

Module designation	GEO 7432 "Lithology of natural oil and gas reservoirs"
Semester(s) in which this module is taught	2nd semester
The person responsible for the module	Ensepbayev Talgat Ablaevich – Professor
Language	Russian
Attitude to the curriculum	Profile (P)
Teaching methods	lecture, practice
Workload (incl. contact hours, hours of independent work)	((Estimated) Total workload: 5 cr Contact hours (please indicate whether there will be a lecture, exercise, laboratory session, etc.): 45h Private training, including exam preparation, specified in hours 24 : 15h
Credit scores	5 (2/0/1/2)
Necessary and recommended prerequisites for joining the module	Availability of a computer and computer equipment. Availability of an Internet channel with a speed of at least 0.5 Mbit/sec. A personal account with a photo of the person on the avatar and corporate email on the Microsoft 365 platform. Attendance of classes is mandatory according to the schedule.
Module objectives/expected learning outcomes	The purpose of teaching the discipline GEO 7432 "Lithology of natural oil and gas reservoirs" is to provide undergraduates with theoretical ideas about the classification of sedimentary rocks, types of lithogenesis, methods of lithological studies of rocks, the main stages of formation and transformation of sedimentary rocks, definitions and descriptions of the composition, structure and texture of rocks, generalize analytical data. -know the types of sedimentary rocks, the stages of formation and transformation of sedimentary rocks, the most common natural reservoirs, causes of deposition of matter, sedimentation textures, sedimentary rock structures.
	- know the concept of facies -master the methods of geological and lithological studies - graphically display oil and/or gas deposits and their lithological content using maps and profile sections of wells.

Content	<ul style="list-style-type: none"> - The subject of lithology is the tasks of science, the practical significance of the doctrine of sedimentary rocks. The material composition of the Earth's crust. Similarities and differences in the chemical composition of sedimentary and igneous rocks. - The structure of sedimentary rocks. <p>Classification of sedimentary rocks. Textures of sedimentary rocks. Sedimentary rock structures. Pyroclastic rocks. Classification and geological distribution of pyroclastic rocks.</p>
	<ul style="list-style-type: none"> - Stages of formation and transformation of sedimentary rocks. Transfer of sedimentary material. - Autigenic and allotigenic components of sedimentary rocks. Mineral composition. Rock-forming minerals. - Actually detrital rocks. Genetic classification and geological distribution of clastic rocks. Granulometric analysis. Terrigenous reservoirs of oil and gas. - Clay rocks. Mineral composition. Conditions of education. Geological distribution. Diagnostics of allotigenic and autigenic components. - Sedimentary rocks of chemical origin (chemobiogenic). Principles of classification, structures and textures of rocks, their mineral composition, conditions of formation and practical significance. - Sedimentary rocks of organogenic origin. Principles of classification, structures and textures of rocks, their mineral composition, conditions of formation and practical significance. - Carbonate rocks. Primary and secondary porosity in carbonate reservoirs of oil and gas. Evaporites. - Conditions for the formation of sedimentary rocks. Stage of hypergenesis. Types of weathering. Weathering products.. - Sedimentogenesis. Causes of precipitation of the substance. Oil and gas sedimentation - Sedimentation textures. Underwater slope basin, shelf margin and shallow shelf. Tidal plains. Evaporites - Diagenesis. The processes occurring during the diagnosis. Formation of stable mineral modifications. The role of tectonics in the process of diagenesis. Influence - Metagenesis. Distinctive features of breeds that have passed the stage of metagenesis. General remarks on the conditions of formation of sedimentary rocks. The frequency of sedimentation. Igneous and metamorphic rocks as possible reservoirs of oil and gas.
Examination forms	Open questions, tests

Requirements for training and exams	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. A master's student should come prepared for lectures and practical classes. Timely protection and full performance of all types of work (practical and independent) is required.
List of literature	<ol style="list-style-type: none"> 1. Kuznetsov Vitaly Germanovich, Lithology. Fundamentals of general (theoretical) lithology Textbook for universities. - M.: Scientific world, 2011. - 360 p. 2. Proshlyakov B.K., Kuznetsov V.G. Lithology: Textbook for universities M.: Nedra, 1991. – 444 p. 3. Proshlyakov B.K., Kuznetsov V.G. Lithology and lithological-facies analysis. – M., Nedra, 1981. – 284 p. 4. Pettijohn F. J. Sedimentary rocks. M., Mir, 1981. 751 p. 5. 5. Alekseev V.P. Lithology: A textbook. – Yekaterinburg: UGGA Publishing House, 2001. – 249 p. 6. Yezhova A.V. Lithology. Educational stipend. – Tomsk, TPU, 2005. -353 p. 21. Karogodin Yu.N. Introduction to petroleum lithology. 7. Naumov V.A. Optical determination of sedimentary rock components. M., Nedra, 1981. 202 p.

Module designation	Geo7462 Theoretical and methodological regularities of the allocation of resources and reserves of hydrocarbon raw materials on the shelf and water area
Semester(s) in which this module is taught	1 semester
The person responsible for the module	Nigmatova Saida Arapovna – Associate Professor
Language	russian
Attitude to the curriculum	Profile (P)
Teaching methods	lecture, practice
Workload (incl. contact hours, hours of independent work)	<p>((Estimated) Total workload: 3 cr Contact hours (please indicate whether there will be a lecture, exercise, laboratory session, etc.): 45h Private training, including exam preparation, specified in hours 24 : 15h</p>
Credit scores	5 (2/0/1/2)
Necessary and recommended prerequisites for joining the module	<ul style="list-style-type: none"> – Availability of a computer and computer equipment. – Availability of an Internet channel with a speed of at least 0.5 Mbit/sec. – Personal account with a photo of the person on the avatar and corporate mail on the Microsoft 365 platform. – Attendance of classes is mandatory according to the schedule.

<p>Module objectives/expected learning outcomes</p>	<p>The purpose of teaching the discipline Geo7462 "Theoretical and methodological regularities of the placement of resources and reserves of hydrocarbon raw materials on the shelf and in the water area" is to get undergraduates theoretical ideas about the patterns of formation and accumulation of hydrocarbons in the waters of the seas and oceans of the Earth; the principles of forecasting accumulations of hydrocarbons and the stages of geological exploration in the waters.</p> <ul style="list-style-type: none"> - solve geodynamic problems; - analyze the geodynamic evolution of certain sections of the lithosphere; - to link geodynamic processes with the formation and forecasting of hydrocarbon deposits.
<p>Content</p>	<p>General information about the formation of organic substances and oil in the water area and shelf. Paleogeography. The relationship of oil accumulation processes with the climate. The composition of the organic world of the water areas and the shelf. Formation of biogenic build-ups. Basic knowledge and skills in the field of geotectonics and geodynamics of oil and gas areas. The main provisions of the theory of plate Tectonics. Evolution of tectonic science from fixism to plate tectonics. Continental, marine and transitional facies. Schematic diagram of the formation. Offshore oil and gas fields. Gas hydrates of the seas and oceans. Isolation and study of oil and gas complexes (terrigenous, carbonate) offshore areas. Gas hydrates. Genesis, conditions of accumulation and preservation. Lithological-facies and filtration-capacitance criteria of shelf oil and gas potential. Oil and gas basins of water areas. Classification and features about different types. Fluid-dynamic features of oil and gas formation in the water areas of sedimentary basins. The basic principles of assessing the prospects of oil and gas potential of water areas. Prediction of HC accumulations in water areas. The stage of geological exploration on the shelf. Features of prospecting and exploration work for the development of hydrocarbon deposits on the shelf. Prospects for hydrocarbon production in the northern and southern parts of the Caspian Sea shelf. Patterns of distribution of oil and gas basins and placement of hydrocarbon deposits in water areas.</p>
<p>Examination forms</p>	<p>Open questions, tests</p>
<p>Requirements for training and exams</p>	<p>Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. A master's student should come prepared for lectures and practical classes. Timely protection and full performance of all types of work (practical and independent) is required.</p>

List of literature	<ol style="list-style-type: none"> 1 1 Jafarov I.S., Kerimov V.Yu., Shilov G.Ya. Shelf, its study for prospecting and exploration of oil and gas accumulations. Nedra, St. Petersburg, 2005, 384 p. 2 2 Maksimov E.M. Marine geology. - Tyumen State University, Tyumen.- 2014 - 370 pages . 3 3 Zapivalov N. P. Oil and gas potential of the water areas of the world: A textbook / ... Novosibirsk, 2009. - 260 p. 4 4 About the state program of the Kazakhstan sector of the Caspian Sea. Decree of the President of the Republic of Kazakhstan. 22.112010.No.1105. 5 5 Carbonate rocks – Moscow: Mir, 1970, vol.1. 395 p., 1971, vol.2. – 267 p. 6 6 Kenneth J. Marine geology. In 2 volumes. –Moscow: Mir, 1987, vol.1 – 365 p., vol.2 – 383 p. 7 7 Lisitsin A.P. Processes of ocean sedimentation. – M.: Nauka, 1978. – 392 p. 8 8 Reinek G.E., Singh I.B. Conditions of terrigenous sedimentation. – M.: Nedra, 1981. -439 p. 9 9 Romanovsky S.P. Dynamic modes of sedimentation. – L.: Nedra, 1985. 201 p. 10 10 Wilson J.L. Carbonate facies in geological history. Moscow: Nedra, 1980.- 463 p. 11 11 Frolov V.T. Genetic typification of marine sediments. – M.: Nedra, 1984. -242 p. 12 12 Cyclic and event sedimentation. –Moscow: Mir, 1985. – 156 p. 13 11. Kazansky Yu.P., Betekhtina O.V., Van A.V. et al.. Sedimentary rocks (composition, textures, types of sections) // Novosibirsk: Nauka, 1990. – 267 p.
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Module designation	GEO7442 Regional and local modeling of sedimentary basin evolution
Semester(s) in which this module is taught	3rd semester
The person responsible for the module	Tanirbergenov Amanzhol Gizzatovich, Assistant Professor
Language	russian
Attitude to the curriculum	Profile (P)
Teaching methods	lecture, practice
Workload (incl. contact hours, hours of independent work)	<p>((Estimated) Total workload: 3 cr</p> <p>Contact hours (please indicate whether there will be a lecture, exercise, laboratory session, etc.): 45h</p> <p>Private training, including exam preparation, specified in hours 24 : 15h</p>

Credit scores	5 (2/0/1/2)
Necessary and recommended prerequisites for joining the module	
Module objectives/expected learning outcomes	<p>As a result of mastering the discipline, the student should know: - scientific and methodological foundations and algorithm of structural and genetic analysis of sedimentary formations; - the main types of sedimentary basins; - a typical formation series of sedimentary basins; - large sedimentary basins of Kazakhstan and the world; - the role of the neotectonic factor in the formation of mineral deposits, including hydrocarbons.</p> <p>Be able to: - identify lateral changes in their structure and reconstruct the conditions of their formation to predict the structure of natural reservoirs during the search, exploration and operation of various fields; - reconstruct the history of the development of the paleobasin; - assess the oil and gas content of various sedimentary basins.</p> <p>Mastering: - methods of studying sedimentary basins, about the characteristics, types of sedimentary basins and their connections with oil and gas, about the patterns of the location of large accumulations of hydrocarbons in the system of sedimentary basins.</p>
Content	<p>Introduction. The main categories of sedimentary basins. The actual composition of sedimentary basins. Sedimentary complexes of basins of the mobile belt. Pools of internal parts of movable belts. Geothermy of sedimentary rock basins. Application of geothermal research in petroleum geology. Reconstruction of the history of immersion of sedimentary basins. The thermal regime of swimming pools and the conditions of maturation of organic substances at different stages of development.</p>
Examination forms	Open questions, tests
Requirements for training and exams	<p>Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson.</p> <p>The master's student must come prepared for lectures and practical classes. Timely protection and full performance of all types of work (practical and independent) is required.</p>

List of literature	<p>1. Sedimentary basins. M., 2004, coll. auth. edited by Yu.G.Leonov and Yu.A.Volozha.</p> <p>2. Lobkovsky L. I., Nikishin A.M., Khain V. E. Modern problems of geotectonics and geodynamics. Moscow: Scientific World, 2004. 610 p.</p> <p>3. Sedimentary basins: methods of study, structure and evolution/ Edited by Yu. G. Leonov and Yu. A. Volozh. Moscow: Scientific World, 2004. 525 p.</p> <p>4 Sedimentation and facies environments/ Edited by H. Reading. Moscow: Mir, 1990. Vol.1. 350 p. Vol.2. 380 p.</p>
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Module designation	GEO7012 - Geostatistics in field and field geological research
Semester(s) in which this module is taught	3rd semester
The person responsible for the module	Tanirbergenov Amanzhol Gizzatovich, Assistant Professor
Language	russian
Attitude to the curriculum	Profile (P)
Teaching methods	lecture, practice
Workload (incl. contact hours, hours of independent work)	<p>((Estimated) Total workload: 3 cr</p> <p>Contact hours (please indicate whether there will be a lecture, exercise, laboratory session, etc.): 45h</p> <p>Private training, including exam preparation, specified in hours 24 : 15h</p>
Credit scores	5 (2/0/1/2)
Necessary and recommended prerequisites for joining the module	

Module objectives/expected learning outcomes	<p>The objectives of mastering the discipline "Geostatistics in field and field-geological research" are the formation of professional competencies of undergraduates related to the use of mathematical and statistical methods of information processing using a PC in their professional field, namely: to be able to master mathematical methods of processing raw data on hydrocarbon deposits, to instill in them the skills of this processing and the use of computer tools; to master the complexes of mathematical methods necessary for geological and commercial generalization of the results of research and exploration and development of oil and gas fields;</p> <p>To teach undergraduates to apply the acquired skills of mathematical data processing and 3-dimensional modeling of hydrocarbon deposits when calculating reserves and geological justification of development.</p>
Content	<p>Introduction. Random variables and random phenomena in oil and gas field geology. Sampling and general population, probabilistic model. The study of the features of the distribution of parameters of heterogeneous productive layers using mathematical methods. The main characteristics of distributions. Mathematical expectation. Variance. Distribution functions in oil and gas field geology. The concept of distribution functions. Examples of discrete theoretical distributions. Continuous distributions. Probability levels. Parameter estimates and their quality. Confidence probability and confidence interval.</p> <p>Entropy in oil and gas field geology. Comparison of the distribution series of the values of the parameters of productive formations.</p>
Examination forms	Open questions, tests
Requirements for training and exams	<p>Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson.</p> <p>The master's student must come prepared for lectures and practical classes. Timely protection and full performance of all types of work (practical and independent) is required.</p>
List of literature	<ol style="list-style-type: none"> 1. Gutman I.S. Application of mathematical methods and computers in oil and gas field geology: Textbook. – M.: MINHiGP, 1976. 2. Gutman I.S. Methods of calculating oil and gas reserves: Textbook for universities. M.: Nedra, 1985. 3. Dubroul O. The use of geostatistics for inclusion in the geological model of seismic data. SEG, EAGE, 2002. 4. Bondarenko V.N. Statistical solutions of some problems of geology. Moscow: Nedra, 1970.

Module designation	GEO992 Petroleum Hydrogeology
Semester(s) in which this module is taught	3rd semester

The person responsible for the module	Tanirbergenov Amanzhol Gizzatovich, Assistant Professor
Language	russian
Attitude to the curriculum	Profile (P)
Teaching methods	lecture, practice
Workload (incl. contact hours, hours of independent work)	((Estimated) Total workload: 3 cr Contact hours (please indicate whether there will be a lecture, exercise, laboratory session, etc.): 45h Private training, including exam preparation, specified in hours 24 : 15h
Credit scores	5 (2/0/1/2)
Necessary and recommended prerequisites for joining the module	
Module objectives/expected learning outcomes	<p>The purpose of the course “ Petroleum hydrogeology” is to gain knowledge about the hydrogeology of oil and gas basins, oil and gas fields, the peculiarities of the formation of underground fluids of deep aquifers containing hydrocarbons, the role of groundwater in the formation, preservation and destruction of hydrocarbon deposits, as well as the practical importance of groundwater in the development of oil and gas fields.</p> <p>A master's student should be able to:</p> <ul style="list-style-type: none"> - apply modern methods of oil and gas, oil and gas prospecting and oil and gas field hydrogeology. - give a mathematical statement of the problem <p>To know:</p> <ul style="list-style-type: none"> - basic concepts of oil and gas hydrogeology, the role of groundwater in the formation, migration, accumulation, preservation and destruction of hydrocarbon deposits, features of hydrogeodynamics and hydrogeochemistry of groundwater of oil and gas fields, the main tasks and methods used in oil and gas exploration hydrogeology and in the development of hydrocarbon deposits. <p>possess: basic skills in solving geological problems by constructing and calculating the necessary geological exploration for oil and gas and the development of hydrocarbon deposits.</p> <p>After completing the course, the master's student must demonstrate the ability to solve geological problems by constructing and calculating the necessary geological exploration for oil and gas and the development of hydrocarbon deposits</p>

Content	Content - getting up-to-date ideas about the formation of underground waters of deep horizons and, in particular, about the role of groundwater in the formation, preservation and destruction of hydrocarbon deposits, get acquainted with the principles and methods of prospecting hydrogeological works for oil and gas; gain knowledge about multiphase filtration, features of the movement of geofluids of variable density and viscosity; get acquainted with the basics of paleohydrogeology and paleohydrogeological methods used in the search for oil and gas deposits; to gain knowledge about the features of the chemical composition, water-dissolved gases, water-dissolved organic matter, isotopic composition of underground waters of oil and gas fields and their practical significance; to get acquainted with the main hydrogeological criteria for assessing the prospects of oil and gas potential and to master existing hydrogeological oil and gas prospecting methods, to acquire knowledge about the main types of hydrogeological studies conducted at oil and gas wells at exploration and exploitation of deposits.
Examination forms	Open questions, tests
Requirements for training and exams	Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. The master's student must come prepared for lectures and practical classes. Timely protection and full performance of all types of work (practical and independent) is required.
List of literature	Matusevich V.M. Oil and gas hydrogeology, part 1. Tyumen, 2010. Kartsev, A.A. Vagin S.B. Matusevich V.M. Hydrogeology of oil and gas basins M., Nedra, 2001 Dunin V.I., Korzun A.V. Hydrogeodynamics of oil and gas basins., M, Scientific World. 2005 Kanalin V.G., Vagin S.B. Oil and gas field geology and hydrogeology. M. Nedra 1997.

Module designation	Analysis of sedimentary basins
Semester(s) in which this module is taught	Spring
The person responsible for the module	Uzbekgaliev Rizakhan Khalilovich - candidate of geological and mineralogical sciences, senior lecturer.
Language	russian
Attitude to the curriculum	Profile (P)

Teaching methods	lecture, practice
Workload (incl. contact hours, hours of independent work)	<p>((Estimated) Total workload: 3 cr</p> <p>Contact hours (please indicate whether there will be a lecture, exercise, laboratory session, etc.): 45h</p> <p>Private training, including exam preparation, specified in hours 24 : 15h</p>

Credit scores	5 (2/0/1/2)
Necessary and recommended prerequisites for joining the module	To successfully master the course "Analysis of sedimentary basins", the student must be a trained specialist in the structure, composition and classification of sedimentary rocks, sediment accumulation processes, the basics of stratigraphy, structural geology, petroleum geology, principles of regional geological zoning. The discipline is closely related to geodynamics in the context of the modern concept of geology.
Module objectives/expected learning outcomes	<p>-To have an idea of:</p> <p>classifications of sedimentary basins in historical retrospect; the relationship of the structure of sedimentary basins, paleogeographic and paleogeological conditions of their formation, with the geodynamics of regions and global factors affecting the sedimentation environment; techniques for restoring the immersion of sedimentation basins; methods for calculating the rate of denudation of areas of demolition and filling of sedimentation basins;</p> <p>- Knowledge:</p> <p>scientific and methodological foundations and algorithm of structural and genetic analysis of sedimentary formations; the main types of sedimentary basins; typical formation series of sedimentary basins; the largest sedimentary basins in the world; the role of the tectonic factor in the formation of hydrocarbon deposits.</p> <p>-Ability:</p> <p>to identify above-fertile geological bodies, reconstruct the conditions of their formation and determine lateral changes in their structure to predict the structure of natural reservoirs in the search, exploration and exploitation of various deposits;</p> <p>reconstruct the history of the paleobasin development; evaluate the oil and gas potential of various types of sedimentary basins.</p>
Content	Sinking of the Earth's crust and formation of sedimentary basins; stratigraphic record of isostasis, tectonic movements, eustasia and sedimentation style; sedimentary systems: distribution, transformation and modification related to the composition of sedimentary material, fluctuations in sea level; deep-sea sedimentary systems; types of sedimentary basins and geodynamic conditions of their formation.
Examination forms	A written exam of three questions. the 1st question is an essay on the proposed topic; the 2nd and 3rd questions are practical tasks.

Requirements for training and exams	<p>Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within a day and explain the plan for self-study of the lesson; mandatory reading of the submitted materials before the lesson;</p> <ul style="list-style-type: none"> - delivery of tasks on time. There are penalties of -10% for late delivery; - 20% non-participation in the audience (for a good reason with supporting documents) - rating "F (Fail)"; - plagiarism and cheating during the execution of the task are not allowed; - mandatory use of electronic gadgets in the classroom is welcome, but it is unacceptable to use them in the exam.
List of literature	<p>Maslov A.V., Alekseev V.B. Sedimentary formations and sedimentary basins: study guide – Yekaterinburg: UGGA, 2003. – 203 s</p> <p>Nikishin A.M. Global geodynamics. Moscow 2014.</p> <p>Nikishin A.M. Types of sedimentary basins. Presentations</p> <p>Lobkovsky L. I., Nikishin A.M., Khain V. E. Modern problems of geotectonics and geodynamics. – M.: Scientific World, 2004. – 610 p.</p>

Module designation	GEO 700 Aerospace methods in the search and exploration of oil and gas fields
Semester(s) in which this module is taught	autumn
The person responsible for the module	Urmanova Dilyara Eldarovna, lecturer, senior researcher
Language	Russian, English
Attitude to the curriculum	Profile (P)
Teaching methods	lecture, practice
Workload (incl. contact hours, hours of independent work)	<p>((Estimated) Total workload: 3 cr</p> <p>Contact hours (please indicate whether there will be a lecture, exercise, laboratory session, etc.): 45h</p> <p>Private training, including exam preparation, specified in hours 24 : 15h</p>

Credit scores	5 (2/0/1/2)
Necessary and recommended prerequisites for joining the module	oil and gas field geology and reserves calculation

<p>Module objectives/expected learning outcomes</p>	<p>- Knowledge: familiarity with information, theory and/or subject knowledge related to working with aerospace images, the principles of their decoding and identification of patterns of oil and gas occurrence</p> <p>Skills: cognitive and practical abilities, which use knowledge on the use of QGIS free access software, working with the USGS aerospace imagery database, etc.</p> <p>- Competencies: integration of knowledge, skills and social and methodological capabilities in work or study situations²⁵, for example: “Students are able to independently work with the material of various databases of aerospace images, process data, analyze and come to conclusions upon completion of the analysis, as well as conduct a comparative analysis of aerospace images of various survey areas with different geological conditions”</p>
<p>Content</p>	<p>The course is intended for undergraduates of the OP "Geology and exploration of mineral deposits", "Geology of oil and gas".</p> <p>The purpose is to acquire theoretical and practical knowledge of the principles of application of aerospace methods of oil and gas geology in the search for oil and gas deposits, familiarization with the methods of oil and gas geological interpretation in various geographical and geological conditions.</p>
<p>Examination forms</p>	<p>The answers are written if the exam is online, oral if offline. 3 questions: 2 theoretical, 1 practical-analysis and decoding of aerospace images</p>
<p>Requirements for training and exams</p>	<p>To successfully complete the course, a master's student needs to decrypt, analyze the aerospace images of the territory of 3 oil fields in various spectra, protect the work on the imposition of isolines on aerospace images using QGIS software, protect 2 presentations on the subject of the course determined by the lecturer.</p> <p>The exam is conducted online during the Covid-19 pandemic restrictions by working in Microsoft teams, subject to the mandatory condition of the camera being turned on, a proctor is present at the exam, who monitors the behavior of students during the exam for academic integrity.</p> <p>The exam is conducted offline outside of the Covid-19 pandemic restriction period, during which undergraduates answer 3 questions in tickets: 2 of a theoretical nature, 1 practical-such as analysis and decoding of an aerospace image.</p>

List of literature

1. Trofimov D.M. et al. Modern methods and algorithms for processing space, geological, geophysical and geochemical information for predicting the hydrocarbon potential of unexplored subsurface areas. M., Fizmatlit, 2012
2. Gafarov N.A. et al. The use of space information in the gas industry. Moscow,,: Gazprom Expo LLC, 2010, - 132 p
3. Korchuganova N.I. Aerospace methods in geology. Moscow: Geokart, GEOS, 2006
4. Stevens P. Kuwait Petroleum Corporation: Searching for Strategy in fragmented oil sector, Program on energy and sustainable development, 2008
5. Zabota B. et al. Accuracy Assessment of UAV-Photogrammetric-Derived Products Using PPK and GCPs in Challenging Terrains: In Search of Optimized Rockfall Mapping. Remote sensing, 2021
6. Granado C. et al. 3D crustal-scale structure of the West Iberia margin: a novel approach to integrated structural characterization of passive margins. Marine geophysical research. 2021
7. Kazemi N. et al. Advanced sensing and imaging for efficient energy exploration in complex reservoirs. Energy reports. 2020
8. Cotugno A. et al. A Framework for Calculating Peak Discharge and Flood Inundation in Ungauged Urban Watersheds Using Remotely Sensed Precipitation Data: A Case Study in Freetown, Sierra Leone. Remote sensing, 2021
9. Sun Yu et al. Alteration Hydrothermal Stage Division and its Application in Geological Prospecting Using CASI-SASI Airborne Hyperspectral Data: Taken the Baixianishan Area in Liuyuan Town of Gansu Province as an Example IOP Conference Series: Earth and Environmental Science, 2019 International Conference on Oil & Gas Engineering and Geological Sciences
10. Dzhevaga N. et al. Analysis of Air Monitoring System in Megacity on the Example of St. Petersburg. Journal of Ecological Engineering. 2021