Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
RUDN University
Academy of Engineering

educational division - faculty/institute/academy

COURSE DESCRIPTION

21.04.01 Oil and Gas Engineering

field of studies / speciality code and title

Course Title	«Professional Russian (as a Foreign Language) / Русский язык (как иностранный) в профессиональной деятельности»
Course workload, credits and academic hours	6/216
Course contents	
Course Module Title	**Brief Description of the Module Content**
Module 1. Institute of Science and Technology (Foreign countries)	Topic 1.1. The specifics of the functioning of the Institute of Science and Technology in foreign-speaking countries and in Russia. The ability to compare this knowledge in communication.
Module 2. Specialized culture	Topic 2.1. Rules and norms of communication in the professional scientific and technical sphere in foreign-speaking countries and in Russia
Module 3. Reports	Topic 3.1. Formation of the ability to understand oral presentations / long speeches in a foreign language on engineering topics.
Module 4. Articles	Topic 4.1. Written foreign-language general scientific / highly specialized articles in the field of engineering.
Module 5. Patents	Topic 5.1. Foreign language patents in the field of engineering.
Module 6. Business Letter	Topic 6.1. Complex argumentation in business foreign-language letters.
Module 7. Prepared conversation	Topic 7.1. The ability to conduct an unprepared conversation on general scientific and highly specialized topics in the field of engineering.
Module 8. Authoritative scientists in the field of engineering (taking into account the direction studied)	Topic 8.1. Famous scientists in the field of science and technology. History and main directions of development of science and technology in foreign-speaking countries, Russia in the field of engineering.
Module 9. Argumentation	Topic 9.1. Logical argumentation in a foreign language. Arguments and counterarguments
Module 10. Discussion	Topic 10.1. Discussions on general scientific and highly specialized issues. Expressing one's own position in a foreign language.
Module 11 Message	Topic 11.1. Message on the proposed general scientific topics in the field of engineering in a foreign language.

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Course workload, credits and academic hours	6/216
Course contents	
Course Module Title	**Brief Description of the Module Content**
Module 12. Presentation of scientific and technical concepts in professionally oriented discourse	Topic 12.1. Scientific and technical concepts in a foreign language and Russian text in the field of engineering
Module 13	Topic 13.1. Composition, motives, pragmatic setting of a foreign scientific text.
Module 14. Abstracting the text	Topic 14.1. Key segments of the text. Receiving the information. Abstract review.
Module 15. Main idea and author's attitude	Topic 15.1. The main idea of the text. Author's attitude to the topic of the text.
Module 16 Abstract	Topic 16.1. Abstracting a foreign language text in the field of engineering. The ability to determine their attitude to the content of the read.
Module 17 Overview	Topic 17.1. An overview outlining developmental achievements in the field of engineering.
Module 18. Business conversation	Topic 18.1. Conversation of a professional/scientific/industrial nature

Name of the discipline	«History and methodology of subsoil use / История и методология недропользования»
Course workload, number of credits / ac.hrs.	3/108
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Module 1. Basic designations and concepts. The history of the oil and gas industry development	Topic 1. Oil, gas and coal are strategic raw materials, not just sources of energy. Coal as a source of energy. Oil and gas as sources of energy. Importance of energy resources for the country. Fuel and Energy Complex in the Structure of the Economy of the USSR and Russia. General overview of the state of the oil and gas industry in Russia. Russian oil and gas on the world market. Problems and prospects. Structure of the Russian gas industry. The structure of the Russian oil industry
Module 2. History of production, processing, application, transportation and storage of oil and gas	Topic 2. Oil, gas and coal are strategic raw materials, not just sources of energy. Coal as a source of energy. Fuel and Energy Complex in the Structure of the Economy of the USSR and Russia. General overview of the state of the oil and gas industry in Russia. Russian oil and gas on the world market. The structure of the Russian oil industry. Oil and gas are valuable raw materials for the chemical industry. The history of the development of methods for transporting and storing oil and oil products. History of pipeline transport.
Module 3. History of development of the main oil and gas fields. Search and exploration of oil and gas fields	Topic 3. The main fields and indicators of oil and gas production in Russia. Methods of search and exploration of oil and gas fields. Problems in the search and exploration of oil and gas, drilling wells

Name of the discipline	«Modern aspects of geological and geophysical research in the oil and gas industry / Современные аспекты геолого-промысловых и геофизических исследований в нефтегазовом деле»
Course workload, number of credits / ac.hrs.	8/288
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Module 1. Introduction. Development of the oil and gas industry and industrial oil and gas production..	Topic 1.1. The current stage of oil and gas industry development. Distribution of current oil production by regions of the Russian Federation. Development of industrial oil production (brief reference). ISO-9001 Quality Management System
	Topic 1.2. Russia's share in world oil production. The staging of geological exploration works. The concept of development and exploitation of deposits. Rational development system. Requirements for labor protection, industrial, fire and environmental safety in the oil and gas industry
Module 2. Features of geological and geophysical surveys in the development of oil and gas deposits.	Topic 2.1. Well grids under different geological conditions.. The concept of "production facility". The drilling process as a complex technological process (TP), consisting of many local (sequential, parallel and combined) processes. Binding of points (wells) on the ground and their transfer for drilling.
	Topic 2.2. Allocation of an production facility. (Obtaining and processing seismic data. Carrying out well logging in wells in order to identify the production facility, well log correlation). The location of well grids under different geological conditions, taking into account the reservoir structure.
Module 3. Significance and place of well logging methods in the general cycle of geological and geophysical studies.	Topic 3.1. Geological and geophysical research in the search and exploration of hydrocarbon deposits (seismic, gravity , magnetic).
	Topic 3.2. Significance and place of well logging methods in the general cycle of geological and geophysical research. The main principles of problem solving are lithological partitioning of the well section; correlation of well sections; separation of mineral formations and estimation of their content; obtaining parameters necessary to calculate the reserves of the deposit. State Reserves Committee regulatory documents.
Module 4. Well logging complexes in oil and gas fields. Control over the development of the field according to the data of geophysical measurements in production wells	Topic 4.1. Identification of reservoirs, features of the application of electrical research methods (specific electrical resistance method, micro-logging method, caliper log measurements, etc.). Determination of porosity (methods: neutron log, acoustic log, gamma-gamma log, self-potential method, nuclear magnetic logging). Determination of clay content (gamma-ray logging, self-potential method). Evaluation of productivity (oil and gas saturation).
	Topic 4.2. Control over the development of the field according to the data of geophysical measurements in production wells. The main objectives of a complex geophysical well logging survey.

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Course workload, number of credits / ac.hrs.	8/288
COURSE MODULES AND CONTENTS	
Modules	**Topics**
	Topic 4.3. General information about geological logging complexes (division by: purpose of wells (reference, parametric, estimation, prospecting, exploration and production); features of the geological section; drilling conditions, etc.). Typical and obligatory sets of geological and geophysical logs.
Module 5. Determination of the lithological characteristics of rocks. Correlation of well sections, well logs. Identification of reservoirs	Topic 5.1. Determination of the lithological characteristics of rocks. Construction of a borehole lithological section: determination of boundaries and thicknesses of individual strata; assessment of the lithological characteristics of the selected strata.
	Topic 5.2. Evaluation of the lithological characteristics of the reservoir using a well logging complex with clarification based on the data of petrophysical studies of the core. The main physical features of rocks (clays, mudstones, sandstones, siltstones) in the sandy-clay section
	Topic 5.3. Determination of clay content of the reservoir. Self-potential method - PS method. According to the PS diagrams, determine the relative clay content. Comprehensively use the PS method with one of the porosity methods (thermal-decay-time logging, gamma-gamma logging or acoustic logging).
	Topic 5.4. Determination of volumetric (or mass) clay content, total rock porosity. Method of natural radioactivity - gamma-ray logging. According to the gamma-ray logging data in rocks with scattered and layered clay content, determine the volumetric clay content based on the correlation between the readings γ ΔJ and the K_{cl} value .
	Topic 5.5. Change in the resistivity log value in sandstones (study of porosity, the nature of pore saturation (oil, water, gas) and impurities of clay material). Basic and additional methods for constructing a lithological column in a sandy-clay section (basic resistivity log, micro-logging method, caliper log measurements and self-potential method, additional - gamma-ray logging, thermal neutron curve (neutron gamma log), acoustic logging).
	Topic 5.6. Construction of a lithological column in a carbonate section (limestones and dolomites), basic methods: resistivity log, thermal neutron curve, acoustic logging; additional - gamma-ray logging and caliper log measurements.
Module 6 Investigation of the filtration-capacitive properties of reservoirs using geological and geophysical methods	Topic 6. 1. Determination of the reservoir porosity coefficient. Study of void space morphology (intergranular pores , cavities, cracks). Study and determination of primary (intergranular) porosity and secondary (the sum of caverns and cracks) porosity.

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Course workload, number of credits / ac.hrs.	8/288
COURSE MODULES AND CONTENTS	
Modules	**Topics**
	Topic 6. 2. Evaluation of the porosity coefficient by the PS method (reservoir porosity is related to the degree of pore filling with clay cement). Study of the correlation dependence αPS=f (Kps). Establishment of the boundary value of αPS according to the core study data.
	Topic 6. 3. Evaluation of the porosity coefficient by electrical logging (the concept of the porosity parameter or relative resistivity according to electrical logging data (resistivity log, induction logging, lateral logging), determination of the relative resistance of a clean reservoir using the Archie-Dakhnov formula).
	Topic 6.4. Evaluation of the permeability coefficient in sandy reservoirs. Study of phase, absolute, relative permeability. Determination of the correlation between the total or effective porosity of the reservoir and its permeability (due to the impossibility of determining the tortuosity and specific surface of the filter channels). Determination of the porosity coefficient by logging and core (GIS-core or core-core systems).
	Topic 6.5. Construction of dependences of the permeability coefficient on the open porosity of the reservoir on the example of fields in Western Siberia. Evaluation of the permeability coefficient in clay reservoirs.
Module 7. Basic physical-chemical, dynamic, porosity-permeability characteristics of the deposit. Acquisition and research for the development of operational facilities.	Topic 7.1. Generalization and unification of geological field and geophysical parameters for the development of the object. Industry standards for experimental determination of relative phase permeability (RP), residual oil saturation and displacement efficiency.
	Topic 7.2. Diagnostics of capacitive properties (porosity, fracturing), dynamic (RP, capillary properties, oil, water and gas saturation , and deformation (Poisson's ratio, Young's modulus) parameters.
	Topic 7.3. Establishment of the current oil saturation by C/O logging. Algorithms for establishing the calculation parameters of porosity, permeability, oil saturation using logging
Module 8. Geological and geophysical aspects in the processes of oil production technology and gas. The influence of various geological and field factors on the value of the initial and current well flow rates.	Topic 8.1. Reasons for establishing recovery rates from reservoirs and wells. Establishment of production rates from production wells with unlimited and limited selection.
	Topic 8.2. Field gas preparation. Purification from mechanical impurities; gas drying (cooling, absorption, adsorption). Purification of gas from hydrogen sulfide (H_2S) by absorption and adsorption methods. Gas purification from carbon dioxide gas.

Name of the discipline	«Modern aspects of geological and geophysical research in the oil and gas industry / Современные аспекты геолого-промысловых и геофизических исследований в нефтегазовом деле»
Course workload, number of credits / ac.hrs.	8/288
COURSE MODULES AND CONTENTS	
Modules	**Topics**
	Topic 8.3. Methods for enhanced oil recovery. Tertiary hydrodynamic methods (and their combinations): hydraulic fracturing (HF), slotted unloading of the near- wellbore zone of the productive formation, reagent treatment of wells, technology of acoustic treatment of wells and vibro -wave exposure.
Module 9. Field preparation of oil and natural gas. Field development control.	Topic 9.1. Techniques and methods for monitoring changes in reservoir pressure and well flow rates . Construction of formation pressure maps (isobar maps).
	Topic 9.2. Field development control: - and study of the "inflow-composition" in a cased well (field geophysical surveys designed to evaluate operational parameters (flow metering , thermometry, barometry)). oxygen activation logging).
	Topic 9.3. Options for evaluating the composition in the borehole (moisture metering , density metering , resistivity logging ; methods for determining the operational characteristics of productive alloys; geophysical technologies; control over flooding processes (determining the intensity of water flow is widely used neutron

Name of the discipline	«Machinery and equipment for field development and transportation of hydrocarbons / Машины и оборудование для разработки месторождений и транспорта углеводородов»
Course workload, number of credits / ac.hrs.	8/288
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Module 1. Machinery and equipment for the development of oil and gas fields	Topic No. 1 / General information about machines and equipment for drilling oil and gas wells.
	Topic No. 2 / Drilling rig traveling system. Purpose and composition.
	Topic No.3 / Drawworks. Brake devices for drilling winches.
	Topic No.4 / Drilling rotors. Drill keys.
	Topic No.5 / Drilling swivels.
	Topic No.6 / Drive of drilling rigs. Power transfers. Couplings.
	Topic No.7 / Drilling rig circulation system.
	Topic No.8 / Blowout Prevention Equipment. Hydro control units.
	Topic No.9 / Drill string.
	Topic No. 10 / Drilling facilities. Fundamentals of calculation of drilling rigs.

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Course workload, number of credits / ac.hrs.	8/288
COURSE MODULES AND CONTENTS	
Modules	**Topics**
	Topic No. 11 / Hydraulic downhole motors. Turbodrills. Screw downhole motors. Electric drills.
	Topic No. 12 / Pumping and cementing equipment.
	Topic No.13 / Casing piping equipment. Column heads.
	Topic No. 14 / Tubing. Fundamentals of calculation of tubing.
	Topic No. 15 / Equipment for the operation of flowing oil and gas wells. Shut-off and control devices for fountain fittings.
	Topic No. 16 / Equipment for the operation of gas-lift wells.
	Topic No. 17 / Equipment for mechanized well operation. Rod and rodless borehole pumping units.
	Topic No. 18 / Equipment for mechanized well operation. Electric pumps with ground and submersible drive. Centrifugal electric pumps.
	Topic No. 19 / Equipment for the operation of wells in a mechanized way. Electric pumps with ground and submersible drive. Screw and diaphragm electric pumps. Jet pumps.
	Topic No. 20 / Equipment for separate and simultaneous-separate operation of wells.
	Topic No. 21 / Equipment for separating the spaces of the production string. Packers. Downhole shut -off valves .
	Topic No. 22 / Equipment for dehydration, desalination of oil and control of oil emulsions. Separators, furnaces, electric dehydrators .
	Topic No. 23 / Natural gas and condensate treatment system at the field. Adsorbers, absorbers.
	Topic No. 24 / Underground well workover. Classification of equipment for well repair.
	Topic No. 25 / Equipment for tripping operations . Tool. Means of mechanization. Lifting equipment.
	Topic No. 26 / Equipment for technological operations. Ground equipment.
	Topic No. 27 / Equipment for technological operations. Equipment and tools lowered into the well.
	Topic № 28 / Equipment for oil and gas transportation at pumping and compressor stations.
Module 2. Machinery and equipment for transporting oil and gas	Topic № 2.1 / General information about transport and oil products.
	Topic № 2.2 / Pipeline transport. Pipeline route and its profile.
	Topic № 2.3 / Equipment for oil and gas transportation at pumping and compressor stations, its purpose and composition, as well as the main technical characteristics.
	Topic № 2.4 / Tanks for storage of oil and oil products. Tank equipment.

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Course workload, number of credits / ac.hrs.	8/288
COURSE MODULES AND CONTENTS	
Modules	**Topics**
	Topic № 2.5 / Classification and composition of natural and artificial gases. Compressor stations of gas pipelines.
	Topic № 2.6 / Removal of impurities from gas. Gas odorization

Name of the discipline	«Applications of Geoinformation Systems / Практикум применения геоинформационных систем»
Course workload, number of credits/ ac.hrs.	3/108
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Space activities of the Russian Federation	Basic information about space activities. Fundamental concepts in the field of use of Space activities results. Types of space activities. The main directions of space activities. Space products and services. National infrastructure for the use of the Space activities results.
Earth remote sensing	The concept of Earth remote sensing (ERS). Use of remote sensing data in solving applied problems (review). Aerospace monitoring of the earth's surface.
Using the results of space activities in the interests of various industries	Land use management. Land Registry. Water management. Management of energy complexes. Management of the oil and gas industry and the mining complex. Transport infrastructure management. Management of forestry and agriculture. Management of rational use of natural resources. Management of the development of recreational, sports areas and facilities. Municipal management. Identification and forecasting of industrial impact on the environment.
The use of geographic information systems in the interests of various industries .	"The concept of geographic information system" (GIS). Integrated use of remote sensing data and geoinformation technologies in sectoral management.
Geoportal solutions based on the use of space activities results in sectoral management	The value of spatial data in sectoral management. Regional geoportals in branch management. Examples of regional geoportals .

Name of the discipline	«Technological processes of pipeline transport / Технологические процессы трубопроводного транспорта»
Course workload, number of credits / acc.hrs.	7/252
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Module 1. Main gas pipeline	Topic 1.1. Main gas pipeline. General characteristics of main gas pipelines
	Topic 1.2. Energy-saving technologies for gas pipeline transport, advanced equipment and technologies
Module 2. Reliability and strength of main gas pipeline	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
	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
Module 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 compressor station and their number during shutdown on the performance of the main gas pipeline. Optimal parameters of the main gas pipeline
	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
Module 4. Procedure for issuing design assignments, development and examination of design documentation for construction, reconstruction and overhaul of main pipelines	Topic 4.1. Development and execution of a design assignment, preparation of initial data. Examination of the design task
	Topic 4.2. Procedure for carrying out design and engineering works. Expertise, approval, approval and acceptance of project documentation
Module 5. Design standards main oil pipeline. Engineering design standards main oil pipeline	Topic 5.1. The composition of the calculations. Initial data for hydraulic calculations. Choice of route main oil pipeline. Determining the boundaries and length of technological Modules, the number and capacity of tank farms
	Topic 5.2. Categories main gasline. Basic requirements for the route main oil pipeline. Design requirements for main oil pipeline. Underground laying of main oil pipeline: Laying of main oil pipeline in mountainous conditions. Laying main oil pipeline in seismic areas. Laying main oil pipeline in areas of permafrost soils. Laying main oil pipeline in tunnels
Module 6. Oil pumping stations (OPS)	Topic 6.1. Design standards Requirements for initial data for designing OPS classification
	Topic 6.2. Composition of the OPS with a tank farm Composition of the OPS structures without a tank farm Requirements for the technological design and equipment of the OPS
	Topic 7.1. Estimated characteristics of materials. Loads and influences Determination of wall thickness of main oil

Name of the discipline	«Technological processes of pipeline transport / Технологические процессы трубопроводного транспорта»
Course workload, number of credits / acc.hrs.	7/252
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Module 7. Calculation of oil pipelines for strength and stability	pipeline. Checking the strength and stability of underground main oil pipelines
	Topic 7.2. Determination of the nominal wall thickness of pipes and bearing capacity diagrams. Ways to increase the throughput of main oil pipeline. Main indicators of main oil pipeline

Name of the discipline	«Technologies for developing prospective hydrocarbon reserves / Технологии разработки перспективных запасов углеводородов»
Course workload, number of credits / acc.hrs.	7/252
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Complicated conditions for the development of oil fields.	The concept of complicated development conditions. Classification of complicated conditions. Basic principles of oil field development.
Complicated natural conditions.	Complications associated with the geological structure of objects. Complications associated with the physical and chemical properties of products. Complications associated with the climatic and geographical features of the deposits.
Methods for the development of oil and gas fields in complicated natural conditions	Methods for the development of low-permeability oil and gas fields. Methods for the development of oil fields with high viscosity.
Complicated man-made conditions.	Technogenic consequences characteristic of developed oil fields. Deterioration of the energy state of the development object. Main reasons. Change in water cut in producing wells due to the development system. Main reasons.
Methods for the development of oil and gas fields in complicated technogenic conditions	Methods for the development of oil fields at a late stage of production. Methods for enhanced oil recovery.
Impact of Complicating Factors on Well Productivity and Reservoir Recovery	Influence of complicating factors on well productivity and current development indicators. Methods of dealing with the consequences of the influence of complicating factors in the process of field development. Assessment of the degree of influence of complicating factors on the process of developing reserves. Influence of complicating factors on the final oil recovery factor (ORF) and possible means of increasing it.

Name of the discipline	«Resource estimation, computation and recalculation of hydrocarbon reserves / Оценка ресурсов, подсчет и пересчет запасов углеводородов»
Course workload, number of credits / acc.hrs.	3/108
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Module 1. Goals and objectives of the discipline. Geological and economic assessment of the main regions producing hydrocarbons	Topic 1.1. Natural reservoirs and traps, concepts and classifications. Deposits, classes of deposits and classification by phase state of hydrocarbons.
	Topic 1.2. Natural regime, types of regimes in oil and gas deposits. Oil and gas fields, classification features, classification of fields by the size of recoverable oil reserves and geological gas reserves and by the complexity of the geological structure.
	Topic 1.3. OPEC countries. Geological and economic assessment of the regions of countries producing hydrocarbons: North and South America (Canada, Brazil), Africa (Morocco, Egypt, Congo, Israel), European countries (France, Italy), China, Australia
Module 2. Classification of reserves and resources of oil and gas	Topic 2.1. The history of the development of classifications of oil and gas reserves. Temporary classification of field reserves, prospective and forecast resources of oil and combustible gases, its essence.
	Topic 2.2. Classifications of oil and gas reserves used in the oil world, comparison of classification systems of reserves and resources of oil and gas in different countries.
Module 3. Exploration work in oil and gas fields	Topic 3.1. Exploration process, its essence. Stages and stages of exploration work. Regional stage, its stages, objects of work, typical complex of work and results of work.
	Topic 3.2. Search and evaluation stage, its stages, objects of work, a typical complex of work and results of work. Exploration stage, its stage, objects of work, typical complex of work and results of work.
Module 4. Categories of reserves and resources, their purpose.	Topic 1. The concept of reserves and resources. Conditions for assigning reserves and resources to different categories. Categories of reserves and resources according to geological knowledge, their purpose. Groups of oil and gas reserves and basic principles of calculation and accounting.
	Topic 2. Estimated plans, their essence. The relationship of categories of reserves and resources with the stages and stages of exploration and development of deposits. Total resources of oil, gas and condensate.
Module 5. Calculation of oil and free gas reserves by volumetric method.	Topic 1. Volumetric method for calculating oil reserves, its essence. Volumetric method for calculating free gas reserves, its essence. Methods for determining the average values of the calculated parameters of deposits, the geometrization of the calculated parameters according to the Module of wells and the area of deposits, types of data averaging, determining the average values of porosity coefficients, oil and gas saturation and effective oil and gas pay thickness.

Name of the discipline	«Resource estimation, computation and recalculation of hydrocarbon reserves / Оценка ресурсов, подсчет и пересчет запасов углеводородов»
Course workload, number of credits / acc.hrs.	3/108
COURSE MODULES AND CONTENTS	
Modules	**Topics**
	Determination of parameters of productive formations by reservoir interModules in wells. Identification of reservoirs by qualitative features, quantitative criteria and structure of the pore space.
	Evaluation of the saturation character according to the data of mud logging, core, well logging, test results during drilling and in the column. Determination of porosity according to core and logging data.
	Determination of oil and gas saturation coefficients from core and logging. Determination of permeability from core data, logging and test results. Determination of physical and chemical properties and parameters of oils , hydrocarbon gases, condensates and formation waters.
	Main stages of calculation of oil and free gas reserves. Calculation of oil and free gas reserves at the stage of exploration and evaluation, upon completion of the exploration stage, in developing deposits. Calculation of oil and free gas reserves in complex reservoirs.
	Calculation of oil and free gas reserves in gas-oil and oil-and-gas deposits. Construction of a geological model of the deposit, correlation of well Modules and geometrization of oil and gas deposits.
Module 6. Material balance method for calculating oil and free gas reserves. Calculation of oil reserves by statistical method.	Principles of the material balance method. The material balance method for calculating oil reserves under various reservoir operation modes. Calculation of free gas reserves by pressure drop method.
	Principles of the statistical method. Statistical method for calculating oil reserves, types of statistical dependencies.
Module 7. Methods for calculating geological and recoverable reserves of gas, condensate, ethane, propane, butanes and useful components dissolved in oil. Methods for determining recoverable oil and gas reserves at various stages of exploration of deposits.	Calculation of reserves of gas dissolved in oil under various operating conditions of the deposit. Methods for calculating geological and recoverable condensate reserves. Calculation of geological reserves of ethane, propane, butanes, hydrogen sulfide and other useful components.
	Determination of recoverable reserves and oil and condensate recovery factors at various stages of exploration of fields (deposits). Substantiation of oil recovery factors depending on the stages of exploration, operating modes and complexity of the geological structure of deposits (deposits).
	Methods for calculating recoverable reserves and oil recovery factors, the essence of statistical, extrapolation and hydrodynamic methods. Calculation of recoverable reserves at various stages of exploration of deposits. The concept of the gas recovery factor.

Name of the discipline	«Resource estimation, computation and recalculation of hydrocarbon reserves / Оценка ресурсов, подсчет и пересчет запасов углеводородов»
Course workload, number of credits / acc.hrs.	3/108
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Module 8. Recalculation (recalculation) of reserves. Assessment of prospective and predictive resources.	Transfer of stocks to higher categories. Peculiarities of recalculation of oil, gas and condensate reserves of deposits under development.
	Evaluation of prospective resources, determination of calculation parameters.
	Estimation of forecast resources, principles of qualitative and quantitative assessment of oil and gas potential. Separate forecasting of oil and gas content.

Name of the discipline	«Information technologies in the oil and gas industry / Информационные технологии в нефтегазовом комплексе»
Course workload, number of credits / acc.hrs.	3/108
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Information and informational technology	Information and information resources. Information technologies and information systems of the oil and gas complex
General characteristics of information technology software	Software classification. Basic software. Application software and trends in its development. Specialized software
Computer networks	Local computer networks. Global computer networks. Automated workplace

Name of the discipline	«Current development of the production of unconventional hydrocarbon resources in the world / Современное развитие добычи нетрадиционных ресурсов углеводородов в мире»
Course workload, number of credits / acc.hrs.	5/180
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Module 1. General information about deposits of unconventional hydrocarbons	Topic 1.1. Geological and physical features of unconventional hydrocarbon deposits
Module 2. Quarry method of field development	Topic 2.1. General information about open pit mining
	Topic 2.2. Opening of deposits
Module 3. Shaft mining method	Topic 3.1. Ukhta method
	Topic 3.2. Deviated borehole method
Module 4. Downhole method of field development	Topic 4.1. Downhole hydraulic extraction of raw materials

Name of the discipline	«Methods of oil production intensification / Методы интенсификации добычи нефти»
Course workload, number of credits / acc.hrs.	5/180
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Well productivity control.	The objectives of well productivity and injectivity control. Methods for stimulating production and injection wells. Distinguishing enhanced oil recovery methods from well stimulation methods
Processes occurring in the bottomhole formation zone.	Reasons for the decline in productivity and injectivity of wells. Processes taking place in the bottomhole formation zone during field development
Acid treatment of wells.	Types of acid treatments, their advantages and disadvantages, scope. Pilot-industrial implementation and evaluation of the effectiveness of acid treatments.
Hydraulic fracturing	Types of hydraulic fracturing, their advantages and disadvantages, scope. Pilot-industrial implementation and evaluation of the effectiveness of acid treatments.
Other technologies for increasing productivity and injectivity of wells	Horizontal wells as a method to increase the productivity and injectivity of wells. Wave action on the reservoir. Thermal methods of oil production stimulation
Enhanced oil recovery methods	Principles of formation of residual oil saturation. Classification of methods for enhanced oil recovery. Pilot-industrial implementation.

Name of the discipline	«Fundamentals of construction and operation of pipeline transport / Основы строительства и эксплуатации трубопроводного транспорта»
Course workload, number of credits / acc.hrs.	6/216
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Module 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
	Topic 1.2. Stress state, strength, stability and movement of underground pipelines
Module 2. Technology of construction of main pipelines	Topic 2.1. Technologies for the construction of main pipelines under normal conditions
	Topic 2.2. Features of the technology of construction of main pipelines in difficult conditions
Module 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
	Topic 3.2. Corrosion protection of metal pipelines

Name of the discipline	«Advanced oil and gas processing equipment and product quality management / Современное оборудование для переработки нефти и газа и управление качеством производимой продукции»
Course workload, number of credits / acc.hrs.	5/180
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Mass transfer (diffusion) processes	Basic concepts and laws of mass transfer . Equilibrium systems. Evaporation and condensation. Rectification. Azeotropic and extractive distillation. absorption and desorption. The main types and calculation of distillation and absorption columns. Adsorption. Extraction. Drying
Hydromechanical processes	Characteristics of disperse systems. Settling. Filtration. Centrifugal settling and centrifugal filtration. Electrical deposition. Separation of gas dispersed systems. Mixing liquids. Hydrodynamics of a layer of granular materials
Mechanical processes	Grinding of hard materials. Classification and dosing of solid materials
Thermal processes	Tube furnaces. Heat exchangers
Processes of chemical processing of crude oil	The main regularities of petrochemical processes. reaction apparatus

Name of the discipline	«Modern stream in oil and gas processing in Russia / Современные направления нефтегазопереработки в России»
Course workload, number of credits / acc.hrs.	5/180
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Status and development trends of the global oil and gas processing industry	Objectives and content of the course. Prospects for the production and use of commercial products of oil and gas processing
Gas processing technology	Classification of types of technological fuel, physical and chemical bases for the creation of technologies for the processing of liquid hydrocarbon raw materials and gas. Methods for the preparation and purification of natural gases. New directions and technologies for gas processing, commercial products from gaseous raw materials
Technology for preparing oil and gas condensate for processing	Methods of their preparation for processing and separation Technology of separation treatment of oil and gas condensate. Separation equipment
Oil and gas condensate processing technology	Atmospheric distillation of oil and gas condensates; atmospheric-vacuum distillation of oil, technological bases for the separation and purification of distillates and residues using various reagents, deasphalting , dewaxing New trends in oil, gas and gas condensate processing technology
Recycling of crude oil	Thermal processes of oil raw materials processing. Catalytic processes of processing of oil raw materials. Hydrocatalytic processes of oil raw materials processing.

Name of the discipline	«Economics and management of oil and gas production / Экономика и управление нефтегазовым производством»
Course workload, number of credits / acc.hrs.	3/108
COURSE MODULES AND CONTENTS	
Modules	**Topics**
General information about the economic aspect of the oil field development project	Calculation of indicators of the use of fixed assets of enterprises in the oil and gas industry: status and movement, extensive, intensive and integral use, generalizing indicators. Factor analysis of capital productivity. Development of proposals and recommendations to improve the efficiency of the use of fixed assets of oil and gas industry enterprises
Methods for evaluating funds used in the development of an oil field	Calculation of indicators of the use of material resources of oil and gas industry enterprises. Analysis of profit per ruble of material costs. Development of proposals and recommendations to improve the efficiency of the use of material resources of the enterprises of the oil and gas industry
Economic parameters of field development	The process of forming the value of the product and its expression. Capital and operating costs. Internal and external factors affecting the cost of products
Taxation of the oil business	The value and system of taxation. Influence of the taxation system on the efficiency of production and its development. Stimulating oil production through changes in taxation

Name of the discipline	«Project management in the oil and gas industry / Управление проектами в нефтегазовой отрасли»
Course workload, number of credits / acc.hrs.	3/108
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Technologies for designing and modeling research objects in the field of oil and gas engineering	Design methodology, familiarity with the main design documents in the oil and gas industry and software tools for their implementation. Approaches to the design and justification of technical, technological and other indicators characterizing technological processes, objects, systems, projects, oil and gas organizations
Software used in the design and accompanying the life cycle of fields	Mathematical and computer models of processes, phenomena and objects related to the professional field. Methods for analyzing information on the objects of work.
Optimization of the design of oil and gas facilities	Collection, processing, analysis and systematization of scientific and technical information on the research topic. Approaches to improving the design methodology based on modern achievements of information and communication technologies.

Name of the discipline	«Innovative technologies for the development of hydrocarbon deposits / Инновационные технологии разработки месторождений углеводородов»
Course workload, number of credits / acc.hrs.	4/144
COURSE MODULES AND CONTENTS	
Modules	**Topics**
General information about smart wells	The concept of an intelligent well. Basic elements and principle of operation of an intelligent well. Examples of intellectualization of wells for oil production.
Intelligent automation systems in technological operations for oil and gas production.	Technical solutions for an intelligent control system for mechanized oil production. Inflow control devices. Manara intelligent production control system (Schlumberger). WellWatcher Intelligent Completion System FLUX (Schlumberger).
Examples of implementation of intelligent technologies	Intellectual developments and their implementation in the fields of Russia. Foreign experience in the implementation of intellectual developments. Prospects for the development of high-tech "smart" fields in Russia and abroad.

Name of the discipline	«Innovative technologies for the transportation and storage of hydrocarbons / Инновационные технологии транспортировки и хранения углеводородов»
Course workload, number of credits / acc.hrs.	4/144
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Mining-geological and technical conditions for the construction of underground gas and oil storage facilities	Rock salt deposits suitable for the construction of underground reservoirs. Possibility of storing hydrocarbons in underground reservoirs . Utilization, discharge and storage of brine obtained during the construction of underground reservoirs in rock salt. Storage of a technological reserve of brine for the operation of underground reservoirs in rock salt
Design and installation of underground storages of hydrocarbons in rock salt	Classification of underground storage facilities and conditions for their use. Technological complex exploitation of underground storages in rock salt . Calculation of the minimum backpressure and the maximum span of a working-capacity in rock salt
Construction technology of underground workings of tanks in rock salt	Technological schemes for the construction of underground reservoirs in rock salt
The main indicators of underground storages in rock salt	Underground storages in Russia and CIS countries . Underground hydrocarbon storage facilities in foreign countries . New directions of underground storage of raw materials in rocks

Name of the discipline	«Diagnostics of oil and petroleum products main pipeline facilities / Диагностирование объектов магистральных трубопроводов нефти и нефтепродуктов»
Course workload, number of credits / acc.hrs.	5/180
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Main tasks and systems of technical diagnostics	The main factors influencing the choice of methods of flaw detection. The location of possible defects on the part. Diagnostics of the equipment of oil pumping stations of main oil pipelines
Non-destructive testing methods	Visual and measuring control, ultrasonic testing, magnetic particle testing, capillary testing (color flaw detection, radiographic testing
Vibrodiagnostic method for monitoring the technical condition of equipment	Vibrodiagnostics development factors . Vibration diagnostics of objects. Causes of vibrations in pipelines. Economic aspects of the use of vibration diagnostics in the operation of machines
Magnetic control methods	Cleaning devices for cleaning the internal cavity of the pipeline. Diagnosis of the linear part of the main gasline. Intratubal diagnostics. The procedure for performing work during an external examination. Tank diagnostics. Methods and technical means of diagnostics

Name of the discipline	«Improving the efficiency of the production process and operation of equipment for the extraction of hydrocarbons / Повышение эффективности процесса добычи и работы оборудования по добыче углеводородного сырья»
Course workload, number of credits / acc.hrs.	5/180
COURSE MODULES AND CONTENTS	
Modules	**Topics**
General information about submersible pumping equipment	Scheme and main elements of the installation of a submersible centrifugal pump (ESP). Operating characteristic of a submersible centrifugal pump. Head, flow and speed coefficient of a vane pump. Influence of the density and viscosity of the pumped liquid on the characteristics of the ESP. The main complicating factors in the operation of wells with submersible pumps. Prospects for the use of submersible pumping units.
Influence of free gas on the characteristics of submersible centrifugal pumps	Forms of the flow of gas-liquid mixture in the channels of the working bodies of a centrifugal pump. Parameters influencing the characteristics of submersible centrifugal pumps when pumpingwater-gas mixture. Installation design, choice of model gas-liquid mixtures and methods of conducting experiments to study the effect of free gas on the characteristics of submersible centrifugal pumps. Study of the effect of gas on the performance of a submersible centrifugal pump when operating on model mixtures "water-gas", "water-surfactant-gas" and various intake pressures. The results of the study of the operation of submersible centrifugal pumps on viscous gas-liquid mixtures "oil-gas". Analysis of mean integral parameters of submersible centrifugal pumps operating on gas-liquid

Name of the discipline	«Improving the efficiency of the production process and operation of equipment for the extraction of hydrocarbons / Повышение эффективности процесса добычи и работы оборудования по добыче углеводородного сырья»
Course workload, number of credits / acc.hrs.	5/180
COURSE MODULES AND CONTENTS	
Modules	**Topics**
	mixtures. Method for calculating the characteristics of submersible centrifugal pumps when pumping water and gas mixtures from wells.
Non -separation methods for increasing the efficiency of ESP operation when pumping gas-liquid mixtures	Deepening the pump under the dynamic level of the liquid in the well. Pouring degassed liquid into the annulus . Use of the "conical" scheme of pumps. Application of pumps with dispersants . Use of steps of special designs.
Application of gas separators and mechanical impurities to ESP	The main types of gas separators for ESPs . Field tests of MNG separators. The effect of supercavitation and its role in the working process of the gas separator to the ESP. Bench research and field tests of gas separators MN-GSL and MNG and separators of the company "REDA". Experimental studies of the characteristics of gas separators and gas separators - dispersants for ESPs at different shaft speeds. Development and field testing of a centrifugal separator of mechanical impurities at the inlet of a submersible pumping unit. Extraction of natural gas from flooded gas wells and methane from coal deposits using submersible pumping systems.
Use of pump-ejector systems for oil production	Scheme and principle of operation of the jet apparatus. Principal diagrams and main elements of pump-ejector systems. Characteristics of joint operation of submersible centrifugal pumps and ejectors. Results of field tests and industrial implementation of submersible pump-ejector systems "Tandem-1", new submersible pump-ejector systems "Tandem-2", "Tandem-3" and "Tandem-4". Field surveys of packers hydraulic jet pumping units at the Samotlor field. Development and field testing of a packerless layout of a hydraulic jet pump with a double-row lift. Possibilities for the development of a hydro -jet method of operation using power ground mini-stations.

Name of the discipline	«Comprehensive analysis of processing, storage and marketing of hydrocarbons / Комплексный анализ переработки, хранения и сбыта углеводородов»
Course workload, number of credits / acc.hrs.	5/180
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Module 1. Global trends in oil and gas processing, oil and gas chemistry	Topic 1.1. Use of associated petroleum gas and gas processing in general
	Topic 1.2. Trends in the development of the world petrochemical industry
Module 2 Oil and Gas Storage	Topic 2.1. Underground natural gas storage
	Topic 2.2. Stabilization and processing of gas condensates

Name of the discipline	«Comprehensive analysis of processing, storage and marketing of hydrocarbons / Комплексный анализ переработки, хранения и сбыта углеводородов»
Course workload, number of credits / acc.hrs.	5/180
COURSE MODULES AND CONTENTS	
Modules	**Topics**
Module 3. Delivery and acceptance points of commercial oil and gas to the system of main pipelines	Topic 3.1. Delivery and acceptance points of commercial oil and gas to the system of main pipelines

HEAD
OF EDUCATIONAL PROGRAMME

signature

Kapustin V.M.

name and surname