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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**

**Fundamentals of construction and operation of pipeline transport / Основы  
строительства и эксплуатации трубопроводного транспорта**

(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 "Fundamentals of construction and operation of pipeline transport / Основы строительства и эксплуатации трубопроводного транспорта" is the acquisition of knowledge on the production and acceptance of construction and installation works during the construction and reconstruction of the linear part of the main pipelines.

The main objectives of the discipline are:

- study of the basic requirements for the production and acceptance of construction and installation works during the construction and reconstruction of the linear part of the main pipelines;
- study of technologies for the construction of main pipelines in normal and difficult conditions;
- solving problems to determine the stress state, strength, stability and movement of underground pipelines;
- study of the features of the construction of crossings of main pipelines through natural and artificial obstacles .

## 2. LEARNING OUTCOMES

Mastering the discipline "Fundamentals of construction and operation of pipeline transport / Основы строительства и эксплуатации трубопроводного транспорта" 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	<p>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 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</p>

Competence code	Competence	Competence indicators (within this discipline)
		<p>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-8	Able to manage the work on the diagnostic examination of the main oil pipelines (MOP) and the main oil product pipelines (MOPP) facilities	<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> <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</p>

Competence code	Competence	Competence indicators (within this discipline)
		diagnosing objects of MOP and MOPP Skills to control data entry into specialized software systems, and their verification

### 3. ACADEMIC PROGRAM STRUCTURE

The discipline "Fundamentals of construction and operation of pipeline transport / Основы строительства и эксплуатации трубопроводного транспорта" 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 "Fundamentals of construction and operation of pipeline transport / Основы строительства и эксплуатации трубопроводного транспорта".

*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	-	Technological practice (training) / Технологическая практика (учебная) Technological practice (production) / Технологическая практика (производственная) 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	-	Diagnostics of oil and petroleum products main pipeline facilities / Диагностирование объектов магистральных трубопроводов нефти и нефтепродуктов Pre-graduate practice / Преддипломная практика SFC

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

### 4. VOLUME OF DISCIPLINE AND TYPES OF EDUCATIONAL WORK

The total workload of the discipline "Fundamentals of construction and operation of pipeline transport / Основы строительства и эксплуатации трубопроводного транспорта" is equal to 6 credits.

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

Type of study work	TOTAL, acc.	Semester(s)	
		one	2
<i>Contact academic hours, acc.</i>	86	54	32
including:			
Lectures	18	18	-
Laboratory work	-	-	-
Seminars (workshops/tutorials)	68	36	32
<i>Self-study (ies), academic hours</i>	103	54	49
<i>Evaluation and assessment (exam or pass/fail grading)</i>	27		27
<b>The course total workload</b>	acc.hrs.	<b>216</b>	<b>108</b>
	credits	<b>6</b>	<b>3</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. Design requirements for main pipelines	Topic 1.1. Requirements for the production and acceptance of construction and installation works during the construction and reconstruction of the linear part of the main pipelines	Lecture, Lab work
	Topic 1.2. Stress state, strength, stability and movement of underground pipelines	Lecture, Lab work
Section 2. Technology of construction of main pipelines	Topic 2.1. Technologies for the construction of main pipelines under normal conditions	Lecture, Lab work
	Topic 2.2. Features of the technology of construction of main pipelines in difficult conditions	Lecture, Lab work
Section 3. Construction of crossings and corrosion protection of main pipelines	Topic 3.1. Features of the construction of crossings of main pipelines through natural and artificial obstacles	Lecture, Lab work
	Topic 3.2. Corrosion protection of metal 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: 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.	

Classroom for Academic Activity Type	Classroom equipment	Specialized educational / laboratory equipment, software and materials for mastering the discipline (if necessary)
work of students	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\\_red&id=457587](http://biblioclub.ru/index.php?page=book_red&id=457587)

2. Verzhbitsky, V.V. Fundamentals of the construction of oil and gas transport facilities: study guide / V.V. Verzhbitsky, Yu.N. Prachev; 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. - 154 p.

[http://biblioclub.ru/index.php?page=book\\_red&id=457777](http://biblioclub.ru/index.php?page=book_red&id=457777)

3. Verzhbitsky, V.V. Fundamentals of the construction of oil and gas transport facilities: study guide / V.V. Verzhbitsky, Yu.N. Prachev; 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. - 154 p.

<http://biblioclub.ru/index.php?page=book&id=457777>

### *Additional(optional) reading (sources):*

1. Pipeline transport and storage of hydrocarbon resources: examples of solving typical problems: textbook: in 2 volumes / A.A. Gladenko, S.M. Chekardovsky, S.Yu. Podorozhnikov and others; ed. Yu.D. Zemenkov; Ministry of Education and Science of Russia, Omsk State Technical University, Tyumen Industrial University. - Omsk: OmGTU Publishing House, 2017. - T. 2. - 352 p. : tab., graph., ill. - Bibliography: p. 367-391 - ISBN 978-5-8149-2550-3. - ISBN 978-5-8149-2552-7 (vol. 2) ;

<http://biblioclub.ru/index.php?page=book&id=493447>

2. Pipeline transport and storage of hydrocarbon resources: examples of solving typical problems: textbook: in 2 volumes / A.A. Gladenko, S.M. Chekardovsky, S.Yu. Podorozhnikov and others; ed. Yu.D. Zemenkov; Ministry of Education and Science of Russia, Omsk State Technical University, Tyumen Industrial University. - Omsk: OmGTU Publishing House, 2017. - T. 1. - 427 p. : tab., graph., ill. - Bibliography: p. 367-391 - ISBN 978-5-8149-2550-3. - ISBN 978-5-8149-2551-0 (vol. 1)

### *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/](https://www.yandex.ru/)  
 - Google search engine <https://www.google.ru/>  
 - abstract database [SCOPUS http://www.elsevierscience.ru/products/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 "Fundamentals of the construction and operation of pipeline transport."
  2. Guidelines for students on mastering the discipline "Fundamentals of construction and operation of pipeline transport / Основы строительства и эксплуатации трубопроводного транспорта."
- \* - 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 "Fundamentals of construction and operation of pipeline transport / Основы строительства и эксплуатации трубопроводного транспорта" are presented in the Appendix to this Work Program of the discipline.

\* - MC and the 100-point (score) 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		Berdnik M.M.
Position, Department	Signature	Full name
<b>Head of Department:</b>		
Director of the Department of Mineral Developing and Oil&Gas Engineering		Kotelnikov A.E.
Name of Department	Signature	Full name
<b>Head of Educational Programme:</b>		
Professor of the Department of Mineral Developing and Oil&Gas Engineering		Kapustin V.M.
Position, Department	Signature	Full name