determined by the amount of academic credits mastered. Upon mastering the established amount of academic credits and achieving the expected learning outcomes for obtaining a master's degree, the Master's degree program is considered fully mastered. In a specialized master's degree with a typical 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 a graduate student.

Planning of the content of education, the way 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 training.

The Master's degree program in the profile direction implements educational programs of postgraduate education for the training of managerial 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 core 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 certification.

Regulatory documents for the development of an educational program

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

- The Law of the Republic of Kazakhstan "On Education" with amendments and additions within the framework of legislative changes to increase the independence and autonomy of universities dated 04.07.18 No. 171-VI.

- The Law of the Republic of Kazakhstan "On Amendments and Additions to Some Legislative Acts of the Republic of Kazakhstan on the expansion of academic and managerial independence of higher educational institutions" dated 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 approval of Standard rules for the activities of educational organizations of appropriate types";

- State mandatory standard of higher education (Appendix 7 to the Order of the Minister of Education and Science of the Republic of Kazakhstan dated 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 Approval of the Rules of Transfer and restoration of Students by Types of Educational Organizations with Amendments and Additions by Order No. 601 dated 31.10.18.;

- Working curriculum of the educational program "Chemical Engineering of hydrocarbon compounds" for 2019-2020, approved by the Rector of the K.I. Satpayev Kazakh National Research Technical University;

- Documents of the QMS system (Quality Management System) on the organization of the educational process at the K.I. Satpayev Kazakh National Research Technical University.

The Content Of The Educational Program: "Chemical engineering of hydrocarbon compounds" is implemented by KazNITU named after K.I. Satpayev in the profile direction of training 7M071 - engineering and engineering 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 production of chemical materials.

The EP provides an opportunity to obtain in-depth knowledge, key skills and abilities of the graduate and their further development in the field of petrochemical engineering and production of chemical materials. This OP 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 their own individual competencies reflecting the specifics of a particular specialization within the framework of the unified educational direction 7M071 – engineering and engineering (master).

Objectives of the educational program:

A master's degree in the field of training 7M071 - engineering and engineering should be prepared to solve 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 the material and thermal balances of petrochemical processes;
- to make the hardware and technological scheme of the process;
- calculate the main structural and technological parameters of the main and auxiliary equipment;
- develop or select drawings of equipment, buildings and structures;
- develop simulation models of chemical and technological processes.

2. Production activities

- develop chemical and technological processes for obtaining new substances and materials;
- to improve the technological schemes of existing production facilities with justification 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, possess modern methods of testing them, use state and international standards in professional activities;

- to 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 chemical materials production;
- develop environmental protection measures for petrochemical enterprises.

3. Organizational and managerial activities.

- to provide information support for production, labor and management;
- to carry out measures for the organization of production in accordance with regulatory documents;

- develop and compile the necessary documentation;
- organize the activities of the team, make work plans and set production tasks.
- solve logistical issues, monitor 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 admission of citizens to the magistracy is established in accordance with the "Standard rules for admission to training in educational organizations implementing 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 free postgraduate education on a competitive basis in accordance with the state educational order, if they receive education at this level for the first time.

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

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

3 Requirements for completing studies and obtaining a diploma

Degree/qualifications awarded: 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 the Master's degree program should 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;
- * ability to formulate research goals independently, establish the sequence of solving professional tasks;
- * the ability to apply in practice the knowledge of fundamental and applied sections of disciplines that determine the orientation (profile) of the master's degree program;
- * the ability to professionally select and creatively use modern scientific and technical equipment to solve experimental and practical problems;
- * the ability to critically analyze, present, defend, discuss and disseminate the results of their professional activities;
- * proficiency 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;
- * willingness to communicate orally and in writing in a foreign language to solve the tasks of professional activity.

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

production activity:

- * the ability to independently carry out production, field and laboratory and interpretative work in solving practical problems;
- * the ability to professionally operate modern field and laboratory equipment and devices in the field of the master's degree program;
- * the ability to use modern methods of processing and interpreting complex information to solve production problems;

project activities:

- * the ability to independently draw up and submit projects of research and scientific-production works;
- * readiness to design complex research and scientific-production works in solving professional tasks;

organizational and managerial activities:

* readiness to use practical skills in organizing and managing research and scientific-production work in solving professional tasks;


* readiness for the practical use of regulatory documents in the planning and organization of scientific and production work.

When developing a master's degree 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 "Chemical engineering of hydrocarbon compounds "

4.1. The duration of training is 1.5 years

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РЕСПУБЛИКИ КАЗАХСТАН
 НАО "КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ ИМ. К.Н. САТБАЕВА"

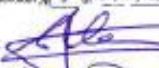




УЧЕБНЫЙ ПЛАН образовательной программы для набора на 2021-2022 учеб. год
 Образовательная программа "090702 - "Углубленная инженерия углеводородных соединений"
 Группы образовательных программ 0907 - "Углубленная инженерия в химии"
 Форма обучения: дневная Срок обучения: 1,5 года Академический совет: министр образования и науки

Год обучения	Код	Наименование дисциплины	Цели	Объем учебной программы	Всего часов	Академический кредит	СРМ (в том числе СРМ/ПД в семестр)	Периодичность	Код	Наименование дисциплины	Цели	Объем учебной программы	Всего часов	Академический кредит	СРМ (в том числе СРМ/ПД в семестр)	Периодичность
1	090701	Вводный курс (профессиональный)	ПД, ОК	4	120	0907	90		090701	Интегрированные курсы по углубленной инженерии углеводородных соединений	ПД, ОК	3	150	3001	105	
	090702	Математика	ПД, ПК	4	90	1001	60		090702	Современные методы математического анализа в инженерии углеводородных соединений	ПД, ПК	3	150	3001	105	
	090703	Физика	ПД, ПК	3	90	1001	90		090703	СФУ углеводородных соединений	ПД, ПК	3	120	1001	90	
	090704	Углубленный курс по органической химии	ПД, ПК	5	150	2001	105		090704	Современные проблемы контроля качества углеводородных соединений	ПД, ПК	2	150	2001	105	
	090705	Углубленные курсы для разработки новых технологий в области углеводородных соединений	ПД, ПК	3	150	3001	105		090705	Докладные технологии в разработке углеводородных соединений	ПД, ПК	3	150	3001	105	
	090706	Безопасность технологических и химических процессов	ПД, ПК	3	150	3001	105		090706	Интегрированные курсы по углубленной инженерии углеводородных соединений	ПД, ПК	4				
	Итого				25				Итого	29						
2	090707	Проектирование процесса	ПД, ПК	12												
	090708	Углубленные курсы по углубленной инженерии углеводородных соединений	ПД, ПК	14												
	090709	Углубленные курсы по углубленной инженерии углеводородных соединений	ПД, ПК	12												
	Итого				38				Итого	45						

Решение Академического совета КазНТУ имени С.Сатпаева. Протокол № 3 от 25.06.2021 г.

Решение Ученого совета ИАИОНУ. Протокол № 5 от 24.12.2020 г.

Проректор по академической работе:  Жетпиев Б.А.
 Директор:  Сатпаев А.Х.
 Заместитель ректора:  Рафикова Х.С.

Цели дисциплины	Кредиты
Цели общей профессиональной подготовки	0
Цели базовых дисциплин (ПД, ПК, КР)	12
Цели профессиональных дисциплин (ПД, ПК, ПД, КР)	45
Всего по теоретическому обучению:	57
ПД, ПК	58
СРМ/ПД/ПД в семестр	52
Итого:	80

5 Descriptors of the level and scope of knowledge, skills, skills and competencies

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

Learning outcomes are formulated both at the level of the entire master's degree 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 studied field 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 their knowledge, understanding and abilities at a professional level to solve problems in a new environment, in a broader interdisciplinary context;

3) to collect and interpret information for the formation of judgments taking into account social, ethical and scientific considerations;

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

5) to show the learning skills necessary for independent continuation of further education in the field of chemical engineering and engineering.

6 Competencies upon completion of training

6.1 Requirements for the core competencies of graduates of the profile Master's degree. The graduate must:

1) have an idea:

* about current trends in the development of scientific knowledge;

* about current methodological and philosophical problems of natural (social, humanitarian, economic) sciences;

* contradictions and socio-economic consequences of globalization processes;

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

* about the organization of strategic enterprise management, innovation management, leadership theories;

* about the main financial and economic problems of the functioning of enterprises.

2) know:

* methodology of scientific knowledge;

* the main driving forces of changing the structure of the economy;

* features and rules of investment cooperation;

• at least one foreign language at a professional level that allows conducting scientific research and practical activities.

3) be able to:

* apply scientific methods of cognition in professional activity;

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

- * integrate the knowledge gained in different disciplines, use them to solve analytical and managerial tasks in new unfamiliar conditions;
- * conduct microeconomic analysis of the economic activity of the enterprise and use its results in the management of the enterprise;
- * to put into practice new approaches to the organization of marketing and management;
- * to make decisions in complex and non-standard situations in the field of organization and management of the economic activity of the enterprise (firm);
- * to apply in practice the norms of the legislation of the Republic of Kazakhstan in the field of regulation of economic relations;
- * think creatively 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;
- * summarize the results of experimental research and analytical work in the form of a master's thesis, an article, a report, an analytical note, etc.

4) *have skills:*

- * solutions to standard scientific and professional tasks;
- * scientific analysis and solution of practical problems in the organization and management of economic activities of organizations and enterprises;
- * research problems in the field of management and marketing and use the results to improve the methods of enterprise management;
- * professional communication and intercultural communication;
- * oratory, correct and logical formalization of their thoughts in oral and written form;
- * expanding and deepening the knowledge necessary for daily professional activities and continuing education in doctoral studies;
- * the 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 modern problems of the world economy and the participation of national economies in world economic processes;
- * in the organization and management of the company's activities;
- * 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, skills and abilities

B1 - the ability to use philosophical concepts of natural science to form a scientific worldview;

B2 - the ability to apply knowledge of the methodology of chemical sciences and chemical engineering to solve specific professional tasks and assess technological risks;

B3 - the ability to use psychological methods and means to improve the effectiveness and quality of training.

P - Professional competencies:

P1 – the ability to independently analyze the available information, set goals and objectives and perform experimental research using modern instrumental methods and computing tools, be responsible for the quality of research and the scientific reliability of the results obtained;

P2 - the ability to generate new ideas and methodological solutions;

P3 - the ability to professionally design, present and report the results of research and production and technological work according to approved forms;

P4 - willingness to creatively apply modern computer technologies in the collection, storage, processing, analysis and transmission of information to solve professional problems in the field of chemical engineering and production of chemical materials;

P5 - the ability to plan and carry out measures to assess the state and protection of the environment, to organize measures for rational use of natural resources;

P6 - proficiency in the formation and presentation of educational material in various forms, conducting laboratory and practical classes, readiness to teach in educational institutions and leadership of students' research work.

O - Universal, social and ethical competencies

O1 - knowledge of modern social and political problems;

O2 - the ability to perceive cross-cultural differences, the ability to observe and maintain ethical norms and rules;

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

C - Special and managerial competencies:

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

C2 - ability to plan and organize professional events;

C3 - willingness 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's student in a specialized master's degree.

The experimental research work of a master's student should:

- 1) correspond to the profile of the master's degree program, according to which the master's project is being implemented and defended;
- 2) be based on modern achievements of science, technology and production and contain specific practical recommendations, independent solutions to management tasks;
- 3) be carried out with the use of advanced information technologies;
- 4) contain experimental research (methodological, practical) sections on the main protected provisions.

6.3 Requirements for the organization of practices:

The educational program of the profile master's degree includes industrial practice in the PD cycle.

Industrial practice in the PD cycle is carried out in order to consolidate the theoretical knowledge gained in the course of training, acquire practical skills, competencies and professional experience in the Master's degree program being taught, as well as the development of best practices.

7 Appendix to the diploma according to the ECTS standard

The application is developed according to the standards of the European Commission, the Council of Europe and UNESCO/SEPES. This document serves only for academic recognition and is not an official confirmation of the document of education. It is not valid without a higher education diploma. The purpose of filling out the European Application is to provide sufficient data about the diploma holder, the qualification he received, the level of this qualification, the content of the training program, the results, the functional purpose of the qualification, as well as information about the national education system. The application model, according to which the estimates will be translated, uses the European Credit Transfer or Credit 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 traveling abroad, additional legalization of the diploma of education will be required for professional recognition. The European diploma supplement is filled out in English according to an individual request and is issued free of charge.

ENGLISH LANGUAGE (PROFESSIONAL)

Professional English for Project Managers

COD– LNG210

CREDIT – 5

PREREQUISITE –Academic English, Business English, IELTS 5.0-5.5

THE PURPOSE AND OBJECTIVES OF THE COURSE

The aim of the course is to form a foreign-language professionally oriented competence among undergraduates. Course objectives:

to develop the ability to realize communicative intention in various situations of professionally oriented oral and written communication based on four types of speech activity:

Listening, Speaking, Reading and Writing. To teach to use a foreign language as a means of accumulating information for professional and academic communication. Prepare undergraduates for passing certified tests

BRIEF DESCRIPTION OF THE COURSE

The course is designed for master students of technical specialties for improvement and development of foreign language communication skills in the professional and academic spheres. The course introduces students the general principles of professional and academic intercultural oral and written communication using modern pedagogical technologies (round table, debates, discussions, analysis of professionally oriented cases, projecting).

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

Upon completion of the course, undergraduates will know:

-language means of professionally oriented and academic foreign language communication;

-a system of rules for constructing meaningful statements in a foreign language; be able to use a foreign language as a means of oral and written communication for professional and academic purposes; communicate and request information, express their own opinion / judgment, using argumentation, and evaluative language means;

- logically and consistently build an oral / written statement (in connection with what they heard / read), expressing personal attitude to the subject of speech;

-use a foreign language as a means of professional and academic interaction

MANAGEMENT

CODE - MNG274

CREDIT 3

THE PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course is to review business and management as a field of theoretical developments and practical activities. It includes consideration of classical management theories and modern approaches to organizations and business conduct. The main blocks of the course are management functions, connecting management processes and interaction between the organization and the external environment. Special emphasis is placed on social responsibility and business ethics, and also includes elements of project management.

BRIEF DESCRIPTION OF THE COURSE

The content of the course reflects the issues of studying the mechanisms of innovation development, financing of scientific and technical projects, innovation management, methods for assessing the economic efficiency of innovations, strategies for entering a new business, features of intellectual property management.

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

A master's student who has studied the course "Management" should know: terminology, basic concepts and definitions; mechanisms for organizing innovation activities; mechanisms for financing scientific and technical projects; features of intellectual property management; features and strategy for entering a new business; be able to: make a business plan for the implementation of a high-tech project; have skills: work with literature on relevant topics.

MANAGEMENT PSYCHOLOGY

CODE - HUM204

CREDIT - 3

PREREQUISITES

PURPOSE AND OBJECTIVES OF THE COURSE

The main purpose of the course is aimed at studying the behavior of individuals and groups of people within organizations; determining psychological and social factors influencing the behavior of employees. Also, much attention will be paid to the issues of internal and external motivation of people. The main goal of the course is to apply this knowledge to improve the efficiency of the organization.

BRIEF DESCRIPTION OF THE COURSE

The course is designed to provide balanced coverage of all the key elements that make up the discipline. It will briefly examine the origin and development of the theory and practice of organizational behavior, and then will examine the main roles, skills and functions of management with an emphasis on management effectiveness, illustrated by real-life examples and case studies.

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

At the end of the course, students will know: the basics of individual and group behavior; basic theories of motivation; basic theories of leadership; concepts of communication, conflict management and stress in the organization; will be able to identify various roles of managers in organizations; look at organizations from the point of view of managers; understand how effective management contributes to an effective organization.

MECHANISMS OF ORGANIC REACTIONS

CODE - CHE 779

CREDIT-5

PURPOSE AND OBJECTIVES OF THE COURSE

As part of the course, the master's student will master the practical use of knowledge on high-molecular compounds, their nomenclature, methods of obtaining.

BRIEF DESCRIPTION OF THE COURSE

The basic knowledge and skills in the field of chemistry of high-molecular compounds, modern ideas about their structure, properties, as well as the most important areas and aspects of the practical application of polymers, methods of their analysis and identification will be presented.

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

The ability to perceive and analyze information about chemical processes; modern methods of working with organic substances; A master's student should be able to: determine the reaction mechanism by external controlled parameters; determine the reaction mechanism by the reaction equation; be able to determine the reaction mechanism by the nature of reagents to navigate the flow of information concerning the dynamics of chemical processes; interpret experimental data and make judgments about the reaction mechanism;- classification of organic reactions and reagents; basic mechanisms of organic reactions.

INDUSTRIAL REACTORS FOR LARGE-CAPACITY PETROCHEMICAL INDUSTRIES

CODE - CHE 766

CREDIT – 5 (2/0/1)

PREREQUISITES Physical chemistry, General chemical technology, Basic processes and devices of chemical technology.

THE PURPOSE AND OBJECTIVES OF THE COURSE

The main purpose of the course is to study the basic laws of chemical processes occurring in reactors, and the theoretical foundations of the calculation of 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.

BRIEF DESCRIPTION OF THE COURSE

The course "Industrial reactors for large-capacity chemical processes" presents the following sections: fundamentals of the theory of the process in a chemical reactor, mathematical modeling of reactors, designs of modern chemical reactors, new trends in the development of the theory of processes and apparatuses; interactions of chemical transformations and transfer phenomena at all scale levels, methods of choosing 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, SKILLS, SKILLS AT THE END OF THE COURSE

Calculate the main characteristics of the 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 optimal and rational technological modes of equipment operation; methods for calculating and analyzing processes in chemical reactors; determination of technological process parameters; methods for selecting chemical reactors.

TECHNOLOGY OF HETEROLYTIC AND HOMOLYTIC OIL REFINING PROCESSES

CODE - CHE 766

CREDIT – 5 (2/0/1)

PREREQUISITES: organic chemistry, physical chemistry

THE PURPOSE AND OBJECTIVES OF THE COURSE

The main purpose of the course "Technology of heterolytic and homolytic processes of oil refining" is to provide scientific foundations and master the basic technological principles of catalytic processes of oil refining.

Course objectives:

- creation of the foundations of theoretical training of undergraduates to solve practical problems;
- laying the scientific foundations of chemistry, kinetics and technology of hydrocarbon processing processes;
- instilling practical skills for the development of energy- and material-saving environmentally friendly technological productions;
- acquisition of skills in technological and structural calculation of equipment for the oil refining and petrochemical industry;

BRIEF DESCRIPTION OF THE COURSE

The discipline "Technology of heterolytic and homolytic processes of oil refining" is intended for undergraduates 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 material-saving environmentally friendly technological productions, acquisition of skills in technological and structural calculation of equipment of oil refining and petrochemical industries, formation of scientific thinking among students, in particular, understanding of the logical connection between 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, application of the knowledge gained in economics, everyday life and in solving environmental protection problems.

KNOWLEDGE, SKILLS, SKILLS AT THE END OF 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 physico-chemical properties of various classes of compounds, to apply the knowledge gained in economics, everyday life and solving environmental problems.

TECHNOLOGY FOR THE PRODUCTION OF NANOCRYSTALLINE INORGANIC MATERIALS

CODE - CHE761

CREDIT – 5

PREREQUISITES - chemistry, physics, mathematics

THE PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline "Nanomaterials and Nanotechnology of Organic Chemistry" is to study the current state and some of the prospects in the field of new technology and materials. The development of the structural features of nanoparticles, giving the nanostructured material unusual characteristics that allow you to create new technologies for obtaining products with desired properties.

Course objectives: The acquisition of knowledge necessary for the possession of today's state and describe some of the prospects in the field of nanomaterials and nanotechnology. Outline the basic concepts of semiconductor, magnetic and molecular nanostructures, X-ray multilayer mirrors, fullerene-like and structural nanomaterials. Consider the use of nanostructures in organic chemistry and the emerging prospects in oil refining, etc .; possession of the fundamentals for the study of nanomaterials and nanotechnology, necessary to solve research and practical problems in the professional field.

BRIEF DESCRIPTION OF THE COURSE

The course "Nanomaterials and Nanotechnology of Organic Chemistry" provides a summary of the sections: The history of the development of nanotechnology. Priority areas of nanotechnology. Basic scientific terms and definitions Nanotechnology development. Priority areas of nanotechnology. Varieties of nanomaterials: consolidated nanomaterials, nano-semiconductors, nanopolymers, nano-biomaterials, fullerenes and tubular nanostructures, catalysts, nanoporous materials, and supramolecular structures. Nanoparticles (nanopowders). The science of small objects (nanoscience). . The natural boundaries of the development of existing microelectronics. Quantum pits, wires and points. Creating nano-objects on the principles of "top-down" and "bottom-up." Fantastic nanotechnology opportunities. The main scientific terms and definitions (nanomaterials, nanotechnology, nanodiagnostics, nanosystem engineering). Fundamental problems of the nanosystems industry. The formation of solid-state nanoclusters. Solid state chemical reactions. Mechanochemical transformations. Shock-wave synthesis. Nanostructuring under pressure with shear. Nanostructuring by crystallization of amorphous structures. Compaction (consolidation) of nanoclusters

KNOWLEDGE AND SKILLS RECEIVED BY STUDENTS AFTER STUDYING OF THE COURSE

The study of this discipline will allow the student to apply the course to learn about the features of the substance in the nanostructured state, about the role of interphase boundaries in shaping the properties of nano-objects, about the stability of nano-objects, kinetics and quasi-equilibrium of processes in nanosystems, etc. As part of special courses, students become truly competent specialists.

MODERN METHODS OF ANTICORROSIVE PROTECTION OF TECHNOLOGICAL EQUIPMENT

CODE - CHE763

CREDIT – 5

THE PURPOSE AND OBJECTIVES OF THE COURSE

The choice of a method for protecting chemical devices and building structures from corrosion is determined by technical and economic calculations that take into account the technological and production conditions of operation of devices and structures, the cost of anti-corrosion work, durability and availability of a protective coating for subsequent repairs and a number of other factors.

BRIEF DESCRIPTION OF THE COURSE

When protecting building structures of buildings and structures exposed to corrosive environments from corrosion, first of all, the measures provided for by the project are carried out to reduce the degree of corrosive effect of the environment by sealing technological equipment, pipelines, ventilation ducts; devices of local ventilation suction to reduce pollution of the workshop atmosphere and reduce the concentration of aggressive gases in it; ensuring normal temperature and humidity conditions.

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

Must know: the basics of the theory of corrosion processes in gas and liquid electrically conductive media; the main sources of corrosion effects on materials used in the medical industry, their qualitative and quantitative characteristics; the concept of comprehensive protection of materials from corrosion. After completing the course, he is proficient in: methods and methods for predicting the reliability of equipment and the consequences of corrosion; with information about the state and changes in the properties of structural materials under the influence of man-made and anthropogenic factors, demonstrate the ability and readiness, assess the nature of the influence of the environment or the

production environment on the patterns of the flow of corrosion processes; choose a structural material; justify the design of the device and a set of measures to protect medical equipment and tools from the corrosive effects of the environment.

CAD CHEMICAL ENGINEERING

CODE - CHE 780

CREDIT – 5

PREREQUISITES:

THE PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course is to familiarize undergraduates with the basics of computer modeling of chemical and technological processes using the ChemCad modeling software package. The ChemCad program allows you to create, analyze and optimize various options for the technological design of production processes, evaluate their effectiveness and choose the best one.

BRIEF DESCRIPTION OF THE COURSE

In the course of the discipline, the basics of computer modeling of chemical-technological processes using the ChemCad modeling software package, modeling of equilibrium (stationary) chemical-technological processes, methods of constructing a technological scheme, the choice of thermodynamic parameters and the method of determining the K-constant, characteristics of the technological scheme and flows will be considered.

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

The study of this discipline will allow the student to correctly apply computer modeling methods to describe the patterns of technological processes; demonstrate the knowledge gained for the structure of chemical-technological schemes using the Package of modeling programs ChemCad.

MODERN PROBLEMS OF QUALITY CONTROL OF ORGANIC PRODUCTS

КОД - CHE 769

КРЕДИТ-5

THE PURPOSE AND OBJECTIVES OF THE COURSE

Ensuring compliance with all required standards and not exceeding permissible values.

BRIEF DESCRIPTION OF THE COURSE

A set of knowledge about the main intellectual potentials and methods of product quality assessment and control. This set of knowledge includes methods of applying this knowle

dge in production-evaluation and quality control of products at the stages of its manufacture. Today, product quality management methods are becoming a sustainable system. Therefore, it is important to master this quality of education. Product quality problems need to be solved from a scientific point of view. And organizational issues should be resolved at all levels of production management and scientific and technical activities. Knowledge about the justification of quality requirements on a scientific basis includes measures to control and ensure them. Quality management and control provides for product quality indicators, methods of formulating regulatory documents, assessing the quality level and quality control.

The product quality assurance system is based on actions and measures distributed at all stages of the product life cycle, and develops planned and systematic support of measures that create conditions for the implementation of quality objectives and goals at all stages of the product life cycle so that the product quality meets the specified requirements.

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

Acquired knowledge and skills at the end of the course – at the end of the course, the master's student will learn to solve problems independently using modern methods and techniques of working with organic substances, the completeness of compliance with the quality of chemical products according to specified regulatory characteristics and apply modern methods of organizing a product quality assurance system, features of the modern system of higher professional education.

MODERN TECHNOLOGIES OF ORGANIC PROCESSING SUBSTANCES

COD – CHE 776

CREDIT – 5

THE PURPOSE AND OBJECTIVES OF THE COURSE

Rules for the disposal of organic waste products to prevent environmental pollution. Organic substances are, in fact, natural resources, their utilization can occur both in real conditions of the natural environment, and with the use of techniques using the principles of transformation of organic matter in the natural cycle.

BRIEF DESCRIPTION OF THE COURSE

The process of processing organic waste consists of several stages, including waste collection, sorting for recycling and the actual processing process itself according to the chosen methodology.

The main purpose of processing this type of waste is to obtain secondary raw materials, combustible substances or products that can be used in various spheres of human activity. The most commonly used methods of processing organic waste include bioener

gy plants. With their help, from different types of waste, it is possible to obtain gas, which can subsequently be burned in special fuel installations.

In addition to this method, there are a considerable number of other techniques that allow you to effectively recycle or dispose of organic waste without harming the environment. There are many different ways to recycle organic waste and get the most out of it.

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

Theoretical foundations for solving practical problems; the limits of applicability of knowledge about the chemical nature, composition and basic physical properties of organic compounds and methods of their processing; to identify the relationship between the chemical nature, composition and physico-chemical properties of various classes of compounds; to apply the knowledge gained in economics, everyday life and solving environmental problems.

DEFENSE OF THE MASTER'S THESIS

COD – ECA205

KREDIT –12

PURPOSE AND OBJECTIVES

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

SHORT DESCRIPTION

A master's thesis is a final qualifying scientific work, which is a generalization of the results of an independent research by a graduate student of one of the actual problems of a specific specialty of the relevant branch of science, having an internal unity and reflecting the progress and results of the development of the chosen topic.

The Master's thesis is the result of the research/experimental research work of the undergraduate conducted during the entire period of the undergraduate's studies.

The defense of a master's thesis is the final stage of master's degree preparation. The master's thesis must meet the following requirements—

- the work must conduct research or solve current problems in the field of chemical technology of inorganic substances;

- the work should be based on the identification of important scientific problems and their solution;
- decisions must be scientifically sound and reliable, have internal unity;
- the dissertation work should be written alone

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МУНАЙ ӨНІМДЕРІН СЫНАЙТЫН ТӘУЕЛСІЗ ОРТАЛЫҒЫ
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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 продукции 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