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**Federal State Autonomous Educational Institution of Higher Education  
Peoples' Friendship University of Russia named after Patrice Lumumba  
RUDN University  
Academy of Engineering**

educational division (faculty/institute/academy) as higher education programme developer

## **COURSE SYLLABUS OF THE DISCIPLINE**

**Advanced oil and gas processing equipment and product quality management /  
Современное оборудование для переработки нефти и газа и управление  
качеством производимой продукции**

(name of discipline/module)

**Recommended by the Didactic Council for the Education Field:**

**21.04.01 Oil and gas engineering**

(code and name of the Higher Education Field)

**The development of the discipline is carried out within the framework of the implementation of the higher education program of higher education (Higher Education Program):**

**Oil and gas engineering / Технологии добычи и транспортировки нефти и газа**

(name (profile/specialization) of the Higher Education Program)

## 1. COURSE GOALS

The purpose of mastering the discipline "Advanced oil and gas processing equipment and product quality management / Современное оборудование для переработки нефти и газа и управление качеством производимой продукции" is to obtain knowledge, skills and experience in the field of technology of oil, natural hydrocarbon gases and gas condensates, its theoretical and applied significance, the basic physical and chemical properties of oil and oil products, the principles of oil treatment, direct distillation of oil and oil and gas condensate raw materials, and as well as further processing to obtain the entire range of petroleum products.

The aims of the course are:

- study of the main processes of primary and secondary processing of oil and gas, their relationship, raw materials for each process and products;
- knowledge of modern oil and gas processing plants.
- study of the latest achievements in the improvement of processes, individual units of installations and modernization of the main equipment;
- analysis and generalization of the results and their use in further practical work at oil refineries;
- obtaining knowledge for solving practical problems of improving equipment and blocks of technological installations.

## 2. LEARNING OUTCOMES

Mastering the discipline "Advanced oil and gas processing equipment and product quality management / Современное оборудование для переработки нефти и газа и управление качеством производимой продукции" is aimed at developing the following competencies (parts of competencies) among students:

*Table 2.1. The list of competencies formed by students in the course of mastering the discipline (the results of mastering the discipline)*

Competence code	Competence	Competence indicators (within this discipline)
SPC-1	Able to use theoretical knowledge when performing technological scientific research in the field of development, transportation and processing of oil and gas	<p>SPC-1.1 Knows fundamental concepts in the field of geology of oil and gas fields, methods of forecasting, prospecting and exploration of mineral deposits; regulatory and methodological documents in the field of hydrocarbon production and development of oil and gas fields</p> <p>SPC-1.2 Can use theoretical knowledge and mining and geological information to carry out technological scientific research, as well as apply knowledge of regulatory and methodological documents to assess oil and gas fields</p> <p>SPC-1.3 Has the theoretical knowledge, methods of subsurface research in the field of oil and gas field development; skills to perform production, technological and engineering research in the field of hydrocarbon production, development of oil and gas fields</p>
SPC-4	Able to manage the system for monitoring the technical condition and technical diagnostics at the facilities and plants of the oil and gas complex	SPC-4.1 Knows the principles, physical foundations, technical support of technical control and diagnostic methods, modern developments in the field of strength of materials, fracture mechanics, materials technology and materials science; design features, manufacturing technology, operation and repair of the control object,

Competence code	Competence	Competence indicators (within this discipline)
		<p>types and types of defects, probable zones of their formation, taking into account the loads acting on the object and other factors, principles, physical foundations, technical support for the types and methods of technical control and diagnostics; principles of construction, functional diagrams and rules for operating equipment for a given method of control, rules for selecting and checking the quality of used consumable flaw detection materials; control systems used to check objects (products) of a certain type; metrological support, standards, calculation methods and other applicable regulatory documents and rules for assessing the technical condition; harmful environmental factors of this control method and ways to prevent their impact on the environment and humans; principles of planning and organization of work of technical control and diagnostic units, current state and prospects for the development of technical control and diagnostic methods; rules for electrical safety and fire safety, rules for the construction and safe operation of facilities</p> <p>SPC-4.2 Can determine the methods, equipment, technologies and techniques to be used for specific types of objects; perform control operations, evaluate and identify the results of control and testing, issue conclusions on the results of technical control and diagnostics; organize, conduct and manage calculations and experimental work to assess the technical condition</p> <p>SPC-4.3 Has the skills to perform verification calculations, taking into account the identified defects; assessment of the mutual influence of various defects on the technical condition of the control object; determining the need for additional research in order to clarify the determining parameters of the technical condition; development of measures to reduce operational risks based on risk analysis, minimization of operational risks</p>
SPC-5	<p>Able to draw up technical documentation for the implementation of the technological process (work schedules, instructions, plans, estimates, requests for materials, equipment, etc.), make an economic assessment of oil and gas fields in accordance with approved forms</p>	<p>SPC-5.1 Knows the requirements and GOSTs for the preparation of technical documentation, basic methods of geological and industrial assessment of oil and gas fields; methods of geological-industrial and geological-economic assessment (GEO) of new geological exploration projects, taking into account all the uncertainties and risks of their implementation</p> <p>SPC-5.2 Can draw up and draw up technical documentation for the implementation of technological processes in the field of oil and gas field development, transportation and processing of oil and oil products; apply new methods of geological and industrial evaluation of oil and gas fields; determine the geological resources and the probability of finding a deposit, its production potential; carry out planning and evaluation of infrastructure solutions; determination of costs for the discovery and development of a field</p> <p>SPC-5.3 Has the methodology for preparing primary reporting, including work schedules, instructions, plans, estimates, applications for materials, equipment according</p>

Competence code	Competence	Competence indicators (within this discipline)
		to approved forms
SPC-9	Able to organize the work of performers, find and make management decisions, rules for ensuring the safety of technological processes, as well as personnel when working in the field, in laboratories, in office processing	SPC-9.1 Knows the safety rules and safety precautions when working in the field, in laboratories, during office processing SPC-9.2 Can justify and make management decisions in the field of organization and regulation of labor; conduct briefings on ensuring the safety of technological processes, as well as personnel when working in the field, in laboratories, during office processing SPC-9.3 Has the methodology for ensuring the safety of technological processes, as well as personnel when working in the field, in laboratories, during office processing

### 3. ACADEMIC PROGRAM STRUCTURE

The discipline "Advanced oil and gas processing equipment and product quality management / Современное оборудование для переработки нефти и газа и управление качеством производимой продукции" refers to the University Disciplines Module of block B1 of the Higher Education Program.

As part of the Higher Education Program, students also master other disciplines and / or practices that contribute to the achievement of the planned results of mastering the discipline "Advanced oil and gas processing equipment and product quality management / Современное оборудование для переработки нефти и газа и управление качеством производимой продукции".

*Table 3.1. List of Higher Education Program components / disciplines that contribute to expected learning/training outcomes*

Competence code	Name of competence	Previous disciplines/modules, practices*	Subsequent disciplines/modules, practices*
SPC-1	Able to use theoretical knowledge when performing technological scientific research in the field of development, transportation and processing of oil and gas	-	Pre-graduate practice / Преддипломная практика SFC
SPC-4	Able to manage the system for monitoring the technical condition and technical diagnostics at the facilities and plants of the oil and gas complex	-	Technological practice (training) / Технологическая практика (учебная) Technological practice (production) / Технологическая практика (производственная) Pre-graduate practice / Преддипломная практика SFC
SPC-5	Able to draw up technical documentation for the	Geoinformation Systems and Applications /	Technological practice (training) /

Competence code	Name of competence	Previous disciplines/modules, practices*	Subsequent disciplines/modules, practices*
	implementation of the technological process (work schedules, instructions, plans, estimates, requests for materials, equipment, etc.), make an economic assessment of oil and gas fields in accordance with approved forms	Геоинформационные системы и их применение	Технологическая практика (учебная) Technological practice (production) / Технологическая практика (производственная) Pre-graduate practice / Преддипломная практика SFC
SPC-9	Able to organize the work of performers, find and make management decisions, rules for ensuring the safety of technological processes, as well as personnel when working in the field, in laboratories, in office processing	-	Technological practice (training) / Технологическая практика (учебная) Technological practice (production) / Технологическая практика (производственная) Pre-graduate practice / Преддипломная практика SFC

\* - filled in in accordance with the matrix of competencies and Higher Education Program.

#### 4. COURSE WORKLOAD and ACADEMIC/TRAINING/LEARNING ACTIVITIES

The course total workload for the discipline "Advanced oil and gas processing equipment and product quality management / Современное оборудование для переработки нефти и газа и управление качеством производимой продукции" is equal to 5 credits.

Table 4.1. Types of academic activities during the period of the HE program mastering

Type of study work	TOTAL, acc. hrs.	Semester(s)
		1
<i>Contact academic hours, acc .</i>	54	54
including:		
Lectures	18	18
Laboratory work		
Seminars (workshops/tutorials)	36	36
<i>Self-study (ies), academic hours</i>	99	99
<i>Evaluation and assessment (exam or pass/fail grading)</i>	27	27
<b>The course total workload</b>	acc. hrs.	<b>180</b>
	credits.	<b>5</b>

#### 5. COURSE MODULE and CONTENTS

Table 5.1. The content of the discipline (module) by type of educational work

Name of the section (topic) of the discipline	Contents of the section (topic)	Type of study work
Section 1. Mass transfer (diffusion) processes	Basic concepts and laws of mass transfer . Equilibrium systems. Evaporation and condensation. Rectification. Azeotropic and extractive distillation. absorption and	Lecture, Lab work

	desorption. The main types and calculation of distillation and absorption columns. Adsorption. Extraction. Drying	
Section 2. Hydromechanical processes	Characteristics of disperse systems. Settling. Filtration. Centrifugal settling and centrifugal filtration. Electrical deposition. Separation of gas dispersed systems. Mixing liquids. Hydrodynamics of a layer of granular materials	Lecture, Lab work
Section 3. Mechanical processes	Grinding of hard materials. Classification and dosing of solid materials	Lecture, Lab work
Section 4. Thermal processes	Tube furnaces. Heat exchangers	Lecture, Lab work
Section 5. Processes of chemical processing of petroleum raw materials	The main regularities of petrochemical processes. reaction apparatus	Lecture, Lab work

## 6. LOGISTICS AND TECHNICAL SUPPORT OF THE DISCIPLINE

Table 6.1. Logistics of discipline

Classroom for Academic Activity Type	Classroom equipment	Specialized educational / laboratory equipment, software and materials for mastering the discipline (if necessary)
Lecture	Training room for conducting lecture-type classes: room. No. 335 A set of specialized furniture; technical means: projection screen; multimedia projector SANYO PROxtraX ; system block DEPO Neos 220	
Seminar	Classroom for conducting seminar-type classes: room. No. 356 A set of specialized furniture; chalk board; monitor NEC PLASMA MONITO MODEL PX-42XM1G; system block DEPO Neos 220	
For self-study	Classroom for conducting seminar-type classes: room. No. 356 A set of specialized furniture; chalk board; monitor NEC PLASMA MONITO MODEL PX-42XM1G; system block DEPO Neos 220	

## 7. Recommended Sources for Course Studies

*Main reading(sources):*

1. Ryabov, V. D. Chemistry of oil and gas: textbook. allowance / V.D. Ryabov. - 2nd ed. , Rev. and additional - Moscow: Publishing House "FORUM": INFRA-M, 2019. - 335 p. <https://znanium.com/catalog/product/940691>

2. Zarifyanova , M.Z. Chemistry and technology of secondary oil refining processes : textbook / M.Z. Zarifyanova , T.L. Puchkova, A.V. Sharifullin ; Ministry of Education and Science of Russia, Kazan National Research Technological University. - Kazan: Kazan Research Technological University (KNITU), 2015. - 156 p. <https://biblioclub.ru/index.php?page=book&id=428799>

3. Nekozyreva , T. N. Chemistry of oil and gas: textbook / T. N. Nekozyreva , O. V. Shalamberidze . - Tyumen: Tsogu , 2013. - 76 p. - ISBN 978-5-9961-0768-1. — Text: electronic // Doe: electronic library system. <https://e.lanbook.com/book/55436>

*Additional(optional) reading (sources):*

1. Reservoirs for receiving, storing and dispensing petroleum products: study guide / Yu.N. Bezborodov, V.G. Shram, E.G. Kravtsova and others; Ministry of Education and Science of the Russian Federation, Siberian Federal University. - Krasnoyarsk: Siberian Federal University, 2015. - 110 p.

<http://biblioclub.ru/index.php?page=book&id=435609>

2. Agabekov, V.E. Oil and gas: technologies and products of processing / V.E. Agabekov. - Minsk: Belarusian Science, 2011. - 460 p.

<http://biblioclub.ru/index.php?page=book&id=86694>

3. Ponomareva, G. A. Hydrocarbons of oil and gas: physical and chemical properties: textbook / G. A. Ponomareva. - Orenburg: OGU, 2016. - 98 p. - ISBN 978-5-7410-1411-0. — Text: electronic // Doe: electronic library system. <https://e.lanbook.com/book/98000>

*Internet-(based) sources:*

1. Electronic libraries with access for RUDN students:

RUDN Electronic Library System - RUDN EBS <http://lib.rudn.ru/MegaPro/Web>

- ELS "University Library Online" <http://www.biblioclub.ru>

- EBS Yurayt <http://www.biblio-online.ru>

- ELS "Student Consultant" [www.studentlibrary.ru](http://www.studentlibrary.ru)

- EBS "Lan" <http://e.lanbook.com/>

- EBS "Trinity Bridge"

2. Databases and search engines:

- electronic fund of legal and normative-technical documentation <http://docs.cntd.ru/>

- Yandex search engine <https://www.yandex.ru/>

- Google search engine <https://www.google.ru/>

- abstract database SCOPUS <http://www.elsevier.com/locate/scopus/>

*Learning toolkits for self- studies in the RUDN LMS TUIS:*

1. A course of lectures on the discipline "Advanced oil and gas processing equipment and product quality management / Современное оборудование для переработки нефти и газа и управление качеством производимой продукции."

2. Guidelines for students on mastering the discipline "Advanced oil and gas processing equipment and product quality management / Современное оборудование для переработки нефти и газа и управление качеством производимой продукции."

\* - all educational and methodological materials for independent work of students are placed in accordance with the current procedure on the page of the discipline **in TUIS!**

## **8. ASSESSMENT AND EVALUATION TOOLKIT**

Marking criteria (MC) and a 100-point (score) scale for assessing the level of competencies (parts of competencies) based on the results of mastering the discipline "Advanced oil and gas processing equipment and product quality management / Современное оборудование для переработки нефти и газа и управление качеством производимой продукции" are

presented in the Appendix to this Work Program of the discipline.

\* - MC and the 100-point (score) scale are formed on the basis of the requirements of the relevant local normative act of the Peoples' Friendship University of Russia.

**DEVELOPERS:**

Professor of the Department of Mineral  
Developing and Oil&Gas Engineering

Position. Department

Signature

Kapustin V.M.

Full name

**Head of Department:**

Director of the Department of Mineral  
Developing and Oil&Gas Engineering

Name of Department

Signature

Kotelnikov A.E.

Full name

**Head of Educational Programme:**

Professor of the Department of Mineral  
Developing and Oil&Gas Engineering

Position. Department

Signature

Kapustin V.M.

Full name