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 OF THE DISCIPLINE

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

(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)

2023

1. COURSE GOALS

The purpose of mastering the discipline "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. LEARNING OUTCOMES

Mastering the discipline «Information technologies in the oil and gas industry / Информационные технологии в нефтегазовом комплексе» 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)
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	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

Competence code	Competence	Competence indicators (within this discipline)
	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.	with available means; apply and adapt known methods and technologies of working with information to new 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 PROGRAM STRUCTURE

The discipline «Information technologies in the oil and gas industry / Информационные технологии в нефтегазовом комплексе» 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 «Information technologies in the oil and gas industry / Информационные технологии в нефтегазовом комплексе».

Table 3.1. List of Higher Education Program components / disciplines that contribute to expected learning/training outcomes

Compete nce code	Name of competence	Previous disciplines/modules, practices*	Subsequent disciplines/modules, practices*
GC-4	Able to carry out business communication in oral and written forms in the state and foreign(s) language(s)	Professional Russian (as a Foreign Language) / Русский язык (как иностранный) в профессиональной деятельности	SFC
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.	Modern aspects of geological and geophysical research in the oil and gas industry / Современные аспекты геолого-промысловых и геофизических исследований в нефтегазовом деле	SFC
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 / Технологические процессы трубопроводного транспорта	Technological practice (training) / Технологическая практика (учебная) Research work (obtaining primary skills in research work) / Научно-исследовательская работа (получение первичных навыков научно-исследовательской работы) Technological practice (production) / Технологическая практика (производственная) SFC
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 / Геоинформационные системы и их применение	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 of the discipline "Information technologies in the oil and gas industry / Информационные технологии в нефтегазовом комплексе" is equal to 3 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
Contact academic hours, acc .	*36*	*36*
including:		
Lectures		
Laboratory work		
Seminars (workshops/tutorials)	36	36
Self-study (ies), academic hours	*72*	*72*
Evaluation and assessment (exam or pass/fail grading)		
The course total workload acc.hrs.	108	108
credits .	3	3

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	

Classroom for Academic Activity Type	Classroom equipment	Specialized educational / laboratory equipment, software and materials for mastering the discipline (if necessary)
	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	
Seminar	Geoinformatics Laboratory No. 444 A set of specialized furniture; System block : Processor Intel P4 3.6/800/2Mb 661 M.pl. Asus P5B (S-775, iP965/ICH8R, 4xDDRII 800, SATA-II, Ext SATA-II RAID RET (Core 2 Duo) DIMM DDRII 1024Mbx2, 800Mhz (Samsung) Original HDD_250Gb Seagate, SATA-II, 16Mb, ST3250410AS Barracuda 10, 7200rpm, NCQ Gigabyte video card (PCX8500 GT, 256Mb DDR2, TV-OUT. Monitor SyncMaster 205BW Samsung TFT 20" 206BW (SFV) (LCD,TFT, 1680*1050-75Hz, 300cd/m, 3000:1, 2ms , DVI) TCO"03 Printer HP LaserJet P2015 Printer DeskJet 9803 Plotter HP Designjet 500 plus 1 Inv. No. 101.040961 Mustek flatbed scanner ScanExpress A3 USB; Switch	MS Windows 7 Enterprise (Desktop School All Languages Lic ./SA Pack MVL (ASA)) Reg . number 90-07-001-00313-0 (06 August 2013) MS Office 2007 Prof. (Desk-top School All Languages Lic./SA Pack MVL (ASA)) 2007 , IEP No. 1.1.16.3/40 Reg . number 90-07-012-00239-9 (06 Aug 2013) ArcGIS for Desktop Advanced (ArcInfo) Lab Pak 10.5 floating license Sublicensed treaty dated 5/1/3 April 02 , 2015 Micromine 2018 License No. 4056 Reg . number 90-07-019-00065-7 (March 18 , 2008) Statistica 6.1 Reg . number 90-07-016-00030-8 (March 18, 2008) Erdas Imagine professional 9.1 Contract 78-01.168K dated 06.12.2007 Registration number 90-07-019-00033-6 (March 18, 2008) GoldenSoftware Surfer 8 Contract 78 01.168K dated 06.12.2007 Registration number 90-07-019-00034-3 (March 18, 2008)
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.   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-(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/
  - Google search engine https://www.google.ru/
  - abstract database SCOPUS http:// www .elsevierscience.ru/ products / scopus /

Learning toolkits for self- studies in the RUDN LMS TUIS:

1. Guidelines for students on mastering the discipline "Information technologies in the oil and gas industry / Информационные технологии в нефтегазовом комплексе"
* - 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. EVALUATION MATERIALS AND SCORE-RATING SYSTEM FOR ASSESSING THE LEVEL OF FORMATION OF COMPETENCES IN THE DISCIPLINE

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

Assistant of the Department of Mineral Developing and Oil&Gas Engineering		Khakimov R.V.
Position, Department	Signature	Full name

Head of Department:

Director of the Department of Mineral Developing and Oil&Gas Engineering		Kotelnikov A.E.
Name of Department	Signature	Full name

Head of Educational Programme:

Professor of the Department of Mineral Developing and Oil&Gas Engineering		Kapustin V.M.
Position, Department	Signature	Full name