



*Author(s): Kosharna Sofiia Kostiantynivna, PhD in Geology, Assistant professor, Department of Hydrogeology and Engineering Geology; Havryliuk Ruslan B., PhD in Geology, lecturer, Department of Hydrogeology and Engineering Geology*

**APPROVED**


Head of department of Hydrogeology and Engineering Geology

  
(signature,) (prof. Koshliakov O.E.)

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Head of the Scientific-methodical Commission   
(signature) (as.prof. Demidov V.K.)

**The aim of the discipline** - is to provide future specialists with theoretical and practical knowledge in the field of petroleum deposits hydrogeology; to familiarize students with the conditions of petroleum deposits' groundwater formation, the main genetic types of oil and gas basins and with the features of hydrogeological surveys and research in oil and gas production areas.

**Preliminary requirements:**

1. basic knowledge of hydrogeology
2. the level of English proficiency not lower than B1.

**Annotation of discipline:**

Academic discipline "Petroleum deposits hydrogeology" that integrates the principles of classical natural sciences is part of education and professional training program for the education level "master" branch of knowledge 10 - Natural Science of specialty 103 - Earth Sciences Educational program: Hydrogeology.

The discipline is taught in the 1-st semester of 1-st year Master's degree program in volume – 180 hours (6 credits ECTS), including lectures - 28 hours, practical classes - 28 hours, consultations – 4 hours, self-study work - 120 hours.

The course content provides two modules and two tests. The discipline is finished by an exam.

In order to determine the role of groundwater in the migration and accumulation of oil and gas deposits, the introduction to different types of groundwater, its geochemical composition and genesis takes place. The course also includes reviewing the possibilities of the underground gas and other hydrocarbons storage formation.

**The tasks of the discipline:**

- mastering the hydrocarbons' migration, conservation and destruction theoretical issues;
- obtaining the necessary skills to substantiate oil and gas exploration indicators;
- mastering the modern methods of purification of technogenic polluted groundwater that might be formed during petroleum fields development;
- obtaining the necessary knowledge in the field related to research needed for creation and exploitation of underground hydrocarbon storages and injection of industrial effluents into the absorbing horizons.

**The results of study:**

<i>Learning results</i> (1. to know; 2. be able to; 3. communication; 4. autonomy and responsibility)		<i>Methods of teaching and learning</i>	<i>Assessment methods</i>	<i>Percentage in the final assessment of the discipline</i>
<i>Code</i>	<i>Learning outcomes</i>			
1.1	<i>Peculiarities of the natural waters' chemical composition formation at the great depths</i>	<i>Lecture, practical class</i>	<i>Paperwork</i>	<i>up to 10%</i>
1.2	<i>Features of groundwater and brines' movement</i>	<i>Lecture, practical class</i>	<i>Paperwork</i>	<i>up to 10%</i>
1.3	<i>Basic conditions for the petroleum deposits' groundwater formation</i>	<i>Lecture, practical class</i>	<i>Paperwork</i>	<i>up to 10%</i>
1.4	<i>Genetic types of oil and gas basins' waters</i>	<i>Lecture, practical class</i>	<i>Paperwork</i>	<i>up to 10%</i>
1.5	<i>Methodology of oil and gas hydrogeological research</i>	<i>Lecture, practical class</i>	<i>Paperwork</i>	<i>up to 10%</i>
2.1	<i>Construct and interpret hydro-geochemical and hydrogeodynamic maps and sections</i>	<i>practical class, self study</i>	<i>Paperwork</i>	<i>up to 10%</i>
2.2	<i>Perform hydrogeological research during the prospecting, exploration and production of oil and gas</i>	<i>practical class, self study</i>	<i>Paperwork</i>	<i>up to 10%</i>

2.3	Assess the oil exploration and industrial value of groundwater	practical class, self study	Paperwork	up to 20%
3.1	Be able to organize team working to solve the problem effectively	practical class	--/-	up to 5%
4.1	Understanding of individual responsibility for personal solving of a part of common task	practical class	--/-	up to 5%

### The correlation of the learning outcomes of the discipline with the program results

Learninh outcomes of the discipline	Program learning outcomes									
	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	3.1	4.1
Analyze the features of natural and anthropogenic systems and objects of the Earth's geospheres	+	+	+	+	+					
To know modern methods of research regarding Earth and its geospheres, in particular the ways of studies of geological environment and underground hydrosphere, and to be able to apply these methods in research and development activities.						+	+	+	+	+

**Structure of discipline:** *Lecture, practical class, students' self-study*

### Scheme of grading forms:

#### Form of student evaluation

##### 1. Semester grading:

- 1) *Control test* (min – 6, max – 10)
- 2) *Control test* (min – 6, max – 10)
- 3) *Works paper and oral reports* (min – 24, max – 40)

**2. Final assessment is in the form of an exam** (min – 24, max – 40) (total score of discipline (maximum 100 grades) is defined as the sum for the systematic work during the semester).

#### *Final evaluation based on the results of the student's work throughout the semester*

##### *Procedure and evaluation system*

	Semester grades	Exam	Final grade
Min	36	24	60
Max	60	40	100

*For students who have obtained total grades less than critically-calculated minimum of 20 grades are not allowed for taking the exam.*

**Grading:** *For admission to the final grading it is obligatory: 1) to pass two control tests; 2) to complete 10 practical tasks, prepare two abstracts and two essays which can be presented in the form of presentations. The final grading is carried out in the form of exam with written and oral parts.*

##### Assessment:

Excellent	90-100
Good	75-89
Satisfactory	60-74
Fail	0-59

**STRUCTURE OF THE DISCIPLINE  
PLAN OF LECTURES AND PRACTICAL CLASSES**

№	Theme	Hours		
		Lectures	Practical class	Self-study
<i>Module 1. «Groundwater formation»</i>				
1	Introduction. History of development and current state of petroleum deposits hydrogeology.	2	2	12
2	Movement of groundwater and brines.	2	2	14
3	Groundwater and brines formation. Exogenous (sedimentation, revived, infiltragenous) and endogenous waters).	2	2	6
4	Formation of the chemical composition of groundwater of oil and gas-bearing water pressure basins.	2	2	6
5	Throughgoing fluid-conducting structures (FC-structures)	2	4	22
6	Hydrogeological conditions of formation, preservation and destruction of oil and gas deposits	2	2	8
	Control test	2		
<i>Module 2. «Hydrogeological methods of petroleum deposits' studying»</i>				
7	Hydrogeological criteria for petroleum prospects assessment	2	2	10
8	Geological and hydrogeological modeling during petroleum fields development. Industrial classification of waters.	2	2	10
9	Hydrogeological conditions for the manifestation of various modes of oil and gas reservoirs. The use of hydrogeological data for oil and gas fields' designing.	2	2	12
10	Environmental protection during exploitation of oil and gas deposits	2	4	8
11	Oil contamination of the geological environment	4	4	12
	Control test	2		
<b>Total</b>		<b>28</b>	<b>28</b>	<b>120</b>

**Total hours of the discipline – 180, that include:**

lectures – **28 hrs.**

practical classes – **28 hrs.**

consultations – **4 hrs.**

self-studying work – **120 hrs.**

**RECOMMENDED LITERATURE:**

**Basic:**

- Bradley Bryant W (1992) Two oilfield water systems. Robert E, Krieger publishing company Malabar, Florida – 258
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- Global Overview of Saline Groundwater Occurrence and Genesis. International groundwater resources assessment centre. Utrecht. 2009. – 107
- Groundwater in Geologic Processes. Cambridge University Press. S.E. Ingebristen, W.E. Sanford. 1998. - 341 p.

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11. Трубенко О.М. Маєвський Б. Й., Куровець С.С., Омельченко В.Г. Геологія і нафтогазоносність морських надр: Підручник. – Івано-Франківськ: ІФНТУНГ, 2011, 232 с.
12. Эколого-гидрогеологический мониторинг территорий загрязнения геологической среды легкими нефтепродуктами / Н.С. Огняник, Н.К. Парамонова., А.Л. Брикс, Р.Б. Гаврилюк. Киев: LAT & K., 2013. 254 с.

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