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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

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

course title

Recommended by the Didactic Council for the Education Field of:

21.04.01 Oil and gas engineering

field of studies / speciality code and title

**The course instruction is implemented within the professional education programme of
higher education:**

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

higher education programme profile/specialisation title

1. COURSE GOALS

The goal of the course "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 course 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. REQUIREMENTS FOR LEARNING OUTCOMES

The course "Fundamentals of construction and operation of pipeline transport / Основы строительства и эксплуатации трубопроводного транспорта" is designed for students to acquire following competences (competences in part):

Table 2.1. List of competences that students acquire during the course

Competence code	Competence descriptor	Competence formation indicators (within this course)
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 experimental work to assess the technical condition</p>

Competence code	Competence descriptor	Competence formation indicators (within this course)
		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
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 diagnosing objects of MOP and MOPP</p>

Competence code	Competence descriptor	Competence formation indicators (within this course)
		Skills to control data entry into specialized software systems, and their verification

3. ACADEMIC PROGRAMME STRUCTURE

The course refers to the variable component of (B1) block of the higher educational programme curriculum.

Table 3.1. The list of the higher education programme components that contribute to the achievement of the expected learning outcomes as the course results

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	-	<i>Diagnostics of oil and petroleum products main pipeline facilities**;</i> <i>Innovative technologies for the transportation and storage of hydrocarbons**;</i> Methods of oil production intensification; Pre-graduation Practical Training;
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	-	<i>Diagnostics of oil and petroleum products main pipeline facilities**;</i> <i>Pre-graduation Practical Training;</i>

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

4. COURSE WORKLOAD

The total workload of the course "Fundamentals of construction and operation of pipeline transport / Основы строительства и эксплуатации трубопроводного транспорта" is 8 credits.

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

Type of study work	TOTAL, acc.	Semester(s)		
		1	2	
<i>Contact academic hours, acc .</i>	<i>105</i>	<i>54</i>	<i>51</i>	
including:				
Lectures	35	18	17	
Laboratory work	-	-	-	
Seminars (workshops/tutorials)	70	36	34	
<i>Self-study (ies), academic hours</i>	<i>156</i>	<i>54</i>	<i>102</i>	
<i>Evaluation and assessment (exam or pass/fail grading)</i>	<i>27</i>		<i>27</i>	
The course total workload	acc.hrs.	288	108	180
	credits	8	3	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. 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 PROextraX; 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 work of students	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. RESOURCES RECOMMENDED FOR COURSE

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

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

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 sources

1. Electronic libraries (EL) of RUDN University and other institutions, to which university students have access on the basis of concluded agreements:

- RUDN Electronic Library System (RUDN ELS) <http://lib.rudn.ru/MegaPro/Web>
- EL "University Library Online" <http://www.biblioclub.ru>
- EL "Yurayt" <http://www.biblio-online.ru>
- EL "Student Consultant" www.studentlibrary.ru
- EL "Lan" <http://e.lanbook.com/>
- EL "Trinity Bridge"

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

- EL "Student Consultant" www.studentlibrary.ru
- EL "Lan" <http://e.lanbook.com/>
- EL "Trinity Bridge"

Learning toolkits for self- studies:

1. A course of lectures on the course "Fundamentals of the construction and operation of pipeline transport".
2. Guidelines for students on the development of the course ""Fundamentals of the construction and operation of pipeline transport".

*The training toolkit and guidelines for the course are placed on the course page in the university telecommunication training and information system under the set procedure.

8. ASSESSMENT TOOLKIT AND GRADING SYSTEM* FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL AS COURSE RESULTS

The assessment toolkit and the grading system* to evaluate the level of competences (competences in part) formation as the course results are specified in the Appendix to the course syllabus.

* The assessment toolkit and the grading system are formed on the basis of the requirements of the relevant local normative act of RUDN University (regulations / order).

DEVELOPERS:

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

position, educational department

Berdnik M.M.

name and surname

Head of Department:

Head of the Department of Mineral Developing
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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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Kapustin V.M.

name and surname