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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

Technological processes of pipeline transport / Технологические процессы 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 "Technological processes of pipeline transport / Технологические процессы трубопроводного транспорта" is to master the theoretical and practical knowledge for undergraduates to form the required level of professional competencies in the field of technological processes of pipeline transport.

The aims of the course are:

- training undergraduates in the technological processes of pipeline transport of hydrocarbons;
- development of skills and ability to use normative and technical documentation;
- development of skills and abilities to perform calculations related to the implementation of design solutions;
- assess risks and determine measures to ensure the safety of technological processes of pipeline transport of hydrocarbons.

2. REQUIREMENTS FOR LEARNING OUTCOMES

The course "Technological processes of pipeline transport / Технологические процессы 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)
GPC-3	GPC-3. Able to develop scientific and technical, design and service documentation, draw up scientific and technical reports, surveys, publications, reviews	GPC-3.1. Knows methods for evaluating the types of entrepreneurial activities used in the enterprise. GPC-3.2. Can use the basics of logistics, in relation to an oil and gas enterprise, when the main technological operations are performed in conditions of uncertainty; put into practice the elements of production management; use the opportunities for entrepreneurial activities at the entrusted facility and its legislative regulation; find the possibility of combining the performance of basic duties with elements of entrepreneurship. GPC-3.3. Has the skills of personnel management in a small production unit
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	SPC-8.1 Knows: Methods for organizing work on in-line diagnostic inspection of the MOP and MOPP using in-line inspection devices 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 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 The procedure for the formation of long-term development plans in the field of diagnostic work at the facilities of MOP and MOPP The procedure for the development of design, executive and operational documentation for the direction of activity Rules for working with specialized software systems Requirements for labor protection, industrial, fire and

Competence code	Competence descriptor	Competence formation indicators (within this course)
		<p>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>
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	<p>SPC-9.1 Knows the safety rules and safety precautions when working in the field, in laboratories, during office processing</p> <p>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</p> <p>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</p>

1. 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*
GPC-3	GPC-3. Able to develop scientific and technical, design and service documentation, draw up scientific and technical reports, surveys, publications, reviews	Disciplines of the previous level of education	Information technologies in the oil and gas industry; Research work / Научно-исследовательская работа (получение первичных навыков научно-исследовательской работы); 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	Disciplines of the previous level of education	<i>Diagnostics of oil and petroleum products main pipeline facilities**</i> ; Pre-graduation Practical Training; 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	Disciplines of the previous level of education	<i>Pre-graduation Practical Training</i> ; <i>Project management in the oil and gas industry**</i> ; <i>Economics and management of oil and gas production**</i> ; <i>Current development of the production of unconventional hydrocarbon resources in the world</i> ; SFC

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

4. COURSE WORKLOAD

The total workload of the course "Technological processes of pipeline transport / Технологические процессы 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>		70	36	34
Lectures		35	18	17
Laboratory work		-	-	-
Seminars (workshops/tutorials)		35	18	17
<i>Self-study (ies), academic hours</i>		174	117	57
<i>Evaluation and assessment (exam or pass/fail grading)</i>		27	27	
The course total workload	acc.hrs.	288	180	108
	credits	8	5	3

5. COURSE MODULE and CONTENTS

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

Name of the discipline section	Contents of the section (topic)	Type of study work
Section 1. Main gas pipeline	Topic 1.1. Main gas pipeline. General characteristics of main gas pipelines	Lecture, Seminar
	Topic 1.2. Energy-saving technologies for gas pipeline transport, advanced equipment and technologies	Lecture, Seminar
Section 2. Reliability and strength of MG	Topic 2.1. Estimation of constructive reliability of the pipeline. Loads and impacts on the main gas pipeline. throughput of the gas pipeline. Terms and definitions, nomenclature of the main characteristics	Lecture, Seminar
	Topic 2.2. Distribution of pressure along the length of the gas pipeline. Average pressure, the nature of its change. Change in temperature along the length of the gas pipeline. The effect of temperature change on the performance of the gas pipeline	Lecture, Seminar
Section 3. Joint operation of the gas pipeline and compressor station	Topic 3.1. The mode of operation of the gas pipeline when the compressor station or gas compressor unit is turned off. Influence of the number of CS and their number during shutdown on the performance of the main gas pipeline. Optimal parameters of the main gas pipeline	Lecture, Seminar
	Topic 3.2. Graphical method. Method for comparing competing options. Analytical method. The mode of operation of the gas pipeline during discharges and pumping. Location of compressor stations along the gas pipeline route	Lecture, Seminar
Section 4	Topic 4.1. Development and execution of a design assignment, preparation of initial data. Examination of the design task	Lecture, Seminar
	Topic 4.2. Design and survey procedure	Lecture, Seminar
Section 5. Design standards MN. Engineering standards MN	Topic 5.1. The composition of the calculations. Initial data for hydraulic calculations. Choice of route MN. Determining the boundaries and length of technological sections, the number and capacity of tank farms	Lecture, Seminar
	Topic 5.2. Categories MN. Basic requirements for the route MN. Design requirements k.MN. Underground laying of MN Laying of MN in mountainous conditions. Laying MN in seismic areas. Laying MN in areas of permafrost soils. Laying MN in tunnels	Lecture, Seminar
Section 6. Oil pumping stations	Topic 6.1. Design standards Requirements for initial data for designing OPS classification	Lecture, Seminar
	Topic 6.2. Composition of the PS with a tank farm Composition of the PS facilities without a tank farm Requirements for the technological design and equipment of the PS	Lecture, Seminar
Section 7. Calculation of oil pipelines for strength and stability	Topic 7.1. Estimated characteristics of materials. Loads and influences Determination of wall thickness of MN. Checking the strength and stability of underground MPs	Lecture, Seminar
	Topic 7.2. Determination of the nominal wall thickness of pipes and bearing capacity diagrams. Ways to increase the throughput of MN. Main indicators of MN	Lecture, Seminar

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. 2030 A set of specialized furniture; interactive panel	
Seminar	Computer class No. 2033 Set of specialized furniture; PC, telepanel	
For self-study	Classroom for conducting seminar-type classes: room. No. 2037 Set of specialized furniture; chalkboard; projector, laptop	

7. RESOURCES RECOMMENDED FOR COURSE

Main reading(sources):

1. 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>

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; Ministry of Education and Science of Russia, Omsk State Technical University, Tyumen Industrial University; ed. Yu.D. Zemenkov. - Omsk: OmGTU Publishing House, 2017. - T. 2. - 352 p.

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

Additional(optional) reading (sources):

1. 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>

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 "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 "Technological processes of pipeline transport / Технологические процессы трубопроводного транспорта".
2. Guidelines for students on the development of the course «Technological processes of pipeline transport / Технологические процессы трубопроводного транспорта»

*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.

3. 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:

Senior lecturer of the Department of Mineral
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