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

Information technologies in the oil and gas industry / Информационные технологии в нефтегазовом комплексе

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

2025

1. COURSE GOALS

The goal of the course "Information technologies in the oil and gas industry / Информационные технологии в нефтегазовом комплексе" is the mastery of theoretical and practical knowledge in the field of software for the design and operation of pipeline systems with the formation of the required level of professional competencies in this area.
The aims of the course are:
- familiarization with modern software for the design and operation of pipeline systems;
- development of skills and abilities to use normative and technical documentation;
- development of skills and abilities to perform calculations in modern software systems.

2. REQUIREMENTS FOR LEARNING OUTCOMES

The course "Information technologies in the oil and gas industry / Информационные технологии в нефтегазовом комплексе" 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)
GC-4	Able to carry out business communication in oral and written forms in the state and foreign(s) language(s)	GC-4.1. Knows computer technologies and information infrastructure in the organization; factors for improving communication in an organization, communication technologies in professional interaction; characteristics of communication flows; the importance of communication in professional interaction; methods of research of the communicative potential of the individual; modern means of information and communication technologies. GC-4.2. Can create in Russian and foreign languages written texts of scientific and official-business style of speech on professional issues; explore the flow of information on management communications; define internal communications in the organization; to make editorial and proofreading corrections of texts of scientific and official business styles of speech in Russian and foreign languages; analyze the system of communication links in the organization. GC-4.3. Has the principles of oral and written communications, including in a foreign language; methods for implementing the results of one's own and team activities using communication technologies; technology for building effective communication in the organization; transfer of professional information in information and telecommunication networks.
GC-7	Able to: search for the necessary sources of information and data, perceive, analyze, memorize and transmit information using digital means, as well as algorithms when working with data received from various sources in order to effectively use the information received to	GC-7.1. Knows the technologies for collecting, processing, analyzing and interpreting information in digital environments; rights and obligations governing relations between people, social communities, organizations. GC-7.2. Can assess the risks and threats associated with the use of information and communication technologies in their professional activities, knows how to level them with available means; apply and adapt known methods and technologies of working with information to new

Competence code	Competence descriptor	Competence formation indicators (within this course)
	solve problems; evaluate information, its reliability, build logical conclusions based on incoming information and data.	tasks due to changing socio-economic conditions; find and analyze relevant legal and economic information sufficient to make informed decisions; apply legal knowledge in the analysis of conflict situations. GC-7.3. Has the information technologies of communication, search, processing and storage of information; the skills to prevent negative legal and economic consequences of their own actions or inactions.
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.
GPC-4	Able to find and process the information required for decision-making in scientific research and in practical technical activities	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. 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. 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.

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	Competence descriptor	Previous courses/modules, internships*	Subsequent courses/modules, internships*
GC-4	Able to carry out business communication in oral and written forms in the state and	Modern aspects of geological and geophysical research in the oil and gas	Final State Examination / Государственная

Competence code	Competence descriptor	Previous courses/modules, internships*	Subsequent courses/modules, internships*
	foreign(s) language(s)	industry;	итоговая аттестация
GC-7	Able to: search for the necessary sources of information and data, perceive, analyze, memorize and transmit information using digital means, as well as algorithms when working with data received from various sources in order to effectively use the information received to solve problems; evaluate information, its reliability, build logical conclusions based on incoming information and data.	Professional Russian (as a foreign language);	Final State Examination / Государственная итоговая аттестация
GPC-3	Able to develop scientific and technical, design and service documentation, draw up scientific and technical reports, surveys, publications, reviews	Technological processes of pipeline transport; Technological practice (educational) / Технологическая практика (учебная); Technological practice (industrial) / Технологическая практика (производственная);	Technological practice (educational) / Технологическая практика (учебная); Research work (obtaining primary skills in research work) / Научно-исследовательская работа (получение первичных навыков научно-исследовательской работы) Technological practice (industrial) / Технологическая практика (производственная); Final State Examination / Государственная итоговая аттестация
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;	Final State Examination / Государственная итоговая аттестация

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

4. COURSE WORKLOAD

The total workload of the course "Information technologies in the oil and gas industry / Информационные технологии в нефтегазовом комплексе" is 4 credits.

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

Type of study work		TOTAL , acc.hrs.	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		*90*	*90*
Evaluation and assessment (exam or pass/fail grading)			
The course total workload	acc.hrs.	**144**	**144**
	credits.	**4**	**4**

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. Strength calculations	Topic 1.1. Start . The program for the calculation of pipelines, checking the strength and stability of pipelines, strength calculation of pipelines for various purposes, engineering calculations.	Seminar
	Topic 1.2. Passat. Program for strength calculation of vessels and apparatuses, calculation of pipelines and equipment.	Seminar
	Topic 1.3. Fitting-FEM. Program for calculating the strength of tie-in units and determining the allowable loads.	Seminar
Section 2. Hydraulic and thermal-hydraulic calculations	Topic 2.1. Hydraulic system. Hydraulic and thermal -hydraulic calculations, as well as the choice of diameters of pipeline systems for various purposes with a detailed account of local resistances.	Seminar
	Topic 2.2. prevalve . The program for the calculation and selection of safety valves is carried out together with the hydraulic calculation of the inlet and outlet pipelines.	Seminar
	Topic 2.3. Simulis Thermodenamics . A modern software system for calculating thermophysical properties and phase equilibria, which calculates a wide range of products on a modern methodological basis	Seminar
Section 3 Regulatory Requirements	Topic 3.1. Insulation. Program for calculation and design of thermal insulation, release of project documentation.	Seminar
	Topic 3.2. DBMS project. The system for managing the parameters and products of the project at the stage of installation design, issuing project documentation.	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	

Classroom for Academic Activity Type	Classroom equipment	Specialized educational / laboratory equipment, software and materials for mastering the discipline (if necessary)
	A set of specialized furniture; interactive panel	
Seminar	Computer class No. 2033 Set of specialized furniture; PC, telepanel	
Seminar	Computer class No. 457 Set of specialized furniture; PC, projector, laptop	Virtual Reality Class for Oil and Gas Production Process Management

7. RESOURCES RECOMMENDED FOR COURSE

Main reading(sources):

1. Seleznev, V.E. Fundamentals of numerical modeling of main pipelines / V.E. Seleznev, V.V. Aleshin, S.N. Pryalov . - Ed. 3rd, revised . and additional - Moscow; Berlin: Direct-Media, 2014. - 436 p.
http://biblioclub.ru/index.php?page=book_red&id=260664
2. Seleznev, V.E. Modern computer simulators in pipeline transport: mathematical modeling methods and practical application: monograph / V.E. Seleznev, V.V. Aleshin, S.N. Pryalov . - Moscow; Berlin: Direct-Media, 2014. - 199 p.
http://biblioclub.ru/index.php?page=book_red&id=260665

Additional(optional) reading (sources):

1. Seleznev, V.E. Mathematical modeling of pipeline networks and canal systems: methods, models and algorithms: monograph / V.E. Seleznev, V.V. Aleshin, S.N. Pryalov . - Moscow; Berlin: Direct-Media, 2014. - 694 p.
http://biblioclub.ru/index.php?page=book&id=260662

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 "Information technologies in the oil and gas industry / Информационные технологии в нефтегазовом комплексе".
2. Guidelines for students on the development of the course "Information technologies in the oil and gas industry / Информационные технологии в нефтегазовом комплексе".

*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	Tyukavkina O.V.
position, educational department	name and surname

Head of Department:

Head of the Department of Mineral Developing and Oil&Gas Engineering	Kotelnikov A.E.
position, educational department	name and surname

Head of Educational Programme:

Professor of the Department of Mineral Developing and Oil&Gas Engineering	Kapustin V.M.
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