MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

IVANO-FRANKIVSK NATIONAL TECHNICAL UNIVERSITY OF OIL AND GAS

Institute of Petroleum Engineering

APPROVED
Director of the Institute
of Petroleum Engineering
_____ Oleg VYTYAZ
«30» ____08____ 2024 year

SYLLABUS

TECHNOLOGY OF OIL FIELD DEVELOPMENT

Educational level	Bachelor
field of Study	18 Production and technologies
Specialty	185 Oil and Gas Engineering and Technologies
Educational program	Oil and Gas Production
Discipline status	Selective
Language of training	English

2024

Developer: A
Associate professor Department
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Lesia MOROZ

Approved at the meeting of the Department of Petroleum Production
Protocol on «_28_» August 2024 y. № 1

Head of the department
of petroleum production, Ph.D., associate professor **Liliia MATIISHYN**

Agreed:

Head of the Department
of Petroleum Production, Ph.D., associate professor **Liliia MATIISHYN**

Guarantor of the educational and
professional program
oil and gas production,
Speciality 185 – «Petroleum engineering
and technologies» **Lesia MOROZ**

1 GENERAL INFORMATION ABOUT THE DISCIPLINE

Aims and objectives disciplines	**The purpose of the discipline** is to acquire compensation for specialists in modern technologies of oil field development. Stabi-?ization and further development of the oil and gas industry and reduction of energy dependence on neighboring countries is one of the primary and urgent tasks to be solved in the oil and gas complex of Ukraine. One of the ways to do this is to study and improve existing technologies for the development of oil fields, which will ultimately lead to an increase in oil and gas production. The main objective of the discipline "Oil Field Development Technology" is to teach the theory and practice of analyzing the development of oil fields at a high professional level that would meet modern requirements for training.
Link to the discipline on the learning platform	https://nung.edu.ua/department/osvitnya-prohrama-vydobuvannya-nafty-i-hazu-riven-bakalavr
Prerequisites for studying the discipline (prere-?uisites)	Oil and gas geology, oil and gas reservoir physics, underground hydrogeomechanics, development and operation of oil fields
Post requisites	state examination
Learning outcomes	GC6. Analyze geological processes, basic patterns of formation and properties of rocks, including oil and gas deposits. PO7. To apply modern digital technologies and specialized software to solve engineering and management problems related to the implementation of basic oil and gas technologies for well drilling, production, transportation and storage of oil and gas. ELO8. Make effective decisions on professional issues in difficult-to-predict hazardous environments, taking into account goals, timelines, resource and legal constraints, environmental and ethical aspects. ELO11. Calculate the parameters of hydrogas-dynamic processes that accompany the movement of oil and gas and process fluids in the formation/well/field and main pipelines using the laws of therm-?dynamics, hydraulics and gas dynamics and modern methods of relevant calculations.
Competencies	SC2. Ability to characterize geological processes, patterns and properties of rocks, including oil and gas deposits. SC4. Ability to analyze the processes of oil and gas movement in the formation, wells and pipelines. SC6. Ability to perform operational calculations of technological parameters in oil and gas engineering. SC11. Ability to carry out technological and technical and economic assessment of the effectiveness of new oil and gas technologies and technical devices.
Final control, form	Exam, test, CP
List of social, "soft" skills (soft skills)	Sociability; logical thinking; positive thinking; self-discipline and self-control; desire to learn and constantly develop, complex problem solving, critical thinking forming their own opinions and making decisions, etc.

2 POLICY OF THE DISCIPLINE

1) attendance and behavior in the classroom

According to the Regulations on the Organization of the Educational Process at Ivano-Frankivsk National Technical University of Oil and Gas (https://salo.li/00e7FDf), attendance of all classroom lessons by higher education students according to the semester schedule is mandatory. Attendance and lateness do not have a direct impact on the system of points accrual, however, in case of systematic absences from classes and failure to perform the prescribed assessed activities (testing, practical work), the teacher reserves the right to report this case to the institute's directorate in writing.

During lectures, you are allowed to use cell phones, laptops and tablets to view presentation and text components of lecture materials. During practical classes, you are allowed to use phones and tablets to view presentation materials, as well as your own laptops to perform practical work and demonstrate the results of your work during the defense.

The applicant's activity in lectures and the ability to ask questions on the topic of the lecture to the teacher are welcomed.

In the case of a class using distance learning tools, access to the video conference is carried out exclusively from the corporate e-mail account in order to identify the student. If the defense of practical works is conducted using distance learning tools, the applicant is obliged to turn on the video connection during the defense of the work.

2) on compliance with the principles of academic

Students are obliged to strictly comply with the "Regulations on Academic Integrity of Employees and Students of Ivano-Frankivsk National Technical University of Oil and Gas" (dated 05.04.2022, Order No. 73). In particular, they are obliged to perform classroom assignments and tests independently, not to falsify their learning outcomes; avoid cheating, not to use prompts from other persons during the current knowledge control measures; to be correct in referring to information sources when borrowing information, statements and ideas.

3) on evaluation

Subject to completion of all practical work, passing two colloquia based on the results of the lecture course and confirmation of mastery at the minimum level of learning outcomes (at least 35 points on the ECTS scale per semester), a higher education applicant is admitted to semester control in the discipline. The form of semester control is an exam, a test, a CP.

Incentive points are awarded for the preparation of reviews of scientific papers, presentations on one of the topics of the discipline's SRS, completion of additional tasks, etc. The number of incentive points is not more than 10.

In case of using distance learning technologies, current and semester control is carried out in accordance with the "Regulations on the organization of current, semester control and certi-?ication of higher education students using distance technologies" of 22.10.2022 (Order No. 262).

4) on deadlines and retakes

The completed practical work must be defended/handed in at the beginning of the next practical class. For each week of delay in submitting the report on practical work, a penalty (-1) point is awarded, but in total no more than -2 for one practical work

The conditions for admission to the retake of module and final examinations, schedule and forms of retakes are regulated by the Regulations on the organization of the educational process at IFNTUOG, specified in paragraph 1) of this section.

5) on the recognition of learning outcomes in non-formal education

The results of non-formal learning can be recognized and re-credited as part of the assessed activities, REGULATIONS on the procedure for recognition of results obtained in non-formal and informal education at IFNTUOG (https://griml.com/Ew5zh) in case of presentation of a certificate of successful completion of the course (with the specified grade) and if the topics of the online course, training, course correspond to the educational elements of the discipline. Examples of courses whose elements can be recognized and counted as assessed activities:

https://griml.com/1WuPG
https://griml.com/MUxh4

6) to appeal the results of control measures

Higher education applicants have the right to appeal the grade in the discipline received during the control measures. The appeal is carried out in accordance with the Regulations on Appeals of Higher Education Applicants on Issues Related to the Educational Process, approved by the order of the Rector of the University No. 43 of 02/24/2020. The document is available at https://griml.com/L3VUV.

7) regarding conflict situations

Communication between the participants of the educational process (teachers, students) is based on partnership, mutual support, mutual respect, tolerance and respect for the personality of each person, and the goal of gaining true knowledge. Conflict resolution is carried out in accordance with the Regulations on conflict resolution at IFNTUOG, approved by the order of the Rector of the University No. 44 dated 24.02.2020. The document is available at https://griml.com/i42PI.

8) on the survey of

After completing the course, the applicant is given the opportunity to take a survey on the quality of teaching the discipline at https://nung.edu.ua/department/yakist-osviti/04-anketuvannya

9) on the policy of using generative artificial intelligence tools in the educational process

All participants in the educational process must adhere to the basic principles of using generative artificial intelligence tools in accordance with the Regulations on the general policy of using generative artificial intelligence tools in the educational process of IFNTUOG, approved by the order of the rector of the university dated 15.03.2024 No. 82. The document is available at https://salo.li/1E36Aae.

3 STRUCTURE OF THE DISCIPLINE "OIL FIELD DEVELOPMENT TECHNOLOGY"

3.1 Scope of the discipline

The resource of hours for studying the discipline "Technology of oil field development" according to the current EP, distribution by semesters and types of academic work for different forms of education is characterized in Table 1.

Table 1 - Distribution of hours allocated for the study of the discipline "Technology of oil field development"

Name of indicators	Total	Distribution by semester	
		Semester _7	Semester 8
Number of credits ESTS	9	4	5
Number of modules	4	2	2
Total amount of time, hours	270	120	150
Classroom classes, hours, including:	118	54	64
– lecture classes	68	36	32
– practical classes	50	18	32
– laboratory classes	-	-	-
Independent work, hours	152	66	86
Form of semester control	Exam, test, course project defense	Examination	Credit, defense of the course project

3.2 Thematic plan of lecture classes

The thematic plan of lecture classes of the discipline "Technology of oil field development" is characterized in Table 2.

Table 2 - Thematic plan of the lecture session

Code.	Names of modules (M), content modules (CM) and topics (T)	Volume hours	Literature
			Serial number
7th semester			
M1	**Oil field development systems and technology**	**12**	
ZM1	**Object, system and development technology**	**6**	
T 1.1	Object, system and development technology. Basic concepts and definitions. Oil recovery factor. Calculation of oil reserves by the volumetric method. Separation of production facilities into independent development objects.	2	1, 2
T 1.2	Main provisions and tasks of preparing oil fields for production.	2	1, 2
T 1.3	Rational development system. Choosing a rational development system	2	1, 2
ZM2	**Development indicators**	**6**	
T 2.1	Indicators of oil field development. Stages of development	2	3, 4
T 2.2	Modes of oil field development. Oil recovery in different modes	4	3, 4
M2	**Basic hydrodynamic calculations in different modes**	**24**	
ZM3	**Basic hydrodynamic calculations for elastic and dissolved gas conditions**	**10**	
T 3.1	The basic formula for the elastic regime. Estimation of pressure changes over time depending on the selection.	2	2, 3, 4
T 3.2	Discrepancy between theoretical and actual pressure changes over time. Superposition method. Dispersed oil extraction from a reservoir by wells. Dynamics of the main indicators of development in the elastic and water pressure regime.	2	2, 3, 4
T 3.3	Development of oil fields in the dissolved gas regime. Assumptions underlying the hydrodynamic theory of oil reservoir development in the dissolved gas regime. Deter-?ination of oil saturation at the end of the pressure change interval (Zinovieva's method).	4	2, 3, 4
T 3.4	Determination of production rates and bottomhole pressures in the dissolved gas regime. Determination of development time. Placement of wells on the reservoir in the dissolved gas regime. Oil recovery. Dynamics of the main development indicators.	2	2, 3, 4
T 3.5	Classification and characteristics of development systems. Signs of development systems. Placement of wells in the oil bearing area.	2	2, 3
ZM4	**Basic hydrodynamic calculations in the hard-pressure regime**	**14**	
T 4.1	Development of oil fields under hard pressure conditions. Selection of the basic scheme of development. Schematization of development conditions. Method of electrodynamic analogy for solving hydrodynamic problems.	4	2, 3, 4
T 4.2	Hydrodynamic calculations of production rates and bottomhole pressures, as well as development time when oil is displaced by water without taking into account phase permeability.	6	2, 3, 4

T 4.3	Determination of production rates and development time for oil deposits with two-sided pressure. Consideration of two-phase filtration flows when oil is displaced by water. Dynamics of the main development indicators in the hard pressure regime	4	2, 3, 4
8th semester			
M3	**Maintaining reservoir pressure by injecting water and gas into the reservoir**	**14**	
ZM5	**Maintaining reservoir pressure by replenishing water**	**12**	
T 5.1	Location of injection wells. Calculation of the water injection process.	6	2, 3, 4
T 5.2	Determining the amount of water to be stored. Determining the number of water injection wells.	4	2, 3, 4
T 5.3	Requirements for injected water. Equipment used for waterflooding of oil deposits	2	2, 3, 4
ZM6	**Maintaining reservoir pressure by replenishing gas**	**2**	
T 6.1	Advantages and disadvantages of maintaining reservoir pressure by gas replenishment	2	2, 3
M4	**Forecasting development indicators**	**18**	
ZM7	**Heterogeneity of productive formations**	**6**	
T 7.1	Consideration of heterogeneity of productive formations. Types and nature of heterogeneity distribution. Permeability spectrum. Laws of permeability distribution. Basic statistical chara-?teristics of permeability.	4	1, 2
T 7.2	Control and regulation of oil field development	4	1, 2
ZM8	**Forecasting. Methods of oil recovery enhancement**	**12**	
T 8.1	Forecasting the development of oil fields. Forecasting oil production using the results of previous development.	2	1, 2, 3
T 8.2	Forecasting oil and water production by displacement chara-?teristics.	4	1, 2, 3
T 8.3	Methods of enhanced oil recovery. The main reasons for incomplete oil recovery from the subsoil. Selection of the enhancement method. Methods of enhanced oil recovery, their classification and purpose.	2	1, 2, 3
T 8.4	Hydrodynamic, gas, physicochemical and thermal methods of enhanced oil recovery.	4	1, 2, 3

3.3 Topics of the workshops

The topics of practical classes in the discipline "Technology of oil field development" are shown in Table 3.

Table 3 - Topics of the workshops

Code.	Names of modules (M), content modules (CM) and topics (T)	Volume hours	Literature
			Serial number
7th semester			

M1	**Oil field development systems and technology**	**2**	
ZM1	**Object, system and development technology**	**2**	
П 1.1	Estimation of oil reserves by the volumetric method. Oil recovery factor. Properties of reservoir oil and water.	2	5, 6
M2	**Basic hydrodynamic calculations in different modes**	**16**	
ZM3	**Basic hydrodynamic calculations for elastic and dissolved gas conditions**	**10**	
П 3.1	The basic formula for the elastic regime. Determination of pressure at the wellbore and at a distance from the well. Estimation of pressure changes in time depending on the sampling. Superposition method in elastic mode problems	4	5, 6
П 3.2	Determination of oil saturation at the end of the pressure change interval in the dissolved gas mode	4	5, 6
П 3.3	Determination of production rates and bottomhole pressures in the dissolved gas mode. Determination of the development period. Determination of the oil recovery factor in the dissolved gas mode	2	5, 6
ZM4	**Basic hydrodynamic calculations in the hard-pressure regime**	**6**	
П 4.1	Hydrodynamic calculations of production rates and bottomhole pressures during oil displacement by water without taking into account phase permeabilities	2	5, 6
П 4.2	Consideration of two-phase filtration flows during oil displacement by water. Determination of oil saturation at the front of oil displacement by water. Determination of the coefficient for the increase in filtration resistance for a strip-shaped reservoir under a hard-pressure regime. Determination of development time for circular and striped oil reservoirs under hard pressure conditions	4	5, 6
8th semester			
M3	**Maintaining reservoir pressure by injecting water and gas into the reservoir**	**12**	
ZM5	**Maintaining reservoir pressure by replenishing water**	**8**	
П 5.1	Determining the amount of water to be stored. Determination of the compensation factor. Determination of the amount of water to be pumped into one well. Determination of the number of water injection wells by analytical and graphical methods	8	5, 6
ZM6	**Maintaining reservoir pressure by replenishing gas**	**4**	
П 6.1	Determination of the amount of gas required to be reinjected into the reservoir	4	5, 6
M 4	**Forecasting development indicators**	**20**	
ZM 7	**Heterogeneity of productive formations**	**10**	
П.7.1	Calculation and graphic work No. 1 on the topic: "Estab-?ishment of static characteristics, laws and distribution functions for the permeability distribution polygon"	4	5, 6
П 7.2	Calculation and graphic work No. 2: "Determination of oil recovery and water content in well products using VNII-1 methodology"	6	5, 6

ZM 8	**Forecasting. Methods of oil recovery enhancement**	**10**	
П 8.1	Forecasting oil production using the results of previous development	4	5, 6
П 8.2	Predicting oil and water production by displacement chara-?teristics	6	5, 6

3.4 Laboratory classes

Laboratory classes are not provided.

3.5 Tasks for independent work of the student

This includes studying lecture material, preparing for practical classes, and completing a course project.

The lectures cover all the lecture material, but emphasize the fundamental and basic issues, mathematical descriptions and methods for determining the relevant parameters. The applicant independently deepens knowledge of the issues covered in the lectures, consolidating them by solving practical problems.

The list of material to be studied independently is presented in Table 4.

The types of independent work within the discipline "Technology of oil field development" are shown in Table 4.

Table 4 - Content of independent work

Name of the types of independent work	Amount of hours	
	Semester _7	Semester 8
Study the material presented in the lectures	12	18
Working on the material submitted for independent study	12	18
Preparing for control measures	12	20
Preparation for laboratory work, reports of laboratory work protocols	-	-
Implementation of the course project (work)		30
Preparing for the exam	30	-
Total hours	66	86

The list of material to be studied independently is presented in Table 5.

Table 5– Material for independent study

Code.	**Names of modules (M), content modules (CM) and questions for independent study (T)**	**Volume hours**	**Literature**
			Serial number
7th semester			

M1	**Oil field development systems and technology**	**12**	
ZM1	**Object, system and development technology**	**6**	
T 1.1	Geological and physical characteristics of oil fields. Properties of reservoir oil and water.	4	2, 9,10
T 1.2	Main provisions and tasks of preparing oil fields for development	2	2, 9,10
ZM2	**Development indicators**	**6**	
T 2.1	Oil recovery factors in different modes	2	2, 9,10
T 2.2	Sources of reservoir energy	4	2, 9,10
8th semester			
M3	**Maintaining reservoir pressure by injecting water and gas into the reservoir**	**6**	
ZM5	**Maintaining reservoir pressure by injecting water into the reservoir**	**6**	
T 5.1	Area flooding system. Determination of flow rates and development time for different schemes for the area flooding system	4	2, 9,10
T 5.2	Requirements for stored water	2	2, 9,10
M4	**Forecasting development indicators**	**12**	
ZM7	**Heterogeneity of productive formations**	**6**	
T 7.3	Control and regulation of oil field development	6	2, 9,10
ZM8	**Forecasting. Methods of oil recovery enhancement**	**6**	
T 8.4	Hydrodynamic, gas, physicochemical and thermal methods of enhanced oil recovery	6	2, 9,10

3.6 Course design

A course project is a form of independent work of students, the purpose of which is to deepen theoretical knowledge and consolidate practical skills in the course "Oil Field Development Technology".

3.6.1 Purpose and objectives of the course project

The purpose of the course project on the technology of oil field development is as follows: a) to consolidate the lecture material and the results of the student's independent work; b) to deepen and generalize the student's knowledge; c) to develop the student's creative thinking; d) to acquire the student's skills of specific, independent and creative work on mathematical formu?-lation of problems, their solution, calculation, analysis of the results, interpretation in terms of improving the technological efficiency of the process under consideration or the use of the phenomenon under study; e) to

The main **objectives** of the course project are: to summarize data on the geological and physical characteristics of a particular field and establish its characteristic oil production features, to clarify the initial and residual oil reserves, parameters of the oil reservoir and contour zone, final oil recovery factors based on commercial data, to assess the efficiency of the existing field development system and justify possible directions for its further development, to forecast oil production for various design options, to select the optimal Within the course project, individual tasks are interrelated.

An important task of the course project is for students to conduct research while working on the project. Their results should be reflected in the general or special parts of the course proj?-ct.

3.6.2 The main stages of the course project

1. The assignment of coursework to full-time and part-time students is carried out at the beginning of the academic semester.

When issuing a course project assignment, the first thing a student must do is choose a course project topic.

The schedule for the main stages of the project is being clarified.

2. After determining the topic, the student should work on the sources of information. It is necessary to pay attention to the year of publication! First of all, it is advisable to familiarize yourself with the materials of scientific and theoretical and informational publications: monographs, materials of scientific conferences, textbooks, etc. When working on periodicals, first of all, you should review the journals for the last two or three years of the following publications: journals in the Scopus and Web of Science databases, The Society of Petroleum Engineers (SPE), Exploration and Development of Oil and Gas Fields, Scientific Bulletin of Ivano-Frankivsk National Technical University of Oil and Gas, Oil and Gas Energy, Journal of Hydrocarbon Power Engineering.

3. The final study of the final literature on the scientific problem should be the devel-?pment of the structural logic of the course project and the preparation of the plan. After that, the plan is approved by the supervisor.

4. During the course of the course project, all questions that students have about the project can be resolved with the course project leader at appropriate consultations. Students can find the schedule of consultations with the course project manager at the Department of Oil and Gas Production.

5. The text of the course project must meet the basic requirements of the scientific teaching style. The style of scientific speech is an impersonal monologue. The presentation is usually in the third person and focuses on the content and logical sequence, not the subject. It has become a written rule to use the preposition "we" instead of "I", to use the phrases "in our opinion", "we believe", "the author believes", "the author suggests".

The qualities that define the culture of presenting scientific or practical material are accuracy, clarity, precision, and brevity. You should avoid verbosity, unnecessary repetition, unnecessary detail, and avoid tautology.

6. Work on the course project must be completed no later than the deadline.

7. The total length of the course project should be 35-60 A4 pages.

3.6.3 Structure and content of the course project

The course project in the discipline "Technology of oil field development" consists of a calculation and explanatory note of up to 35-60 pages and two sheets of graphic material.

A calculation and explanatory note to a course project is a document that provides justi-?ication for the decisions made in the project. It includes:

1) title page;
2) assignments for a course project;
3) annotation;
4) content;

5) a list of basic notations, symbols, and units;
6) Introduction;
7) the main part, which is divided into separate sections and subsections;
8) Conclusions;
9) list of references;
10) applications;
11) bibliographic reference.

3.6.4 Indicative topics of the course project

The following approximate list of topics is recommended for course projects depending on the stage and phasing of field development:

1. Analysis of field (deposit) development and design of measures to intensify development and increase oil recovery.

The following measures are recommended:

a) introduction of focal flooding to cover undrained and stagnant areas;

b) design of hydraulic fracturing, including high-capacity fracturing, using modern imported equipment and automated selection of process parameters using a computer;

c) drilling one or two horizontal wells to extract oil reserves from hard-to-reach areas, etc.

2. Analyze the efficiency of reservoir pressure maintenance in reservoirs and design measures aimed at improving the state of field development.

3. Analysis of development and refinement of technological indicators of field devel-?pment in the modes of oil displacement by water and depletion.

4. Design of oil and liquid production and final oil recovery based on displacement characteristics.

4. EDUCATIONAL AND METHODOLOGICAL SUPPORT OF THE DISCIPLINE

4.1 Main literature

1. Boyko V.S. Designing the development of oil fields: Textbook. - Ivano-Frankivsk: Nova Zorya, 2012. - 580 p.
https://drive.google.com/drive/folders/1twWalAT63sywCbah6gVJBb6p4KZHJm2D?usp=drive_link

2. Boyko V.S. Technology of oil field development: Textbook. - Ivano-Frankivsk: Nova Zorya, 2011. - 509 p.
https://drive.google.com/drive/folders/1twWalAT63sywCbah6gVJBb6p4KZHJm2D?usp=drive_link

4.2 Further reading

3.Boyko V.S. Handbook on oil and gas business [Text] / V.S. Boyko, R.M. Kondrat, R.S. Yaremiychuk; Ivano-Frankivsk National Technical University of Oil and Gas. - Lviv, 1996. - 620 p.
https://drive.google.com/drive/folders/1twWalAT63sywCbah6gVJBb6p4KZHJm2D?usp=drive_link

4.O.I.Akulshin, O.O.Akulshin, V.S.Boyko, V.M.Doroshenko, Y.O.Zarubin Technology of Oil and Gas Production, Storage and Transportation: Study guide. – Ivano-Frankivsk: Fakel, 2003. – 434 c.
https://drive.google.com/drive/folders/1twWalAT63sywCbah6gVJBb6p4KZHJm2D?usp=drive_link

4.3 Literature and methodological support for practical classes

5. Volchenko D.O., Dragan I.M. Technology of oil field development: a workshop: Ivano-Frankivsk: IFNTUOG, 2017. 84 p.
https://drive.google.com/drive/folders/1twWalAT63sywCbah6gVJBb6p4KZHJm2D?usp=drive_link

6. Technology and design of oil field development. Collection of tasks / V. S. Boyko, D. O. Volchenko, I. M. Dragan - Ivano-Frankivsk, 2016. 84 p.
https://drive.google.com/drive/folders/1twWalAT63sywCbah6gVJBb6p4KZHJm2D?usp=drive_link

4.4 Literature and methodological support for course design

7.Moroz L.B., Ugrinovsky A.V., Matiishyn L.I. Engineering of oil field development: course design. - Ivano-Frankivsk: IFNTUOG, 2023. - 35 p.
https://drive.google.com/drive/folders/1twWalAT63sywCbah6gVJBb6p4KZHJm2D?usp=drive_link

8.Moroz L.B., Uhrynovskyi A.V., Matiyishyn L.I. Designing of oil field development: course design. - Ivano-Frankivsk: IFNTUOG, 2023. - 36 p.
https://drive.google.com/drive/folders/1twWalAT63sywCbah6gVJBb6p4KZHJm2D?usp=drive_link

4.5 Literature and methodological support for independent work

9.Orlovsky V.M., Biletsky V.S., Sirenko V.I. Oil and gas recovery from hard-to-reach and depleted formations. Kharkiv: A.M. Beketov Kharkiv National University of Municipal Economy, NTU "Kharkiv Polytechnic Institute", LLC STP "Burova Tekhnika", Lviv, Publishing House "Novyi Svit - 2000", 2023. 312 p.
https://drive.google.com/drive/folders/1twWalAT63sywCbah6gVJBb6p4KZHJm2D?usp=drive_link

10.Tarek Ahmed, Paul McKinney. Advanced Reservoir Engineering. 1st Edition - August 27, 2004. eBook ISBN: 9780080498836
https://shop.elsevier.com/books/advanced-reservoir-engineering/ahmed/978-0-7506-7733-2

5. FORMS AND METHODS OF TRAINING

Forms and methods of teaching and assessment within the discipline "Technology of oil field development" are shown in Table 6.

Table 6 - Provision of program learning outcomes by appropriate forms and methods

Code of the program learning outcome	Teaching methods (TM)	Forms and methods of evaluation (MFO)
PH6. **PH7.** **PH8.** **RN11.**	MN 1.1 - lecture MN 1.2 - narrative explanation MN 1.3 - conversation MN 2.1 - illustration MN 2.4 - multimedia methods MN 3.4 - practical work MH 18 - methods of independent work at home MN 19 - work under the guidance of a teacher MH 20.1 - method MN 20.7 - conversation-dialogue	MFO 1 - exam MFO 3 - differentiated credit MFI 4 - current control MFO 7 - practical control MFO 8 - test control

The codes of the program learning outcome are borrowed from the PLO, and their content is given in the first section of this program.

6 CONTROL METHODS AND SCORING SCHEME

Assessment of students' knowledge is based on the results of comprehensive controls for modules M1, M2 (7th semester) and M3, M4 (8th semester). Module control for each content module involves the control of theoretical knowledge and practical skills. The scheme of scoring in assessing students' knowledge of the discipline is shown in Table 7.

The following methods and forms of assessment will be used during the study of the discipline: current control (MFO 4), test control (MFO 8), practical control (MFO 7), form of final certification - exam, credit, CP.

Table 7 - Scoring scheme in the process of assessing students' knowledge of the discipline "Technology of oil field development"

Types of work to be controlled	Maximum number of points
7th semester	
Control of mastering theoretical knowledge of the content module M1-M2 * MFO 4, 8 (2*25)	50
Control of mastering the practical knowledge of the content module M1-M2 *MPHO 4, 8 (5+10+5+5+5+10)	50
Total assessment of current control (Po)	100
Exam grade (EE)	100
Final semester grade (Co)*.	*Co* = (*By* + *Io*) / 2.
8th semester	
Control of mastering theoretical knowledge of the content module M3-M4 * MFO 4, 8 (2*25)	50
Control of mastering the practical knowledge of the content module *MPHO 4, 8 (5+5+10+10+5+5)	50
Total assessment of current control (Po)	100

* - *for explanation see the Order of the Rector of IFNTUOG "On encryption of teaching methods, methods and forms of assessment" №150 dated 24.06.2021*

The final evaluation of the exam and test in the discipline is carried out in accordance with the requirements of the current Regulations "On the system of current and final control, knowledge assessment and determination of student rating"

Students can receive incentive points for preparing reviews of scientific papers, presentations on one of the topics of the discipline's SRS, completing additional tasks, etc. The total number of incentive points is not more than 10.

Total assessment of current control (TAC) - the sum of assessments of the current control of applicants, namely: the results of control measures, practical and other works provided for in the work program.

A course project is a separate type of individual assignment that is part of the independent work in the discipline, however, it has a separate grading system and a final grade that is not part of the final grade in the discipline and does not affect admission to the semester assessment in the discipline.

Subject to the completion of all types of work provided for in the curriculum and program and confirmation of mastery at the minimum level of learning outcomes (35 points on the ECTS scale), a higher education student is admitted to semester control in the discipline in the form of an exam.

Exam grade (EG) is the number of points on a stobal scale that an applicant received during the semester exam.

The final semester grade in the discipline (Co) is determined by the formula - Co = (Po + Io) / 2.

To determine the degree of mastery of the educational material and its subsequent evaluation, the levels of academic achievement of higher education students are used, as shown in Table 8.

Table 8 - Levels of academic achievement

Levels of academic achievement	Percentage of points for completing tasks	Criteria for assessing academic achievement	
		Theoretical training	Practical training
		Higher education applicant	
Excellent	*90...100*	fluent in educational material, expresses his/her opinions, draws reasoned conclusions, reviews the answers of other applicants, creatively performs individual and collective tasks; independently finds additional information and uses it to implement the tasks assigned to him/her; freely uses new information technologies to replenish his/her own knowledge	can reasonably choose a rational way to perform a task and evaluate the results of their own practical activities; performs tasks not provided for in the curriculum; freely uses knowledge to solve problems
Sufficient	75...89	fluent in the educational material, applies knowledge in practice; summarizes and systematizes educational information, but makes minor mistakes in comparisons, formulating conclusions, applying theoretical knowledge in practice	independently performs practical tasks provided by the program; has stable skills in performing the task
Satisfactory	60...74	superficially, fragmentarily, at the level of memorization reproduces a certain part of the educational material with elements of logical connections, knows the basic concepts of the educational material	has basic, unstable skills to perform the task
Not free	less than 60	has fragmentary knowledge (less than half) in an insignificant total amount of educational material; no formed skills and abilities; significant errors are made during the answer	plans and performs part of the task with the help of the teacher

Learning outcomes in the discipline are assessed on a 100-point scale (from 1 to 100) with conversion to a grade on the traditional scale ("excellent", "good", "satisfactory", "unsatisfactory" according to the scale given in Table 9).

Table 9 - Grading scale: national and ECTS

Sum of points for all types of learning activities	ECTS evaluation	Score on the national scale
		for the exam, differentiated test, course project (work), practice
90 - 100	**A**	excellent
82-89	**B**	well
75-81	**C**	
67-74	**D**	satisfactorily
60-66	**E**	
35-59	**FX**	unsatisfactory with the possibility of reassembly
0-34	**F**	unsatisfactory with mandatory re-study of the discipline

7 LEARNING TOOLS

In the conditions of full-time education, the teacher uses equipment for multimedia presentations: a multimedia projector, a projection screen, a laptop. There are no requirements for students to have equipment.

In the context of distance learning, you need a laptop, personal computer or mobile device (phone, tablet) with an Internet connection, a video camera and a microphone. Classes are held using the Google Meet and Google ClassRoom platforms.

The course project is written using the Microsoft software package, the MS Office application package (Excel, Word, PowerPoint).