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Информация о владельце:
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Должность: Ректор
Дата подписания: 31.05.2023 23:30:59
Уникальный программный ключ:
ca953a0120d891083f939673078ef1a989dae18a

**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

**Current development of the production of unconventional hydrocarbon resources in
the world / Современное развитие добычи нетрадиционных ресурсов
углеводородов в мире**

(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 "Current development of the production of unconventional hydrocarbon resources in the world / Современное развитие добычи нетрадиционных ресурсов углеводородов в мире" is the acquisition by students of theoretical knowledge, practical skills, as well as the development of innovative technologies for open-pit, mine and well development of unconventional hydrocarbons.

The aims of the course are:

- understanding of the concept of "non-traditional source of hydrocarbons", the economic benefits of their use;

- mastering by students of knowledge about the characteristics and features of non-traditional hydrocarbon sources, modern methods of their use, problems and prospects for the development of the industry of exploitation of non-traditional hydrocarbon sources, mastering methods for evaluating their effectiveness.

2. REQUIREMENTS FOR THE RESULTS OF MASTERING THE DISCIPLINE

Mastering the discipline "Current development of the production of unconventional hydrocarbon resources in the world / Современное развитие добычи нетрадиционных ресурсов углеводородов в мире" 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)
GC-1	Able to search, make a critical analysis of problem situations based on a systematic approach, develop a strategy.	GC-1.1. Knows the methods of critical analysis and evaluation of modern scientific achievements; methods of critical analysis; basic principles of critical analysis. GC-1.2. Can analyze the task, highlighting its basic components, decompose the task; receive new knowledge based on analysis, synthesis, etc.; carry out a critical analyze of information necessary to solve the problem; collect data on complex scientific problems related to the professional field; search for information and solutions based on actions, experiment and experience. GC-1.3. Has the ability to study the problem of professional activity using analysis; synthesis and other methods of intellectual activity; identify scientific problems and use adequate methods to solve them; the skills of value judgments in solving professional situations.
GPC-1	Able to solve production and/or research tasks based on fundamental knowledge in the oil and gas field.	GPC-1.1. Knows the methods and technologies (including innovative ones) of development in the field of oil and gas engineering, scientific and methodological support of professional activity, principles of professional ethics. GPC-1.2. Can carry out research activities for the development and implementation of innovative technologies in the field of oil and gas engineering; develop programs for monitoring and evaluating the results of the implementation of professional activities; develop information and methodological materials in the field of professional activity; use the fundamental knowledge of professional activity to overcome specific challenges of oil and gas production.

		<p>GPC-1.3. Has the skills of physical and software modeling of separate fragments of the process of choosing the best option for specific conditions; skills in analyzing the causes for the quality reduction of technological processes and suggests effective methods to improve the quality of work in various technological operations; the skills in the use of modern tools and methods for planning and controlling projects related to the complications arising in the course of work.</p>
GPC-4	<p>Able to find and process the information required for decision-making in scientific research and in practical technical activities</p>	<p>GPC-4.1. Knows the technology of conducting standard experiments on standard equipment in the laboratory and in production; a complex of modern methods for processing the results of research, practical technical activities using existing equipment, instruments and materials.</p> <p>GPC-4.2. Can independently search, analyze and select the necessary information, organize, transform, store and transmit it; analyze the internal logic of scientific knowledge; justify their worldview and social position and apply the acquired knowledge in areas not related to professional activities; assess innovation risks; compare and process the results of research activities using standard equipment, instruments and materials.</p> <p>GPC-4.3. Has the technique of experimentation using software packages; the main directions of development of innovative technologies in the oil and gas industry; the skills in developing innovative approaches in specific technologies with the help of AWS.</p>
SPC-1	<p>Able to use theoretical knowledge when performing technological scientific research in the field of development, transportation and processing of oil and gas</p>	<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-6	<p>Capable of applying the basic principles of rational use of natural resources and environmental protection</p>	<p>SPC-6.1 Knows the legal and methodological framework of the procedure for conducting environmental impact assessment EIA and environmental expert activities for use in professional activities; fundamentals of the theory and normative legal acts of the integrated development and rational use of natural resources and environmental protection; the procedure for conducting a geological examination of projects, regulatory documents for compiling an environmental passport</p> <p>SPC-6.2 Can assess the state of the environment when conducting complex geological and geographical studies; use mechanisms for the rational use of natural resources and environmental protection; apply regulatory and methodological documents to assess and prevent environmental damage at production facilities</p> <p>SPC-6.3 Has the methodology of rational use of natural resources and environmental protection; a system of methods</p>

		(EIA) and conducting state environmental expertise for successful research and production activities; skills and knowledge to assess environmental damage at production facilities, modern methods for eliminating the consequences and preventing environmental damage at production facilities
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 "Current development of the production of unconventional hydrocarbon resources in the world / Современное развитие добычи нетрадиционных ресурсов углеводородов в мире" refers to the Compulsory (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 "Modern development of the production of unconventional hydrocarbon resources in the world."

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*
GC-1	Able to search, make a critical analysis of problem situations based on a systematic approach, develop a strategy.	Economics and management of oil and gas production / Экономика и управление нефтегазовым производством Project management in the oil and gas industry / Управление проектами в нефтегазовой отрасли	Pre-graduate practice / Преддипломная практика SFC
GPC-1	Able to solve production and/or research tasks based on fundamental knowledge in the oil and gas field.	Modern aspects of geological and geophysical research in the oil and gas industry / Современные аспекты геолого-промысловых и геофизических исследований в нефтегазовом деле	Technological practice (production) / Технологическая практика (производственная) SFC
GPC-4	Able to find and process the information required for decision-making in scientific research and in practical technical activities	Geoinformation Systems and Applications / Геоинформационные системы и их применение	SFC
SPC-1	Able to use theoretical	Geoinformation Systems and	Research work / Научно-

Competence code	Name of competence	Previous disciplines/modules, practices*	Subsequent disciplines/modules, practices*
	knowledge when performing technological scientific research in the field of development, transportation and processing of oil and gas	Applications / Геоинформационные системы и их применение	исследовательская работа Pre-graduate practice / Преддипломная практика SFC
SPC-6	Capable of applying the basic principles of rational use of natural resources and environmental protection	Modern aspects of geological and geophysical research in the oil and gas industry / Современные аспекты геолого-промысловых и геофизических исследований в нефтегазовом деле Machinery and equipment for field development and transportation of hydrocarbons / Машины и оборудование для разработки месторождений и транспорта углеводородов Resource estimation, computation and recalculation of hydrocarbon reserves / Оценка ресурсов, подсчет и пересчет запасов углеводородов	Technological practice (production) / Технологическая практика (производственная) 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 (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 "Current development of the production of unconventional hydrocarbon resources in the world / Современное развитие добычи нетрадиционных ресурсов углеводородов в мире" is 5 equal to credits.

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

Type of study work	TOTAL, acc.	Semester(s)
		3
Contact academic hours, acc.	54	54
including:		
Lectures	18	18
Laboratory work		
Seminars (workshops/tutorials)	36	36
Self-study (ies), academic hours	99	99

Type of study work		TOTAL, acc.	Semester(s) 3
<i>Evaluation and assessment (exam or pass/fail grading)</i>		27	27
The course total workload	acc.hrs.	180	180
	credits	5	5

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. General information about deposits of unconventional hydrocarbons	Topic 1.1. Geological and physical features of unconventional hydrocarbon deposits	Lecture, Lab work
Section 2. Quarry method of field development	Topic 2.1. General information about open pit mining	Lecture, Lab work
	Topic 2.2. Opening of deposits	Lecture, Lab work
Section 3. Shaft mining method	Topic 3.1. Ukhta way	Lecture, Lab work
	Topic 3.2. Deviated borehole method	
Section 4. Downhole method of field development	Topic 4.1. Downhole hydraulic extraction of raw materials	Lecture, Lab work

6. CLASSROOM EQUIPMENT and TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Classroom Equipment and Technology Support Requirements

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. Golik V.I. Special methods of field development: Textbook / - M.: NITs INFRA-M, 2014.

<http://znanium.com/catalog/product/344986>

2. Tetel'min V.V., Yazev V.A. Energy of oil and gas: Textbook /. - Dolgoprudny:

Intelligence, 2009. - 352 p.

<http://znanium.com/catalog/product/241178>

3. Tetel'min V.V., Yazev V.A., Solov'yanov A.A. Shale hydrocarbons. Mining technologies. Environmental Threats: Textbook /. - Dolgoprudny: Intellect, 2014. - 296 p.

<http://znanium.com/catalog/product/495846>

Additional(optional) reading (sources):

1. Apasov, T.K. Methods of intensification of oil production and enhanced oil recovery for the fields of Western Siberia [Electronic resource]: tutorial / T.K. Apasov, R.T. Apasov, G.T. Apasov. — Electron. Dan. - Tyumen: Tsogu, 2015. - 187 p.

<https://e.lanbook.com/book/91835>

2. Ganieva T.F. High-viscosity oils, natural bitumens and bituminous rocks [Electronic resource]: textbook / T.F. Ganieva, V.K. Polovnyak. — Electron. Dan. - Kazan: KNRTU, 2012

<https://e.lanbook.com/book/73243>

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

- 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.elsevierscience.ru/products/scopus/>

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

1. A course of lectures on the discipline "Current development of the production of unconventional hydrocarbon resources in the world / Современное развитие добычи нетрадиционных ресурсов углеводородов в мире."

2. Guidelines for students on mastering the discipline "Current development of the production of unconventional hydrocarbon resources in the world / Современное развитие добычи нетрадиционных ресурсов углеводородов в мире."

* - 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 (part of competencies) based on the results of mastering the discipline "Modern Development of the Production of Unconventional Hydrocarbon Resources in the World" 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:

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

Position, Department



Signature

Malyukov V.P.

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