NJSC "Satbayev University"

Chemical and Biological Technology Institute

CURRICULUM PROGRAM

ENGINEERING AND ENGINEERING BUSINESS

Master of Engineering in «7M07109 -Hydrocarbon Engineering»
(Scientific and pedagogical area (2 years)

1st edition

In accordance with State Mandatory Standard of Higher Education 2018

Almaty 2020

Программа составлена и подписана сторонами:

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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.

PROGRAM DESCRIPTION

1Goals:

- the formation of general cultural, professional and special competencies based on National Research University'sscientific school, allowing the graduate to successfully work in the field of petrochemical technology and be competitive in the labor market;

- the development of such personal qualities as creativity, responsibility, tolerance, desire for self-development and disclosure of their creative potential;

Developing the research qualities, the ability to plan, stage, perform and generalize experimental studies on the chosen program, forming a critical understanding of existing fundamental scientific theories and concepts, and explain the results from modern chemical science and technology perspective.

2 ***Types of work***. Graduate of "ChemicalEngineering of HydrocarbonCompounds" educational program in the scientific and educational training direction7M071 - Engineering and engineering educatesthe following types of professional activities:

Manufacturing and technological;

Organizational and managerial;

Research;

Design and engineering;

Pedagogical.

3*Objects of professional activity*: chemicals and materials; methods and instruments to determine and research the composition and properties of substances and materials; processes and industrial systems for obtaining petrochemical products, as well as systems for their management and regulation; interactive forms and innovative teaching methods in a modern university.

*Professional subjects:*research and engineering companies,research and design industry institutes; research laboratories, higher and secondary technical schools; chemical and petrochemical plants and enterprises.

1 Programscope and content

The study duration in Master's is determined by the amount of academic credits acquired. In mastering the established amount of academic credits and achieving the expected study results to obtain Master's degree, Master's educational program is considered to be fully mastered. In the scientific and educational Master's degree at least 120 academic credits for the entire period of study, including all types of undergraduates' academic and scientific activities.

Planning of the education content, the way in which the educational process is organized and carried out is executes by the university and the scientific organization independently based on credit study technology.

Master's degree in scientific and educational direction implements educational programs of postgraduate education to prepare academic and scientific-educational personnel for universities and scientific organizations with in-depth scientific-educational and research training.

Master's educational program content consists of:

1) Theoretical training that includes studying the cycles of basic and profiling disciplines

2) Practical training of undergraduates: different types of practices, scientific or professional internships

3) Research work, including the performance of a master's thesis - for a scientific and educational master's degree

4) Final appraisal.

Regulatory documents for developing the educational program

The regulatory legal framework to develop the given educational program is:

- Law of the Republic of Kazakhstan "On education" with amendments and additions within the framework of legislative changes to increase the independence and universities' autonomy" dated 04.07.18. # 171-VI.

- Law of the Republic of Kazakhstan "On amendments and additions to some RK legislative acts on expanding the academic and managerial independence of higher educational institutions" dated 04.07.18. # 171-VI;

- RK Education and Science Minister's decree dated 30.10.18. # 595 "On approval of standard rules of activity at educational institutions of corresponding types";

- State mandatory standard of postgraduate education (Annex 8 to the decree of Minister of Education and Science of the Republic of Kazakhstan # 604-dated 31.10.18;

- Decree of RK Education and Science Minister dated 20.01.15. # 19 "On approval of the rules for transfer and restoration of students by types of educational organizations with amendments and additions under #601 decree dated 31.10.18;

- Working curriculum of "Chemical engineering of hydrocarbon compounds"educational program for 2019-2020, approved by Rector of Kazakh National Research Technical University named after K. I. Satbayev;

- Documents of QMS system (Quality Management System) on organizing the educational process at Kazakh National Research Technical University named after K. I. Satbayev.

EP Content: EP "Chemical engineering of hydrocarbon compounds" is implemented byKazakh National Research Technical University named after K. I. Satbayev in'7M071-Engineering and engineering profession'training direction (Master's degree) and represents a system of documentation regulating the goals, expected results, content and implementation of the educational process in chemical engineering and chemical materialsproduction sphere.

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. The given EP is built taking into account the possibility of providing 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 that reflect the specifics of a particular specialization within '7M071 – Engineering and engineering profession'unified educational direction (Master).

Educational program objectives:

Educational program objectives:

Master's student in‘7M071-Engineering and engineering profession’training direction should be coached to solve the following professional tasks in accordance with EP "Chemical engineering of hydrocarbon compounds" direction and types of professional activities:

1. *Design and engineering activities*

- To calculate the material and thermal balances of chemical-technological process

- To make the hardware and technological scheme of the process

- To 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 and technological processes.

2. *Design and technological activities*

- To develop chemical and technological processes for obtaining new substances and materials

- To improve the technological schemes of existing production facilities with the justification related to the main parameters and process indicators

- To draw up a business plan for a chemical and technological project

- To develop energy-and resource-saving technologies in the field of oil-gas processing and chemical materialsproduction

- To develop measures to protect the environment for petrochemical enterprises.

3. *Research activities*

- To conduct a literature and patent search, prepare reports on patent research, information reviews, conclusions, etc.

- To plan experimental research, choose research methods

- To develop schemes and experimental installation design, carry out installation and debugging

- To conduct experimental work applying modern instrumental methods of research and analysis of composition, structure and quality of the resulting products and starting materials

- To process data using mathematical methods of experiment planning, regression and correlation analysis

- To develop and research mathematical models of chemical and technological processes

- To analyze and summarize research results, publish the results in the form of scientific articles and abstracts, issue pre-patents and patents for inventions.

4. *Organizational and managerial activities*.

- To provide information support for production, labor and management

- To carry out measures for organizing the production in accordance with regulatory documents

- To develop and prepare the necessary documentation

- To organize team activities, make work plans and set production tasks

- To solve issues of material and technical support, monitor tasks execution.

5. *Teaching activities*:

- To develop and implement active learning methods that help to form a creative, innovative approach to understanding professional activities, develop independent thinking and the ability to make optimal decisions in a certain situation

- To develop educational and methodological documentation, methods for monitoring students' knowledge and multimedia materials for the educational process;

- To conduct laboratory and practical training.

2Requirements to applicants

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

The procedure for admission of citizens to Master's program is established in accordance with "Standard rules for admission to training in educational organizations that implement educational programs of postgraduate education".

The formation of undergraduates' contingentis carried out by placing a state educational order for training of scientific and pedagogical personnel, as well as paying for the study 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 this level of education for the first time.

At “the entrance", Master's student must have all the prerequisites necessary for grasping the corresponding educational program of Master's degree. The higher education institution determines the list of prerequisites independently.

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

3 Requirements for study completion and obtaining a diploma

Awarded degree/qualifications: A graduate of "Chemical engineering of hydrocarbon compounds" educational program is awarded "Master of Technical Sciences"academic degree.

A graduate who completed Master's degree programs 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 the sequence of solving professional tasks;
- knowledge of fundamental and applied sections of disciplines that determine the orientation (profile) of Master's program;
- the ability to professionally select and creatively use modern scientific and technical equipment to solve scientific and practical problems;
- the ability to critically analyze, present, defend, discuss and disseminate their professional activities results;
- proficiency in preparing and executing the scientific and technical documentation, scientific reports, reviews, reports and articles;
- willingness to lead the team in the field of their professional activities, tolerantly perceiving social, ethnic, religious and cultural differences;
- Readiness for communication in oral and written forms in a foreign language to solve professional activity problems.

A graduate who obtained Master's program must have professional competencies, which correspond to professional activities’ types that Master's program focuses on:

Research activities:

- ability to form diagnostic solutions to professional problems by integrating the fundamental sections of science and specialized knowledge obtained during grasping the Master's program;
- ability to independently conduct scientific experiments and research in the professional field, summarize and analyze experimental information, draw conclusions, formulate conclusions and recommendations;
- ability to create and research models of the studied objects based on the use of in-depth theoretical and practical knowledge in the field of chemical materials production, chemical engineering and engineering;

Research and production activities

- ability to independently conduct production and research and production experimental, laboratory and interpretation work in solving practical problems;
- ability to professionally operate modern industrial and laboratory equipment and devices in the field of Master's degree program;
- Ability to use modern methods of processing and interpreting complex information to solve production problems.

Design and technological activities

- ability to independently draw up and present projects of research and production works;
- Readiness to design complex research and production works in solving professional problems.

Organizational and managerial activities:

- readiness to use practical skills in organizing and managing research and production activities in solving professional problems;
- readiness for the practical use of normative documents in the planning and organization of scientific and production works;

Scientific and pedagogical activity

- ability to conduct seminars, laboratory and practical classes;
- ability to participate in developing interactive teaching methods, educational and methodological documentation, multimedia materials and methods of monitoring training;
- Ability to participate in managing the students' scientific and educational work in petrochemical engineering field.

When developing Master's program, all general cultural and general professional competencies, as well as professional competencies related to the types of professional activities that Master's program focuses on, are included in the set of required results of grasping the Master's program.

4 Work curriculum of "Chemical Engineering of Hydrocarbon Compounds"educational program

4.1. 2 years 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							2nd semester						
	LNG205	Foreign language (professional)	DB VK	5	3	0/0/3	LNG1055 LNG1056		Component of choice	BD KV	5	3		
	HUM201	History and philosophy of science	DB VK	4	2	1/0/1			Component of choice	BD KV	5	3		
	HUM205	High school educators	DB VK	4	2	1/0/2		CHE268	Oil productschemical science	VC PD	5	3	2/0 /1	
		Management Psychology	DB VK	4	2				Component of choice	PD KV	4	2		
		Component of choice	BD KV	5	3				Component of choice	PD KV	4	2		
	CHE264	Technology of heterolysis andmonolithicprocesses	VC PD	5	3	2/0/1			Research work of a master's degree	NIRM	7	2		
		Teaching practice	DB VK	3	3									
		Total:		**30**	**18**				**Total:**		**30**	**15**		
2	3rd semester							4th semester						
		Component of choice	PD KV	5	3				Research work of Master's degree	NIRM	9	2		
		Component of choice	PD KV	5	3				Research practice	Pd	9	2		
		Component of choice	PD KV	4	2				Designing and defending Master's thesis(OISMD)	Ia	12	3		
		Component of choice	PD KV	4	2									
		Component of choice	PD KV	4	2									
		Research work of a master's degree	NIRM	8	2									
		Total:		**30**	**14**				**Total:**		**30**	**7**		
									Total:		**120**	**54**		

4.2. Elective DisciplinesCatalogue

Chemical Engineering of Hydrocarbon Compounds

Study duration: 2 years

Component of choice					
	Code	**Discipline name**	**Loans**	**Lk/blob/p**	**Semester**
DB Component of Choice - 9 credits					
	CHE261	Current problems of petrochemical technology	3	2/0/1	1
	CHE282	Chemical reagents in oil preparation and oil production processes	3	1/2/0	2
	CHE254	Computer simulation of petrochemical production	3	0/3/0	
PD Component of Choice - 16 loans					
	CHE226	Industrial catalysis and catalysts in refining	2	1/0/1	2
	CHE188	Solid fossil fuel chemical technology	2	1/0/1	
	CHE272	Industrial reactors for large-capacity chemical plants	3	2/0/1	3
	CHE706	Problems of waste disposal of petrochemical plants	3	2/0/1	
	CHE280	Polyolephin production and processing technology	2	1/0/1	
	CHE230	Gas processing processes	2	1/0/1	
	CHE251	Selectiveness and stereo-specificity of catalysts	2	1/0/1	
		Total:	**25**		

Modular curriculum

Thecycle	code	Nameofdisciplines	Semester	Acad. credits	lec.	lab.	prac	IWS	Type of control	Chair
Profile training module										
Basic disciplines (BD)(40 credits)										
Universitycomponent(UK) (22 credits)										
BD	HUM201	History and philosophy of science	1	4	1	0	1	2	Exam	SD
BD	HUM207	Higherschoolpedagogy	1	4	1	0	1	2	Exam	SD
BD	LNG202	Foreignlanguage (professional)	1	6	0	0	3	3	Exam	EL
BD	HUM204	Management psychology	1	4	1	0	1	2	Exam	SECPM
Practice-oriented module										
	AAP244	Pedagogicalpractice	2	4			2	2	Report	ChBE
Choicecomponent(CC) (18 credits)										
BD	BIO 704	Chemical reagents in the processes of oil refining and oil production	1	6	2		1	3	Exam	ChBE
BD	BIO707	Environmental aspects of petrochemical industries								
BD	CHE298	*The bases of the modern technologies of the processing of mineral raw materials	2	6	2	1		3	Exam	ChPIE
BD	CHE283	Industrial water treatment and methods of sewage treatment								

BD	CHE299	System analysis of chemical and technological processes	2	6	2		1	3	Exam	ChPIE
BD	CHE708	Modern technologies for the processing of organic substances								ChBE
BD	CHE224	*Industrial organic chemistry	2	6	2		1	3	Exam	ChBE
BD	CHE709	*CAD Chemical engineering								ChPIE
Majordisciplines (MD) (49 credits)										
Choice component (CC) (42credits)										
MD		Modern technologies in the field of petrochemicalsModule								
MD	CHE272	*Industrial reactors for large-tonnage chemical productions	1	6	2		1	3	Exam	ChBE
MD	CHE275	*Modern bases of development of polymeric materials science								
MD	CHE750	Modern methods of corrosion protection of technological equipment	2	6	2		1	3	Exam	ChPIE
MD	CHE297	Modern methods of scientific research in chemical technology								ChBE
MD	CHE293	Chemmotology petroleum products	2	6	2		1	3	Exam	ChBE
MD	CHE710	Modern problems of quality control of chemical products								
MD		Chemical Engineering Disciplines and Catalysts in Refining Module								
MD	CHE725	Technology of heterolytic and homolytic processes of oil refining	2	6	2		1	3	Exam	ChBE
MD	BIO708	Selected aspects of the technology for the production of valuable products from hydrocarbon raw materials								
MD	CHE279	Heavy oil refining of solid fossil fuels	3	6	2		1	3	Exam	ChBE
MD	BIO709	Basic organic analysis								

MD	CHE706	Problems of waste disposal of petrochemical industries	3	6	2		1	3	Exam	ChBE
MD	BIO710	Modern problems of petrochemical technology								
MD	CHE713	Biofuel technology	3	6	2		1	3	Exam	ChBE
MD	BIO711	Catalytic processes for the processing of liquefied gases								
MD	CHE226	Industrial Catalysis and Catalyzer in refining	3	6	2		1	3	Exam	ChBE
MD	CHE714	Selectivity and stereospecificity of catalysts in organic chemistry								
Practice-oriented module										
MD	AAP236	Researchpractice	4	7					Report	ChBE
ResearchModule (24 credits)										
MSSR	AAP242	Master's student scientific research	1	6					Report	ChBE
MSSR	AAP242	Master's student scientific research	2	6					Report	ChBE
MSSR	AAP242	Master's student scientific research	3	6					Report	ChBE
MSSR	AAP242	Master's student scientific research	4	6					Report	ChBE
Module of final attestation (12 credits)										
FA	ECA205	Registration and defense of the master's thesis	4	12					Defens eofdiss ertation	ChBE
			Total	**125**						

5 Descriptors of the level and scope related to knowledge, skills, abilities and competencies

Requirements for training level of Master's student are determined based onDublin descriptors of higher education’s second level (Master's degree) and reflect the acquired competencies expressed in the achieved learning outcomes.

The results of training are formulated both at the level of the entire Master's degree educational program, and at the level of individual modules or academic discipline.

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

1) To demonstrate the expanding knowledge and understanding in the field of chemical processes and production of organic and inorganic substances and materials based on advanced knowledge of chemical science and engineering in the development and / or application of ideas in the context of research

2) To apply your 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 to form judgments based on social, ethical and scientific considerations

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

5) To show the training skills necessary for independent continuation of further training in chemical engineering and engineering sphere.

6 Competencies upon the study end

6.1 Requirements for graduates' key competencies of *Scientific andPedagogical Magistracy*. The graduate must:

1) *to have an idea*

- on the role of science and education in public life;
- on current trends in scientific knowledgedevelopment;
- on current methodological and philosophical problems of natural (social, humanitarian, economic) sciences;
- on a higher school teacher's professional competence;
- on contradictions and socio-economic consequences of globalization processes;

2) *toknow*

- methodology of scientific knowledge;
- principles and structure of organizing the scientific activities;
- psychology of students' cognitive activity in the learning process;
- psychological methods and means of improving the effectiveness and quality of training;

3) *tobe able to*

- use the acquired knowledge for the original development and application of ideas in scientific research context;
- critically analyze existing concepts, theories and approaches to the analysis of processes and phenomena;
- integrate knowledge gained from different disciplines to solve research problems in new unfamiliar environments;
- make judgments and decisions based on incomplete or limited informationthrough integrating the knowledge;
- apply the knowledge of pedagogy and psychology at higher education in their teaching activities;
- apply interactive learning methods;
- conduct information-analytical and information-bibliographic work with the involvement of modern information technologies;
- think creatively and be creative in solving new problems and situations;

- be fluent in a foreign language at a professional level that allows them to conduct scientific research and teach special disciplines at universities;
- Summarize the results related to research and analytical work in the form of a dissertation, scientific article, report, analytical note, etc.

4) *Tohave skills of*

- scientific research activity, decision of standard scientific tasks;
- implementing the educational and pedagogical activities on credit study technology;
- methods of teaching professional disciplines;
- using the modern information technologies in the educational process;
- professional communication and cross-cultural communication;
- oratory, correct and logical design of their thoughts in oral and written form;
- Expanding and deepening the knowledge necessary for daily professional activities and continuing education in the doctoral program.

5) *To be competent*

- in the field of research methodology;
- in the field of scientific and scientific-pedagogical activity in higher educational institutions;
- in matters of modern educational technologies;
- in the implementation of scientific projects and research in the professional field;
- In the ways to ensure continuous updating the knowledge, expanding 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 chemical science methodology and chemical engineering to solve specific professional tasks and assess technological risks;

B3 is the ability to use psychological methods and means to improve the study effectiveness and quality.

*P – Professional*competencies:

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

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

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

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

P5 - the ability to plan and carry out measures to assess conditionand environmental protection and organize environmental management activities;

P6 - mastering the skills of forming and presenting educational material in various forms, conducting laboratory and practical classes, readiness to teach in educational institutions and management of students' research work.

A - Human, social and ethical competences

O1 - knowledge of contemporary social and political problems;

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

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

C - Special and Management Competencies:

C1 - ability to lead the workforce and provide safety measures;

C2 - ability to plan and organize professional events;

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

6.2 Requirements for the research work of Master's student in scientific and educational Master's degree.

The research work of a graduate student should:

1) correspond to educational program profile of Master's degree, on which Master's thesis is performed and protected;

2) be relevant and contain scientific novelty and practical significance

3) bebased on modern theoretical, methodical and technological advances in science and practice

4) be performed using modern methods of scientific research;

5) contain research (methodical, practical) sections on the main protected provisions;

6) Based on international excellence in chemical science and engineering.

6.3 Internship organization requirements:

The educational program of scientific and educational master's degree includes two types of practices, which are conducted in parallel with theoretical training or in a separate period:

1) Pedagogical in GD cycle - at the university;

2) Research in PD cycle - at the site of the dissertation.

Teaching practice is realized with the aim of forming practical skills of teaching and teaching methods. At the same time, undergraduates are involved in Bachelor degree atuniversity discretion.

The uundergraduates' research practice undergoes in order to familiarize with the latest theoretical, methodological and technological achievements of domestic and foreign science, modern methods of scientific research, processing and interpretation of experimental data.

7 Diploma appendix byECTS standard

The appendix is developed according to the standards of European Commission, Council of Europe and UNESCO/SEPES. This document serves onlyfor academic recognition and is not an official confirmation of the document related to education. It is not valid without a higher education diploma. The purpose of filling out the European application is to provide sufficient data on the diploma holder, the qualification obtained, the level of this qualification, the training program content, the results, the qualification functional purpose, as well as information about the national education system. The application model that will be used for the transfer of assessments uses 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 traveling abroad for professional recognition, additional legalization of the diploma of education will be required. The European diploma supplement is completed in English on an individual request and is issued free of charge.

FOREIGN LANGUAGE(PROFESSIONAL)
Professional English for Project Managers
CODE - LNG205
CREDITS - 3
PREREQUISIT-Academic English, Business English, IELTS 5.0-5.5

COURSE GOALS AND OBJECTIVES

Thanks to this, you will learn specific terminology, be able to read specialized literature, get the knowledge necessary for effective oral and written communication in a foreign language in your professional activities.

COURSE BRIEF DESCRIPTION

During the training, students gain knowledge of a foreign language, including the proficiency of specialized vocabulary, necessary for effective oral and written communications in a foreign language in their professional activities.

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION

Due to mastering the discipline, the student expands professional lexical vocabulary, has the skills to carry out effective communication in a professional environment, the ability to competently express thoughts in oral and written speech, understand specific terminology and read specialized literature.

HISTORY AND PHILOSOPHY OF SCIENCE

CODE - HUM201
CREDITS - 2
PREREQUISIT- HUM124

COURSE GOALS AND OBJECTIVES - to reveal the connection between philosophy and science, to highlight philosophical problems of science and scientific cognition, the main stages of the science history, leading concepts of the science philosophy, modern problems of developing the scientific and technical reality.

COURSE SHORT DESCRIPTION - the subject of science philosophy, science dynamics, the specifics of science, science and prescience, antiquity and formation of theoretical science, the main stages related to historical development of science. As well as features of classical science, non-classical and post-classical science, philosophy of mathematics, physics, technology and engineering, the specifics of engineering sciences, science ethics, the scientist's and engineer'ssocial and moral responsibility.

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION To know and understand philosophical questions of science, the main historical stages of science growth, leading to science philosophy concept. To be able to critically evaluate and analyze scientific and philosophical problems, to understand the specifics of engineering science, possess the skills of analytical thinking and philosophical reflection, to be able to justify and defend its position, to possess the techniques of discussion and dialogue, to master the skills related to communicativeness and creativity at their professional work.

PEDAGOGY OF HIGHER EDUCATION

CODE-HUM205

CREDITS – 3

PREREQUISITE: LNG102

COURSE PURPOSE AND OBJECTIVES. The course aims at studying psychological and pedagogical essence of the educational process at higher school; the formation of ideas about the main trends of higher education development at the present stage. As well as consideration of methodical bases of training process at high school, and psychological mechanisms influencing the success of learning, interaction, management subjects of the educational process. Development of undergraduates' psychological and pedagogical thinking.

COURSEBRIEF DESCRIPTION. During the study course, undergraduates areacquainted with higher educationdidactics, forms and methods of organizing training in higher education, psychological factors of successful learning, features of psychological influence, educational influencemechanisms, and pedagogical technologies, characteristics of pedagogical communication and mechanisms of managing the learning process. They analyze organizational conflicts and ways to resolve them, psychological destructions and deformations of the teacher's personality.

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION– upon the course completion, students should know modern system features of higher professional education, educational researchorganization, characteristics of educational processsubjects, didactic principles of learning process organization in higher education, educational technology, patterns of pedagogical communication, especially educational influences on students and pedagogical activityproblems.

PSYCHOLOGY OF MANAGEMENT

CODE

CREDIT 2

PREREQUISITE

COURSE GOALS AND OBJECTIVES

The main goal of the course is to study the behavior of individuals and groups of people within organizations; determining psychological and social factors that influence the behavior of employees. In addition, much attention will be paid to the issues related to internal and external motivation of people. The course main goal is to apply the given knowledge to improve the organization efficiency.

COURSE BRIEF DESCRIPTION

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

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION

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. They will be able to identify the 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.

TECHNOLOGY OF HETEROLYTIC AND HOMOLYTIC OIL REFINING PROCESSES

CODE-CHE 264

CREDITS – 3

PREREQUISITE: ORGANIC CHEMISTRY, PHYSICAL CHEMISTRY

COURSE GOALS AND TASKS

"Technology of heterolytic andhomo-lyticrefining processes" course’smain goalis to give scientific foundations and master the basic technological principles of catalytic refining processes.

COURSE TASKS:

- Creating the basics of theoretical training for practical tasks for undergraduates;
- Laying the scientific foundations of chemistry, kinetics and technology of hydrocarbon processing processes;
- Instilling practical skills to develop energy- and material-saving environmentally friendly technology plants;
- Acquisition of technological and construction skills of refining and petrochemical equipment.

COURSE SHORT DESCRIPTION

"Technology of heterolyticand homolyticrefining processes" discipline is designed to study the theoretical basis for graduates to solve practical problems, laying the scientific foundations of chemistry, kinetics and technology of hydrocarbon processing processes. As well as inoculating the skills for elaborating energy and material-saving environmentally friendly technological production, acquiring the skills of technological and construction equipment of refineries and petrochemical plants. Forming in students scientific thinking, in particular, understanding the logical communication structure and reactionary ability of organic compounds, about the compounds themselves and methods of obtaining them, instilling practical skills in the synthesis and identification of compounds, the application of the knowledge in the economy.

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION

The study of the given*discipline*will allow the master student to solve practical problems, to form scientific thinking, in particular, to understand properly the limits of applicability of knowledge about the chemical nature, composition and basic physical properties of organic compounds and ways of processing them.As well as to understand the relationship between chemical nature, composition and physical and chemical properties of different classes of compounds, to apply the knowledge in economics, everyday life and environmental problems.

CHEMMOTOLOGY OF PETROLEUM PRODUCTS

CODE-CHE 268

CREDITS – 3

PREREQUISITE: organic chemistry, oil and gas processing technologies

COURSE GOALS AND OBJECTIVES

The aim of the discipline is to study the scientific and applied basics of effective use of fuels, lubricants and technical fluids in various types of technology.

COURSE SHORT DESCRIPTION

Methods of qualifying assessment of fuels, oils and special liquids. 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. Exploring the scientific and applied basics of effective use of fuels, lubricants and technical fluids in various types of technology. Formation of general ideas and understanding of the theoretical basis of the composition of oil, production of fuels, oils, plastic lubricant, technical liquids used in road transport, methodology for determining SL quality.

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION

Expected results: Instilling practical skills to solve various problems related to elaborating the methods for qualification assessment of fuels and lubricants' properties; acquiring skills for modernizing and improving the technical requirements for commercial petroleum products; the ability to formulate technical proposals.

MODERN PROBLEMS OF PETROCHEMICAL TECHNOLOGY

CODE-CHE 261

CREDITS – 3

PREREQUISITE - Chemistry, physics, processes and devices of chemical technology, general chemical technology, chemical technology of organic substances.

COURSE PURPOSE AND OBJECTIVES

Study purpose: "Modern problems of petrochemical technology" course - to give information about processing of oil and petroleum products with the aim of obtaining the final product, modern methods of its processing and analysis and to show the value of oil and gas as an energy source and raw materials for major sectors of chemical, organic and petrochemical industries.

COURSE BRIEF DESCRIPTION

The current state of oil-gas complex of the world and Kazakhstan, the main technological processes of large-capacity oil and oil products processing plants, the current state and main directions of improvement and intensification of oil and oil products processing plants. The current state and improvement of schemes and technologies, modern and promising processes for processing organic substances, new combined installations and systems for processing oil and its derivatives.

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION

Expected results: After mastering the given discipline, the undergraduate should*know:* Basicsof theoretical training to solve practical problems for the formationof scientific

thinking among students, in particular, understanding the formation processes of petrochemical product. As well as knowledge on chemical composition of oil and petroleum products linking the composition of oil and processing ways;

Should be able to use practical skillsand work in the selection and analysis of individual fractions and groups of hydrocarbons of oil, the application of the knowledge obtained in the processing of oil and organic raw materials, in the economy, in everyday life and in solving environmental problems.

CHEMICAL REAGENTS IN OIL TREATMENT AND PRODUCTION PROCESSES

CODE-CHE 282

CREDITS – 3

PREREQUISITE - Technology of organic and petrochemical production, basic processes and devices of chemical technology, technology of processing of hydrocarbon raw materials.

COURSE PURPOSE AND OBJECTIVES

The main purpose of the course-"Chemical reagents in oil treatment and production processes" discipline aims to familiarize undergraduates with the practical and theoretical foundations for the use of reagents in oilfield and oil refining industry.

Course objectives: giving the students the professional competencies required for professional activities in the field of applied scientific research on oilfield chemistry. As well as initiating the creation, elaboration and experimental validation of innovative technologies in developing and implementing in the oil-gas production of chemical reagents for different purposes; improve and develop new methods of experimental research of physical and chemical processes in oil-gas industries, testing of chemical reagents for oil and gas; acquisition of a new “engineer-technologist”qualification.

COURSE BRIEF DESCRIPTION

"Chemicalreagents in oil treatment and production processes" courseis dedicated to oilfield chemistry's current problems related to production, transportation and primary treatment of oil. The major problems that arise in production and transportation of crude oil, as well as in its primary preparation, which can be solved due to chemical reagents use, are summarized and explained from a scientific point of view. The ways and methods of solving the given problems are described; practical recommendations on the choice of necessary oilfield chemistry reagents are given as well.

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION

After mastering the given discipline program, the students must:

- apply in practice the principles of chemical reagents' rational use in oil treatment and oil productionprocesses

- to carry out and correct technological processes during construction, repair and operation of wells for various purposes and trunk profiles on land and at sea, transportation and storage of hydrocarbon raw materials

- operate and maintain technological equipment used in construction, repair, reconstruction and restoration of oil and gas wells, oil-gas production, collection and preparation of well products, transportation and storage of hydrocarbon raw materials

- assess risks and determine measures to ensure the safety of technological processes in oil and gas production

- participate in the research of technological processes, improvement of technological equipment and reconstruction of production

- draw up technological and technical documentation for operating the oil and gas field equipment.

COMPUTER MODELING OF PETROCHEMICAL PRODUCTIONSV

CODE-CHE 254

CREDITS – 3

PREREQUISITE - processes and devices of chemical technology, chemical technology of organic substances.

COURSEPURPOSE AND OBJECTIVES

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

COURSE BRIEF DESCRIPTION "Computer modeling of petrochemical production" discipline is intended for general professional training of specialists in the synthesis and processing of organic substances. Mastering this course develops and strengthens skills in detecting and solving specific problems inherent in chemical and technological processes of synthesis of organic compounds, solving computational and technological design problems, mastering contemporary modeling computer programs.

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION

Expected results: the formation of a system of knowledge and methodology developing therefining and petrochemical processes. Graduate students*must be able to* apply modern methods of calculation and technological design, manage a package of modeling programs to solve specific problems of oil and gas processing.

INDUSTRIAL CATALYSIS AND CATALYSTS IN OIL REFINING

CODE-CHE 226

CREDITS – 2

PREREQUISITE -technology of processing of hydrocarbon raw materials

COURSE GOALS AND OBJECTIVES

The purpose of studying"Industrial catalysis and catalysts in oil refining" course is to form undergraduates' competencies related to understanding the theoretical foundations of catalysis, on the use of which many large-scale oil refineries are based. Gas processing industries, the study of the essence and role of catalysis in the technology of obtaining industrially important products based on petroleum raw materials, in-depth development of basic approaches and key skills for conducting catalytic industrial processes, in-depth study of the nature of the action of catalysts. As well as the formation of abilities to acquire new knowledge in the field of industrial catalysis and catalyst technology.

COURSE BRIEF DESCRIPTION: "Industrial catalysis and catalysts in oil refining" discipline is intended for general professional training of specialists in petro chemistry, mastering the scientific foundations of the concept, theory, principles and applications of catalysis. As well as developing Master's competence in industrial catalysis field, forming scientific thinking among undergraduates, in particular, analyzing and generalizing the principles of catalytic technologies of petro chemistry. Mastering this course develops and strengthens the practical skills of system analysis of the laws of chemical and technological processes, in solving problems of environmental protection and protection.

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION

As a result of studying "Industrial catalysis and catalysts in oil refining" course, the student *will know:* chemical nature of the catalysis, nature of catalysts' action, principles and factors of catalytic processes; possibility of the direction of chemical reactions to get a particular product by selecting the catalyst; the theory and practice of catalysts preparation. Scientific bases of the development of highly selective catalysts and new technologies; issues of catalytic reactions and their use in industrial processes; classification of catalysts and catalytic processes; the essence of catalytic action; requirements for modern catalysts. Due to studying the course, Master's student *will beable to*identify, formulate and solve problems in the field of petrochemical and organic synthesis.

CHEMICAL TECHNOLOGY OF SOLID FUELS

CODE-CHE 188

CREDITS – 2

PREREQUISITE -ORGANIC CHEMISTRY

COURSE GOALS AND OBJECTIVES

The aim of studying the discipline is to develop students' knowledge about the scientific foundations and general techniques of building technological schemes for processing solid combustibles, the interconnection of various processes of their processing, the basic methods and stages of fuel processing, the principles of creating and designing the optimal technologies, the prospects for developing the industry.

COURSE BRIEF DESCRIPTION: Preparation of solid fuels for processing. Characteristics of solid fuels and the main processes occurring during their thermal processing. Basic methods of thermal processing of solid fuels. Low-temperature and energy-technological processing of fuels. High-temperature coking. The technology of coking. Capture of volatile products formed during the thermal processing of solid fuels. Gasification of solid fuels.

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION

Expected results – forming the students' fundamental knowledge on the chemical technology of processing solid fuels, the main methods of fuel processing, the principles of creating and designing optimal technologies.

The student should *know:* the principles of technological schemes and design of technological processes; the state and prospects of raw material base of coking industry; StVZO requirements for production efficiency, quality of raw materials and products; the student must *be able to* develop technology for processing of solid fuels for

production of various types of fuels; to master the methods of chemical and instrumental analysis of coal, peat, oil shale and solid, liquid, gaseous products and quality control; creatively use general scientific and engineering disciplines to manage the processes of chemical processing of solid fuels; understand and explain the complex phenomena encountered in the diverse processes of processing solid fuels, and make optimal decisions on this basis.

INDUSTRIAL REACTORS FOR LARGE-CAPACITY PETROCHEMICAL PLANTS

CODE - CHE 225
CREDITS - 3(2/0/1)
PREREQUISITE -Physical Chemistry, General Chemical Technology, AboutDream Processes and Chemical Technology Devices.

COURSE GOALS AND OBJECTIVES

The main purpose of the course is to study the basic patterns of chemical processes in reactors and theoretical basis for calculating the chemical reactors, as well as the design of industrial chemical reactors.**The objectives**of the course: to form the basis of technological thinking, to reveal the relationship between the development of chemical science and chemical technology, to prepare graduates for active creative work on creatingthe modern chemical reactors.

COURSE BRIEF DESCRIPTION

"Industrial reactors for large-capacity chemical processes" courseoutlines the basis of process theory in the chemical reactor, mathematical modeling of reactors, and the design of modern chemical reactors. New trends in process development and spacecraft theory; interaction of chemical transformation processes and transfer phenomena at all large-scale levels, the methodology of reactor selection and calculation of the process in it; optimization of chemical processes and reactors;

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION

Calculate the main characteristics of the chemical process; make a choice of reactor type and calculate technological parameters for a given process; determine the parameters of the best process organization in a chemical reactor. Methods to determine the optimal and rational technological modes of operation of the equipment; methods for calculating and analysing processes in chemical reactors; determining the process's technological indicators; methods of selecting chemical reactors.

PROBLEMS OF WASTE DISPOSAL IN PETROCHEMICAL INDUSTRIES

CODE-CHE 706

CREDITS – 3

PREREQUISITE - processes and devices of chemical technology, chemical technology of organic substances.

The aim of teaching the discipline

The purpose of teaching "Problems of waste disposal of petrochemical industries" disciplineis to develop the competence of graduates 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 industry, as well as to obtain an additional economic effect from obtaining useful products.

COURSE BRIEF DESCRIPTION

The growth of oil production, the 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 from petroleum products are both mining enterprises, oil refining plants and companies engaged in the transportation of petroleum products. Losses occur during pumping, transportation of oil and petroleum 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 auto repair enterprises. During wastewater treatment, in the system of recycled water supply, drilling, oil treatment, during the repair of

equipment, when cleaning tanks, waste oil products and oil sludge are formed. Environmental characteristics of oil pollution, general characteristics, composition and properties, the impact of oil sludge on 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 "Recycling and recycling of waste from industry enterprises"discipline.

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION

Expected results. The main task of "Recycling and recycling of waste of industry enterprises" discipline is to master the methodology of research related to industrial waste of oil and gas industry, substantiation of their environmental hazard and development of disposal methods to minimize anthropogenic impact on the environment.

Why the master's student should *know* the waste characteristics, methods of their disposal, methods of analysis and control of waste and waste products. The master's student should *be able to* identify objects of the oil and petrochemical industry that pose an environmental hazard, apply the methodology for recycling industrial waste of the oil and gas industry, and determine the environmental hazard of recycling products.

TECHNOLOGIES FOR PRODUCTION AND PROCESSING OF POLYOLEFINS

CODE-CHE 280

CREDITS – 2

PREREQUISITE -Chemistry and Physics of Polymers

COURSE GOALS AND OBJECTIVES

The aim of studying the discipline isto develop the ability to understand the physics and chemical essence of polymer processing processes and use theoretical knowledge in integrated engineering activities.

COURSE BRIEF DESCRIPTION

Introduction. The intensity of plastics is a further development of scientific and technological progress. Classification of plastic recycling methods.The technical properties of plastics. Making parts is molded under pressure. Pressing thermoreactive materials.

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION

When studying the given disciplines, "input" knowledge, skills, experience and competences are formed, necessary for the successful mastery of "Certain aspects ofplastics processing technology"discipline.

Due to grasping the disciplines, the undergraduate*should know*the organization specific chemical technology, processes and devices; the basic principles of chemical production, its structures, methods of evaluating the efficiency of production; general patterns of chemical processes;

The student*should be able to* carry out the technological process in accordance with the regulations and use technical means to measure the basic parameters of the process, properties of raw materials and products;calculate the main characteristics of the chemical process, choose a rational production scheme of a given product, assess the production efficiency.

TECHNOLOGICAL PROCESSES OF GAS PROCESSING

CODE-CHE 230

CREDITS – 2

PREREQUISITE -technology of organic and petrochemical production

COURSE GOALS AND OBJECTIVES

*The aim*of studying the discipline is to gainknowledge, skills and acquisition of technology skills in the field of gas processing andgas chemistry.

COURSE BRIEF DESCRIPTION

"Technological processes of gas processing" discipline is intended for professional training of specialists in oil and gas chemistry. Mastering this course promotes a deep understanding by the students of chemistry and technology of processing hydrocarbon gas, the acquisition of theoretical knowledge needed to develop economically viable and environmentally safe technology for processing of oil and natural gas, and skills of engineering calculations; development prospects of gas processing and gas chemistry.

KNOWLEDGE, SKILLS AND ABILITIES UPON THE COURSE COMPLETION

Development of professional skills of future undergraduates and laying the scientific foundations of the technology related to preparation and processing of hydrocarbon gases and the principles of conducting the technological process and structural calculation of equipment.

SELECTIVITY AND STEREOSPECIFICITY OF CATALYSTS IN PETROCHEMISTRY

CODE-CHE 251

CREDITS – 2

PREREQUISITE-theoretical foundations of organic matter technology, organic and petrochemical production technology

COURSE GOALS AND OBJECTIVES

The purpose of studying "Selectivity and stereo specificity of catalysts in petro chemistry"discipline is to study the essence and role of catalysis in the technology of obtaining industrially important products based on petroleum raw materials. In-depth mastering of the main approaches and development of key skills for conducting catalytic industrial processes, in-depth study of the nature of catalysts action, the ability

to direct a chemical reaction towards obtaining a certain product from a large number of possible by selecting catalysts.

COURSE BRIEF DESCRIPTION

Classification of catalysis and catalytic processes. Concepts of homogeneous and heterogeneous catalysis. The role of catalysis in the development of petrochemical production. Homogeneous-catalytic and heterogeneous-catalytic reactions. Acid-base and electrophilic catalysis. Principles of catalytic action of metal complexes. Stereo specificity of metal-complex catalysts. Two-phase catalysis. Immobilized homogeneous catalysts. Physical and chemical adsorption. Heterogeneous acid catalysts. Catalysis by metals and metal oxides.

KNOWLEDGE,SKILLS AND ABILITIES UPON THE COURSE COMPLETION

- formation of the practice of preparation of catalysts for undergraduates,
- scientific basis for the development of highly selective catalysts and the latest technologies.
- basic concepts of catalysis and catalysts, classification of catalysis and catalytic processes,
- concepts of homogeneous and heterogeneous catalysis, basic characteristics of catalysts,
- determine the chemical nature of catalysis, evaluate the nature of the action of catalysts,
- apply the principles and factors of catalytic processes to regulate the direction of chemical reactions in the direction of obtaining a certain product by selecting a catalyst;
- identify, formulate and solve problems in the field of petrochemical and organic synthesis.

MASTER'S THESIS DEFENSE

CODE-ECA2013

CREDITS - 12

PURPOSE AND OBJECTIVES

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

BRIEF DESCRIPTION

Master's thesis is the graduation qualification scientific work, which is a generalization of independent studies'results by an undergraduate one of the pressing problems of a particular specialty relevant branch of science that has internal unity and reflects the progress and results of the chosen topic development.
Master's thesis is the result of research/experimental research work of a master's student, conducted during the entire study period of a master's student.
Master's thesis defense is the final stage of training a master student. 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 identifying important scientific problems and solving them.
- The decisions must be scientifically sound and reliable, have internal unity.
- The dissertation work must be written individually.

Content

СӘТБАЕВ УНИВЕРСИТЕТІ SATBAYEV UNIVERSITY

МҰНАЙ 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 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**

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