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**Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
RUDN University
Academy of Engineering**

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

COURSE SYLLABUS OF THE DISCIPLINE

**Diagnostics of oil and petroleum products main pipeline facilities /
Диагностирование объектов магистральных трубопроводов нефти и
нефтепродуктов**

(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 "Diagnostics of oil and petroleum products main pipeline facilities / Диагностирование объектов магистральных трубопроводов нефти и нефтепродуктов" is to equip students with theoretical and practical knowledge in the field of technical diagnostics of oil pipeline equipment for the formation of the required level of professional competencies in the field of technological processes of pipeline transportation of hydrocarbons.

The aims of the course are:

- the study of scientific foundations, terms and concepts, as well as the main methods of diagnosing and determining the technical condition of pipelines and equipment;
- study of the organization of work on the conduct of technical diagnostics;
- formation of the ability to study the properties of welded joints and metal of pipes and equipment during technical diagnostics;
- formation of skills for calculating the residual life of pipelines,
- use normative documents on technical diagnostics, compilation of technological maps.

2. LEARNING OUTCOMES

Mastering the discipline "Diagnostics of oil and petroleum products main pipeline facilities / Диагностирование объектов магистральных трубопроводов нефти и нефтепродуктов" 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-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	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, 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

Competence code	Competence	Competence indicators (within this discipline)
		<p>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 to approved forms</p>
SPC-8	<p>Able to manage the work on the diagnostic examination of the main oil pipelines (MOP) and the main oil product pipelines (MOPP) facilities</p>	<p>SPC-8.1 Knows:</p> <p>Methods for organizing work on in-line diagnostic inspection of the MOP and MOPP using in-line inspection devices</p> <p>Organizational and administrative documents, regulatory and methodological materials in the field of quality control of work on the diagnostic examination of the MOP and MOPP</p> <p>List of scientific and technical documentation, the use of which is associated with the performance of work on the diagnosis of MOP and MOPP objects</p> <p>The procedure for the formation of long-term development plans in the field of diagnostic work at the facilities of MOP and MOPP</p> <p>The procedure for the development of design, executive and operational documentation for the direction of activity</p> <p>Rules for working with specialized software systems</p>

Competence code	Competence	Competence indicators (within this discipline)
		<p>Requirements for labor protection, industrial, fire and environmental safety</p> <p>SPC-8.2 Can:</p> <p>Determine the scope and procedure for performing work on the diagnostic examination of the MOP and MOPP</p> <p>Assess the compliance of work performance with the requirements of the technological process for diagnosing objects of MOP and MOPP</p> <p>Determine the composition and sequence of preparatory work for non-destructive quality control of structural elements of objects and structures of MOP and MOPP, mechano -technological equipment and metal structures of MOP and MOPP tanks, technical devices, materials, products, parts, assemblies, welded joints</p> <p>Ensure the prevention and elimination of violations of the production process of diagnosing objects of MOP and MOPP by NDT methods</p> <p>Determine the procedure for performing work to identify defects based on the results of additional flaw detection control of MOP and MOPP objects, including internal ones, measurement and refinement of their parameters</p> <p>Analyze advanced domestic and foreign experience in the field of diagnosing MOP and MOPP objects</p> <p>Use specialized software products in the field of activity</p> <p>Comply with the requirements of industrial safety and labor protection at the facilities of MOP and MOPP</p> <p>SPC-8.3 Has:</p> <p>Skills in planning work on diagnosing MOP and MOPP objects</p> <p>Skills in managing work on processing the results of diagnosing objects of MOP and MOPP</p> <p>Skills for verification and approval of production documentation for the diagnosis and control of MOP and MOPP facilities</p> <p>Skills to control the regulatory and technical support of work on diagnosing objects of MOP and MOPP</p> <p>Skills to control data entry into specialized software systems, and their verification</p>

3. ACADEMIC PROGRAM STRUCTURE

The discipline "Diagnostics of oil and petroleum products main pipeline facilities / Диагностирование объектов магистральных трубопроводов нефти и нефтепродуктов" 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 "Diagnostics of oil and petroleum products main pipeline facilities / Диагностирование объектов магистральных трубопроводов нефти и нефтепродуктов".

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-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	Machinery and equipment for field development and transportation of hydrocarbons / Машины и оборудование для разработки месторождений и транспорта углеводородов Fundamentals of construction and operation of pipeline transport / Основы строительства и эксплуатации трубопроводного транспорта	Pre-graduate practice / Преддипломная практика SFC
SPC-5	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	Applications of Geoinformation Systems / Практикум применения геоинформационных систем Modern stream in oil and gas processing in Russia / Современные направления нефтегазопереработки в России	Research work / Научно-исследовательская работа Pre-graduate practice / Преддипломная практика SFC
SPC-8	Able to manage the work on the diagnostic examination of the main oil pipelines (MOP) and the main oil product pipelines (MOPP) facilities	Machinery and equipment for field development and transportation of hydrocarbons / Машины и оборудование для разработки месторождений и транспорта углеводородов Technological processes of pipeline transport / Технологические процессы трубопроводного транспорта Fundamentals of construction and operation of pipeline transport / Основы строительства и эксплуатации трубопроводного транспорта	Pre-graduate practice / Преддипломная практика SFC

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

4. COURSE WORKLOAD and ACADEMIC/TRAINING/LEARNING ACTIVITIES

The course total workload for the discipline "Diagnostics of oil and petroleum products main pipeline facilities / Диагностирование объектов магистральных трубопроводов нефти и нефтепродуктов" 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)
			3
<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
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. Global trends in oil and gas processing, oil and gas chemistry	Topic 1.1. Use of associated petroleum gas and gas processing in general	Lecture, Lab work
	Topic 1.2. Trends in the development of the world petrochemical industry	Lecture, Lab work
Section 2 Oil and Gas Storage	Topic 2.1. Underground natural gas storage	Lecture, Lab work
	Topic 2.2. Stabilization and processing of gas condensates	Lecture, Lab work
Section 3. Delivery and acceptance points of commercial oil and gas to the system of main pipelines	Topic 3.1. Delivery and acceptance points of commercial oil and gas to the system of main pipelines	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:	

Classroom for Academic Activity Type	Classroom equipment	Specialized educational / laboratory equipment, software and materials for mastering the discipline (if necessary)
	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. Prachev , Yu.N. Construction and repair of the linear part of the main pipelines: study guide / Yu.N. Prachev , V.V. Verzhbitsky; Ministry of Education and Science of the Russian Federation, Federal State Autonomous Educational Institution of Higher Professional Education "North Caucasian Federal University". - Stavropol: NCFU, 2014. - 238 p.
<http://biblioclub.ru/index.php?page=book&id=457587>
2. Oil and gas engineering . Full course [Electronic resource]: Textbook / V.V. Tetelmin , V.A. Yazev. - 2nd ed. ; Electronic text data. - Dolgoprudny: Publishing House "Intellect", 2014. - 800 p.
<http://lib.rudn.ru/ProtectedView/Book/ViewBook/6246>

Additional(optional) reading (sources):

1. Khrenov, N.N. Fundamentals of complex diagnostics of northern pipelines. Ground research / N.N. Fucking. - Moscow: Gasoil press, 2005. - 608 p.
<http://biblioclub.ru/index.php?page=book&id=70345>
2. Khrenov, N.N. Fundamentals of complex diagnostics of northern pipelines. Aerospace methods and processing of survey materials / N.N. Fucking. - Moscow: Gasoil press, 2002. - 352 p.
<http://biblioclub.ru/index.php?page=book&id=70346>

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/](https://www.yandex.ru/)
- Google search engine <https://www.google.ru/>
- abstract database SCOPUS [http:// www .elsevier.com/locate/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 "Diagnosing objects of main pipelines of oil and oil products".
2. Guidelines for students on the development of the discipline "Diagnosis of objects of oil and oil products trunk pipelines".

* - 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 competency formation (part of competencies) based on the results of mastering the discipline "Diagnosing objects of oil and petroleum products trunk pipelines" 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

Yushin E.S.
Full name

Head of Department:

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

Name of Department



Signature

Kotelnikov A.E.
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Head of Educational Programme:

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

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