


THE MINISTRY OF EDUCATION AND SCIENCE  
OF THE REPUBLIC KAZAKHSTAN

M. Auezov SOUTH KAZAKHSTAN UNIVERSITY

«AGREED BY»  
FSBEI of HE S&TU  
Rector, Doctor of Technical  
Sciences, Professor  
B. Kozov D.E.



«APPROVED BY»  
Chairman of the Board-Rector  
Doctor of Historical Sciences,  
academician  
Kozhamzharova D.P.






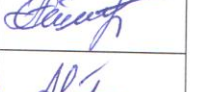





2021

EDUCATION PROGRAMME

7M07176- " Technology Oil and Gas Processing »

Registration number	
Education area code and classification	7M07 Engineering, manufacturing and construction industries
Code and classification of training areas	7M071 Engineering and engineering
Group of educational programs	M097 Chemical engineering and processes
Type of EP	updated
ISCED level	7
NQF level	7
ORC level	7
Language of learning	English
Typical duration of study	2 years
Form of study	Scientific and pedagogical
The complexity of the EP, not less	120 credits
Distinctive features of EP	Joint two-degree program
University partner (JEP)	-
University partner (TDEP)	Federal State Budgetary Educational Institution of Higher Education «Samara State Technical University»
Social partner (DE)	-

Developers:

Daurenbek N.M.	Department of oil refining and petrochemistry Ph.D., associate professor,	
Tanashev S.T.	Ph.D., associate professor Department of oil refining and petrochemistry	
Mamytova G.Zh	Art. Lecturer, Department of oil refining and petrochemistry	
Sarsenbaeva A.U.	Master, Art. Lecturer, Department of oil refining and petrochemistry	
Artykova Zh.K.	Master, Art. Lecturer, Department of oil refining and petrochemistry	
Kydyrali S.B.	Master student gr. MHT-19-7sr	
Eregenov B.T.	Production Director, PetroKazakhstan Oil Products LLP	
Ospanov I.N.	Deputy director LLP "Neftehimstroj-Yug"	
Kubelekova U.D.	Director of quality LLP "Hill Corporation"	

The General education program was reviewed by the Committee on innovative learning technologies and methodological support of Higher schools of Chemical Engineering and biotechnology protocol № 7 from « 22 » 02 2021y.

chairman of committee  Aitkulova R.E.  
signature

Reviewed and recommended for approval at a meeting of the Educational and methodological Council of M. Auezov SKU protocol № 5 from « 23 » 02 2012y

Approved by the decision of the Academic Council of the University Protocol № 12 from « 25 » 02 2021 y.

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## **Introduction**

### **1. Application**

It is intended for the preparation of masters in the educational program (hereinafter - OP) 7M07176 - "Technology of oil and gas processing" in the RSE at the PHV "South Kazakhstan state University named after M. Auezov" MES RK.

### **2. Normative document**

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

Law of the Republic of Kazakhstan "on education" (with amendments and additions as of 04.07.2018);

Standard rules of activity of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by order of the Minister of education and science of the Republic of Kazakhstan dated October 30, 2018 No. 595 (registered in the Ministry of justice of the Republic of Kazakhstan on October 31, 2018 No. 17657);

State mandatory standards of higher and postgraduate education, approved by the order of the Minister of education and science of the Republic of Kazakhstan dated October 31, 2018 No. 604;

Rules for the organization of the educational process on credit technology of training, approved by the order of the Minister of education and science of the Republic of Kazakhstan dated April 20, 2011 No. 152 with amendments and additions dated October 12, 2018 No. 563;

The industry qualification framework "oil and Gas, oil refining and petrochemical industries" was approved by the Protocol of the Industry Commission on social partnership and regulation of social and labor relations of the oil and gas industry dated March 30, 2017, No. 1-2017

Professional standard: "Oil and gas processing"; "production Technology"; "quality Control of oil and oil products"; "Commodity production, storage of oil, oil products and gas" and "Production Management for processing and sale of oil and gas" (Appendix No. 30 to the order of the Deputy Chairman of the Board of the National chamber of entrepreneurs of the Republic of Kazakhstan" Atameken " dated 27.12.2019 No. 266)

Professional standard "Teacher" (Appendix to the order of the Chairman of the Board of the National chamber of entrepreneurs of the Republic of Kazakhstan" Atameken " No. 133 dated June 8, 2017).

### **3. Concept of the educational program**

The purpose of the educational program is consistent with the mission of the University and is aimed at preparing the intellectual elite of the country with advanced knowledge, entrepreneurial skills, fluent in three languages, demonstrating the skills of conceptual, analytical and logical thinking, creative approach in professional activities, able to work in a national and international team, assimilating the learning strategy throughout life.

The educational program is harmonized with the 7th level of the national qualifications framework of the Republic of Kazakhstan, with the Dublin descriptors, and the 2nd cycle of the Qualification Framework of the European Higher Education Area. (A Framework for Qualification of the European Higher Education Area), also with level 7 of the European Qualification Framework for Lifelong Learning.

The educational program is focused on professional and social order through the formation of professional competencies related to the necessary types of research, practical and entrepreneurial activities, adjusted to meet the requirements of stakeholders.

#### **Uniqueness of OP 7M07172 - "Technology of oil and gas processing »:**

EP is focused on the integration of the educational process, research and innovation activities, which contributes to the high competitiveness of graduates in the labor market.

EP is aimed at completing a master's thesis commissioned by enterprises using material and intellectual resources, training with leading domestic and foreign specialists, manufacturers, the

opportunity to work in scientific laboratories of specialized enterprises with unique equipment, participation in international scientific and educational projects, internships in leading Russian and foreign companies and universities

Training at the Samara state technical University SOP with obtaining a diploma of the state sample of the partner University.

The results of the training program are achieved through the following training activities:

- classroom classes: lectures, seminars, practical and laboratory classes are conducted using innovative teaching technologies, the latest achievements of science, technology and information systems. Laboratory classes are held in accredited laboratories of the University: the Testing regional laboratory of engineering profile "Structural and biochemical materials" and the Laboratory of physical and chemical methods of analysis "SAPA", on the basis of educational, scientific and production complexes of "Hillcorporation" LLP.;

- extracurricular activities: independent work of the student, including under the guidance of a teacher, individual consultations;

- conducting pedagogical and research practices, performing master's theses on the basis of specialized enterprises;

- research work of a master's student (R & d): independent scientific work of a student, including the completion of a master's thesis and scientific training in leading Russian and foreign companies and universities.

The University has taken measures to maintain academic integrity and academic freedom, and to protect students from any kind of intolerance and discrimination.

The quality of the EP is ensured by involving stakeholders in its development and evaluation, systematic monitoring and review of its content.

#### **4. Requirements for applicants**

Established under the Model rules of admission for training in organization of education, implementing educational programs of higher and postgraduate education MES RK order No. 600 of 31.10.2018

## **1. PASSPORT OF THE EDUCATIONAL PROGRAM**

### **1.1 Purpose and objectives of the educational program**

Programme objective:

Training of highly qualified personnel who are able to carry out scientific and pedagogical activities, who possess modern approaches to the organization of production and enterprise management, technological design in the field of oil and gas processing.

EP tasks:

- providing conditions for the acquisition of a high intellectual level development, mastering logical and critical thinking and scientific skills organization of labor in scientific and pedagogical activity;
- formation of graduates ' competitiveness in the field of oil and gas processing technology to ensure that they can be employed as quickly as possible in their specialty or continue their doctoral studies.

### **1.2 List of qualifications and positions**

The graduate of the educational program 7M07172 - " Technology of oil and gas processing technology "is awarded the degree"master of technical Sciences".

Masters in the educational program can continue their education in doctoral studies, hold the positions of a researcher, teacher without presenting requirements for work experience, hold the positions of managing Director, development Director, Department Director, Deputy Director of the Department, chief engineer, chief technologist, chief mechanic, chief Manager with practical experience in the specialty, or managerial experience in accordance with the qualification requirements of the " Qualification directory of positions of managers, specialists and other employees», approved by the order of the Minister of labor and social protection of the population of the Republic of Kazakhstan dated may 21, 2012 No. 201-p-m (as amended on 17.04.2013).

### **1.3 Qualification characteristics of the graduate of the educational program**

#### **1.3.1 Scope of professional activity**

The sphere of professional activity is enterprises for the preparation, processing, storage, transportation of oil, gas, coal, production of organic substances, research and design industry institutes, educational institutions, etc.

#### **1.3.2 Objects of professional activity**

The objects of professional activity are equipment, technological processes and industrial systems for obtaining substances, materials, products, as well as their management and regulation systems; chemicals and materials; methods and devices for determining the composition and properties of substances and materials, methods and means for assessing the state of the environment.

#### **1.3.3 Subjects of professional activity**

The subjects of professional activity are oil, gas, coal, products of their processing, petrochemicals, devices and equipment for the preparation, processing, storage, transportation of oil, gas, coal, petrochemicals, various types of raw materials and auxiliary materials, chemical reagents and reagents, research instruments and equipment, educational and methodological documentation, technical training tools.

#### **1.3.4 Types of professional activities**

- research;
- industrial-technological;
- organizational and managerial;
- design;
- educational, pedagogical.

## **2. Learning outcomes at the EP**

After successful completion of this program, the student will be able to:

**LO1** Apply skills of using information resources, analyzing and systematizing the information received and the results of research work in the form of a dissertation, scientific article, report, using knowledge of the state, Russian and English languages.

**LO2** Apply the principles of a systematic scientific worldview in the field of history and philosophy of science in the design and implementation of complex and interdisciplinary research.

**LO3** Apply competencies in the field of psychology and pedagogy, innovative information and educational technologies in professional activities, when planning and performing scientific and pedagogical work.

**LO4** Apply knowledge of higher school psychology in organizing the work of a team of specialists, using entrepreneurial skills, showing leadership qualities, analytical and systematic thinking in non-standard production situations, and taking responsibility for decisions.

**LO5** Manage the technological processes of preparation and processing of oil and gas, petrochemical synthesis with the observance of safe working conditions and the creation of conditions that provide for the complete exclusion or minimization of harmful effects of production on the environment.

**LO6** Develop measures to improve the quality, improve and update products, equipment and technology, to reconstruct and modernize existing installations, to create fundamentally new competitive products.

**LO7** Conduct research and development on individual stages of the topic as a responsible performer or together with a scientific supervisor, carry out complex experiments and observations, present their developments to a wide audience; participate in the implementation of research and development results.

**LO8** perform calculations of technological equipment and devices, develop technological schemes for the preparation, processing and purification of oil and gas, petrochemical synthesis, and hydrogen production; monitor compliance of components, raw materials, and commercial products produced by installations with the requirements of regulatory and technical documentation

**LO9** Know the principles of selection of catalytic systems, taking into account the specifics of certain processes of oil and gas processing, additives for fuels, oils, lubricants.

**LO10** Apply knowledge and skills to analyze and solve production tasks and scientific problems; raise the level of knowledge, skills and abilities to the level that allows you to study for a doctorate.

## **3. COMPETENCE OF THE GRADUATE OF EP**

3.1 Successful completion of training in the OP "technology of oil and gas processing" contributes to the formation of the following competencies for a master's student:

- key competencies (QC)
- professional competence (PC).

Key competencies:

(QC 1) language and computer

- the ability to apply basic communication skills in a foreign language in oral and written forms; the ability to use modern information and digital technologies to analyze, evaluate and synthesize new complex ideas necessary for professional activity;

(QC 2) basic mathematical, natural science and technical training

- The ability and willingness to apply, expand and rethink the educational potential acquired during the study of technical disciplines in professional activities and continuing education in doctoral studies;

(QC 3) economic and business

- ability to organize and manage, analytical and systematic thinking, be responsible for planning, developing and delivering results of business processes that may lead to significant changes or development of the enterprise, manage personnel, and demonstrate entrepreneurial skills;

(QC 4) research

- the ability to analyze scientific and technical information in the field of oil and gas processing technology for the purpose of scientific, patent and marketing support of research; the ability to summarize the results of research work in the form of scientific publications, to defend their position in the discussion and make professional decisions in a situation of partial and complete uncertainty and risk;

(QC 5) methodological

- the ability to analyze and comprehend the realities of modern theory and practice based on the methodology of natural science knowledge, apply new methods of teaching specialized disciplines in teaching activities; develop new laboratory facilities for conducting workshops, update and deepen the knowledge necessary for scientific and pedagogical activities;

professional competencies:

(PC1) the ability to improve chemical and technological processes, introduce new modern technologies into production, develop measures for the integrated use of raw materials, replace scarce materials and find ways to dispose of production waste, assess their economic efficiency and innovation and technological risks;

(PC2) the ability to conduct expert research on the properties and actual structure of chemical technology materials, including independent highly qualified operation of modern equipment and devices in the field of research;

(PC3) the ability to develop and guide the implementation of research and technical projects, new energy-and resource - saving environmentally friendly technologies to achieve maximum production efficiency.

(PC4)ability to quickly and efficiently develop business plans and conduct preliminary marketing research for the commercialization of products in the field of organic chemical technology.

### 3.2 Matrix of correlation of the learning outcomes in EP as a whole with the formed competencies of modules

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
QK1	+		+				+			
QK2			+			+	+			+
QK3				+	+	+				+
QK4	+	+	+			+	+			+
QK5	+	+	+							+
PK1				+	+	+	+			
PK2		+				+	+	+		
PK3				+	+	+	+		+	
PK4				+		+	+			+



**4. SUMMARY TABLE SHOWING THE AMOUNT OF LOANS DISBURSED IN THE CONTEXT OF EDUCATIONAL PROGRAM MODULES**

Training course	Semester /trimester	Number of modules to be mastered	Number of disciplines studied		Number of credits KZ					Total hours	Total loans KZ	Quantity	
			UK	OC	Theoretical training	Pedagogical practice	Research practice	ROU	Final certification			exam	deeth. test
1	1	5	5	2	28			2		900	30	7	1
	2	4	-	4	20	8		2		900	30	4	2
2	3	4	-	3	16		12	2		900	30	3	2
	4	2	-	-	-			18	12	900	30	-	1
total		7	5	9	64	8	12	24	12	3600	120	14	6

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### 5. Information about disciplines

The name of the module	CYCLE	UC/OC	The component name	Brief description of the discipline (30-50 words)	Number of credits	The generated LO (codes)
Module of scientific and pedagogical training	Basic discipline	University component	History and philosophy of science	It examines the history and philosophy of natural and technical Sciences, new European science in culture and civilization, the structure of scientific knowledge, philosophical problems of specific Sciences, communication technologies of the twenty first century and their role in modern science. Defines ways to solve modern topical methodological and philosophical problems of natural and technical Sciences, develops critical thinking and logic.	3	LO2
	Basic discipline	University component	Foreign language (professional)	It allows you to develop oral communication skills in a foreign language, cross-cultural competence, business correspondence exchange skills, master the main types of reading foreign original sources, preparing written messages on scientific topics in the specialty: scientific report, presentation, discussions, abstracts and articles on the topic of scientific research in a foreign language, annotation of scientific text, preparation of a summary.	3	LO1
	Basic discipline	University component	Management psychology	It considers the basic principles of modern psychological science that are necessary in the professional activity of highly qualified specialists. Forms a scientific and theoretical Outlook on fundamental psychological concepts, skills and abilities of psychological research of the individual, introduces the main methods of experimental psychological research and areas of psychocorrection work, management of conflicts in the team, stress and methods of their resolution	3	LO3, LO4
Methodological foundations of teaching	Basic discipline	University component	Pedagogy of higher education	It represents modern paradigms of higher education, the system of higher professional education in Kazakhstan. Examines the methodology of pedagogical science, professional competence of a higher school teacher. It allows you to master the credit system of training, new methods and forms of training in the preparation of future specialists, education and formation of the personality of a specialist with leadership qualities.	3	LO3
	Profile of discipline	University component	Methods of teaching professional disciplines	Considers the application of the competence approach in education, technologies of individual, integrated and multimedia learning. Teaches teaching of specialized disciplines by analyzing and solving problem situations, drawing up a group project, conducting a role-playing game; provides skills for organizing the educational process, scientific work of undergraduates. Allows you to master the methodological features of the study of specialized disciplines, development and updating of educational and methodological documentation.	5	LO1, LO2 LO3
	Basic discipline	University component	Pedagogical practice	Develops professional research culture as a condition of pedagogical skill and pedagogical creativity, professional and pedagogical skills, and culture of scientific and pedagogical thinking. Develops skills in developing educational	4	LO1,LO2, LOO3

		nt		and methodological documentation for the core disciplines, preparing and conducting practical and laboratory classes in special disciplines, and developing new active forms of conducting classes with students.		
Перспективы развития процессов нефтепереработки	Basic discipline	Optional component	Modeling of physical and chemical processes of oil refining	Considers methods of physical and mathematical modeling of oil refining and petrochemistry processes, optimal operation of modern technological processes for the production of fuels and oils, taking into account the influence of external factors (changes in the composition of raw materials, changes in requirements for final and intermediate products, etc.) on the performance of existing production facilities. It allows you to acquire skills in using computers to solve problems of optimizing technological processes, developing their mathematical models, intensifying design work, and helping to understand the basic principles of working with modern computer-aided design (CAD) systems.	5	LO1, LO5 LO6, LO8
			Equipment and technology for disposal of oil-containing waste	Considers the composition, physical and chemical properties of oil-containing wastes, the dynamics of their formation and accumulation, their impact on the environment, equipment for the disposal of oil sludge. Instills skills in the disposal and disposal of oil-containing waste based on data on their composition and properties.		LO1, LO5 LO6, LO8
	Profile of discipline	Optional component	Theoretical foundations and technology of additives to oils and petroleum products	Considers basics of synthesis, the technology for the production of additives for oils and petroleum products, summarizes and systematizes knowledge on the mechanism of action, application and effectiveness of additives for various purposes. Allows you to acquire the skills of analysis of additives, research on finding ways to improve the performance of oil and oil products by adding functional additives and justification for their choice.	5	LO1 LO7 LO9
			Hydrogen production in the oil refining industry	Considers technology, thermodynamics, kinetics, operating conditions, catalysts and hardware design of individual stages of hydrogen production. It instills the skills of operational control of the compliance of components, raw materials and commercial products produced at the installation with the requirements of regulatory and technical documentation, control of the execution of work on the development of measures for the reconstruction and modernization of equipment and production technology.		LO7 LO8
	Profile of discipline	Optional component	Chemistry and technology of basic organic and petrochemical synthesis	Considers the theoretical foundations, systemic patterns, which used in the creation and optimization of production, the technology for producing the main products of basic organic and petrochemical synthesis. It instills the skills of obtaining products and intermediates of petrochemical synthesis, management of technological facilities of petrochemical industries	4	LO1 LO2 LO7
			Reaction devices for oil refining	Considers the main types of reaction apparatus used in oil refining, the principles of their operation; types of thermodynamic and kinetic models used to describe the operation of reactors. It allows to acquire the skills of calculation and		LO2 LO6 LO8

				selection of technological parameters of reaction apparatus; determining the permissible limits of the process parameters and the method of choosing a reaction apparatus.		
	Profile of discipline		Research practice	Develops skills for designing and implementing complex and interdisciplinary research, analyzing and summarizing scientific and technical information using information resources, applying knowledge of a foreign language; performing experimental research, summarizing research results in the form of a report, scientific article, and presentation to a wide audience.	7	LO1,LO7
Oil refining products	Profile of discipline	Optional component	Quality control of raw materials and refined products	Considers innovate experience, state standards and technical conditions in the field of quality control of oil and oil products. It allows to acquire decision-making skills in non-standard situations when testing the quality of oil and its products, organizing chemical and physico-chemical analyzes, developing and introducing new methods into production and improving existing methods.	5	LO1 LO7
			Production of motor fuels from alternative sources of raw materials	It considers the raw material base, processing technology, application features and economic indicators of the use of motor fuels from alternative raw materials (coal, shale, tar oils, natural gas, biomass). It allows to acquire skills in the study of various raw materials from alternative sources and products of its processing and, based on the results, recommend a processing option.	5	LO1 LO5 LO7 LO8
	Profile of discipline	Optional component	Modern and promising thermolytic oil refining processes	It considers the condition and issues of improving the technology and installations of the rmolytic processes, the production of bitumen binders, the influence of kinetic parameters on the composition and properties of the products obtained, the mechanism and hydrodynamics of the processes. It instills the skills of researching the quality of raw materials and products of processes and selecting, on this basis, the most acceptable options for improving plants and intensifying processes.	6	LO1 LO5 LO7 LO8 <b>LO9</b> LO10
			Innovative technologies of production components of motor fuels	It considers the trends in the development of processes for the production of motor fuels, innovative processes for processing natural gas and refinery gases into motor fuels. It instills the skills of selecting the most optimal raw materials and developing alternative options for the modernization and reconstruction of existing plants, taking into account technical and economic feasibility and ensuring the production of products that meet environmental quality standards.		LO1 LO5 LO8
Глубокая переработка углеводородног	Basic discipline	Optional component	Physicochemical technology of oil disperse system	It considers the theoretical and applied problems of physical and chemical technology, the principles of the colloid-chemical approach to the analysis of the structure of hydrocarbon raw materials, the formation of dispersions in oil	5	LO9, LO5

О СЫРЬЯ				systems in non-destructive and destructive oil refining processes. It allows to acquire the skills of regulating phase transitions to intensify the technological processes of processing oil disperse systems.		
			Processing technology of natural gas and condensate	It considers the technology of processing natural gases and gas condensates; technological equipment, modern methods of calculating technological processes, especially the processing of gas condensate to produce motor fuels. It instills the skills of choosing methods for processing gases and condensates, depending on their properties, and the calculation of technological equipment. combating technological complications in the collection and processing of paraffin-containing hydrocarbons.		LO5, LO7, LO8, LO9
	Basic discipline	Optional component	Processing of heavy and residual crude oil	It considers the problems of rational use; new approaches and new directions for the deep processing of heavy and residual petroleum feed stocks, allowing for a residual conversion of feed stocks to target light hydrocarbons. It allows to acquire skills in determining the composition and properties of products of processing of heavy fractions and oil residues using traditional and innovative instrumental methods.	6	LO5, LO7, LO8
			Technology of regeneration of waste oil	It considers the physical and mechanical methods of regeneration: sedimentation, filtration, centrifugation; physicochemical methods of regeneration: coagulation, adsorption purification, ion-exchange purification, selective regeneration; chemical cleaning methods: sulfuric acid purification, hydrogenation, processes using sodium and its compounds; equipment for the regeneration of waste oils. It allows to acquire the skills of organizing complexes for the regeneration of oils to meet the needs of the region.		LO1, LO7, LO8, LO9
			Research work of a master's student, including internships and completion of a master's thesis (RWMII)	Skills of analysis and synthesis of scientific literature on foreign and domestic publications with the involvement of information resources; generalization of results of scientific-research work in the form of a report, sections of the thesis, scientific articles. Allows you to acquire skills for processing and interpreting the results.	24	LO1, LO7, LO8, LO10
Catalytic processes of oil refining	Profile of discipline	Optional component	Technology of development and application of oil refining catalysts	It deepens knowledge on the theory and technology of production of catalysts for oil refining and petrochemical processes; patterns of these processes; considers catalysis using metal complex compounds and various carriers. It inculcates skills in determining the physic-mechanical, chemical properties, selection and prediction of catalysts for oil refining and flue gas treatment.	4	LO1, LO7, LO9
			Homogeneous and heterogeneous catalysis in	It considers the basics of development and ways of using catalysts to obtain various petrochemical products. Develops skills in the analysis and organization of the work of petrochemical catalytic processes; development and use of	4	LO5, LO7, LO8, LO9

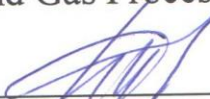
			petrochemistry	catalysts; experimental study of the mechanical and physicochemical properties of various catalytic systems.		
	Profile of discipline	Optional component	Hydrocatalytic processes of oil refining	It deepens knowledge of the thermodynamic foundations and chemical transformations of hydrocarbons and heterocompounds, of chemical-technological macro kinetics, thermal regulation, and technological methods of conducting hydrocatalytic processes. Develops skills in choosing a method for processing oil fractions of oil from new fields; selection of effective catalysts and the optimal operating mode of hydrocatalytic process plants aimed at improving the environmental characteristics of the products obtained.	5	LO 5,LO6, LO7,LO8, LO9
			Environmental aspects of oil and gas deep processing	It considers the principles of quantitative assessment of the possible consequences associated with emergencies, regulatory, organizational, technological and economic methods that can minimize the level of negative environmental impact of the processes of deep oil and gas processing. It instills hazard identification skills, methods of qualitative and quantitative assessment of the environmental risk of deep oil and gas refining.		
			The processes of hydro-refinement of oil fractions	It deepens knowledge of the thermodynamic foundations and chemical transformations of hydrocarbons and heterocompounds, of chemical-technological macrokinetics, thermal regulation, and technological methods of conducting hydrocatalytic processes. Develops skills in choosing a method for processing oil fractions of oil from new fields; selection of effective catalysts and the optimal operating mode of hydrocatalytic process plants aimed at improving the environmental characteristics of the products obtained.		LO5, LO6, LO8
The module final assessment			Industrial ecology of hydrocarbon systems	Forms skills of generalization and systematization of research results in the form of a master's thesis, presentation to a wide audience.	12	LO1, LO2, LO3,LO7, LO8,LO9, LO10
<b>Total for the educational program</b>					<b>120</b>	

# APPROVAL SHEET

by educational program

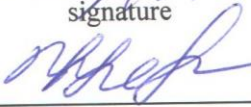
7M07176 · "Oil and Gas Processing Technology"

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Director of DAS

  
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Bazhirov T.S