

**Ministry of Education and Science of Ukraine  
Dnipro University of Technology**

**FACULTY OF GEOLOGICAL PROSPECTING  
OIL AND GAS ENGINEERING DEPARTMENT**

**“APPROVED”**

Head of Department

Koroviaka Ye \_\_\_\_\_

“ \_\_\_\_ ” \_\_\_\_\_ 2019

**WORK PROGRAM OF THE ACADEMIC DISCIPLINE**

***"Well Drilling (Oil & Gas)"***

Field of study.....	18 Production and Technology
Specialty.....	185 Oil and Gas Engineering and Technology
Academic degree.....	Bachelor
Academic program.....	Oil and Gas Engineering and Technology
Type of discipline.....	regulatory
Total workload.....	4.5 ECTS credits (135 hours)
Type of final assessment.....	exam
Period of study.....	5nd semester
Language of study.....	English

Lecturers: docent Khomenko VL.

Prolonged: for 20 \_\_ / 20\_\_ academic year \_\_\_\_\_ ( \_\_\_\_\_ ) " \_\_ " \_\_ 20\_\_.

(Signature, name, date)

for 20 \_\_ / 20\_\_ academic year \_\_\_\_\_ ( \_\_\_\_\_ ) " \_\_ " \_\_ 20\_\_.

(Signature, name, date)

Dnipro  
NTU “DP”  
2019

Work program of the academic discipline “Well Drilling (Oil & Gas)” for bachelor’s specialty 185 “Oil and Gas Engineering and Technology”/VL Khomenko / NTU “Dnipro Polytechnic” Oil and Gas Engineering Department. - DA: NTU «DP» 2019 - 13 p.

Authors:

Khomenko VL, assistant professor of Oil and Gas Engineering Department.

The work program regulates:

- key goals and objectives;
- the disciplinary learning outcomes generated through the transformation of the intended learning outcomes of the degree program;
- the content of the discipline formed according to the criterion “disciplinary learning outcomes”;
- the discipline program (thematic plan by different types of classes);
- distribution of the discipline workload by different types of classes;
- an algorithm for assessing the level of achievement of disciplinary learning outcomes (scales, tools, procedures and evaluation criteria);
- criteria and procedures for evaluating the academic achievements of applicants by discipline;
- the contents of the educational and methodological support of the discipline;

The work program is designed to implement a competency approach in planning an education process, delivery of the academic discipline, preparing students for control activities, controlling the implementation of educational activities, internal and external quality assurance in higher education, accreditation of degree programs within the specialty.

Approved by the decision of the Methodical Commission of specialty 185 “Oil and Gas Engineering and Technology” (protocol № 6 from 07.06.2019).

Recommended for publication by the editorial board of NTUDP (protocol № # from ##.##.20##).

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## 1 DISCIPLINE OBJECTIVES

In the educational and professional programs of the Dnipro University of Technology specialty 185 “Oil and gas engineering and technology”, the distribution of program learning outcomes (NRN) for the organizational forms of the educational process is done. In particular, the following learning outcomes are attributed to the discipline F14 "Well Drilling (Oil & Gas)":

CP9	To create elements of technological schemes and technical devices of oil and gas production, transportation and storage systems
CP11	Analyze the operating modes of the components of an oil and gas facility, make the optimum choice of technological equipment, optimize the operating mode by a certain criterion
BP1.1	To create drilling technologies for oil and gas wells
BP1.2	To build oil and gas wells
BP1.7	Provide regulatory and technical support for oil and gas well construction processes
BP1.8	Organize work on the construction of oil and gas wells in terms of ensuring high levels of productivity, safety and minimum costs
BP1.11	To monitor the organizational activity, efficiency, perfection and prospects of construction of oil and gas wells

**The objective of discipline** - formation of competencies for oil and gas drilling.

The implementation of the objective requires transforming program learning outcomes into the disciplinary ones as well as an adequate selection of the contents of the discipline according to this criterion.

## 2 INTENDED DISCIPLINARY LEARNING OUTCOMES

Code NRN	Disciplinary learning outcomes (DRN)	
	DRN code	content
CP9	CP9-F14	Select the sequence of operations for the exploration and exploitation of oil and gas fields Select wellhead equipment
CP11	CP11-F14	Analyze the operating modes of the components of an oil and gas facility, make the optimum choice of technological equipment, optimize the operating mode by a certain criterion To choose a rig for specific drilling conditions for oil and gas wells
BP1.1	BP1.1-F14	Choose a drilling method and develop a drilling mode Choose a drilling and drilling tool for drilling oil and gas wells
BP1.2	BP1.2-F14	Design the well design for specific drilling conditions
BP1.7	BP1.7-F14	Know the procedure for keeping records of well drilling
BP1.8	BP1.8-F14	Analyze the effect of drilling on the efficiency of oil and gas wells
BP1.11	BP1.11-F14	Analyze oil and gas well activities

### 3 BASIC DISCIPLINES

Subjects	The acquired learning outcomes
F1 Introduction to the specialty	Demonstrate the ability to think abstractly, to perform analysis in the development of technological and calculation schemes of elements of technical systems of production, drilling, transportation and storage of oil and gas. Demonstrate knowledge of the current state and a deep understanding of the role of the oil and gas industry, professional activity in ensuring energy security of Ukraine. Demonstrate skills in the use of information and communication technologies to solve a specific engineering problem related to the implementation of basic oil and gas technologies for the extraction, drilling, transportation and storage of oil and gas. Explain the general structure, interconnection and functional purpose of individual elements of Ukraine's hydrocarbon energy supply system
F2 Fundamentals of oil and gas business	Demonstrate the ability to think abstractly, to perform analysis in the development of technological and calculation schemes of elements of technical systems of production, drilling, transportation and storage of oil and gas. Demonstrate knowledge of the current state and a deep understanding of the role of the oil and gas industry, professional activity in ensuring energy security of Ukraine. Explain the general structure, interconnection and functional purpose of individual elements of Ukraine's hydrocarbon energy supply system
F10 Drilling of wells	Perform calculation and analysis of major technical and economic indicators of well drilling To know the method of designing the construction of wells according to the conditions of the geological section Know the requirements of drilling technology using basic methods Determine the optimum design of the drill string Determine effective types of rock destroying tool, taking into account mechanical properties of rocks

### 4 WORKLOAD DISTRIBUTION BY THE FORM OF EDUCATIONAL PROCESS ORGANIZATION AND TYPES OF CLASSES

Type of classes	Workload hours	Distribution by forms of education, <i>hours</i>					
		Full-time		Part-time		Distance	
		Classes (C)	Individual work (IW)	Classes (C)	Individual work (IW)	Classes (C)	Individual work (IW)
lecture	90	34	56	20	80	10	100
practical	45	17	28	10	40	6	48
TOGETHER	135	51	84	30	120	16	148

## 5 DISCIPLINE PROGRAM BY TYPES OF CLASSES

Ciphers DRN	Types and topics of training sessions	The volume of components, <i>hours</i>
	<b>LECTURES</b>	<b>90</b>
CP11-F14	1 General information on oil and gas well drilling	11
BP1.2-F14	2 Oil and gas well design	11
CP11-F14	3 Oil and gas well drilling rigs	11
CP9-F14	4 Destruction tool	11
CP9-F14	5. Drill string	11
CP11-F14	6 Drilling methods	13
BP1.1-F14 BP1.2-F14	7 Drilling mode	11
BP1.7-F14 BP1.8-F14 BP1.11-F14	8 Wellhead Equipment. Well drilling documentation	11
	<b>PRACTICAL TRAINING</b>	<b>45</b>
BP1.2-F14	1 Well design	6
CP11-F14	2. Choosing the type of drilling rig	6
CP9-F14	3. Three-bits chisels	6
CP9-F14	4. Design of the drill string layout	6
CP11-F14	5. Calculation of well washing	9
BP1.1-F14	6. Design of drilling mode parameters	6
BP1.2-F14	7. Equipment of the mouth of the well	6
	<b>TOGETHER</b>	<b>135</b>
	<b>LECTURES</b>	<b>90</b>
	<b>Well drilling technology project</b>	<b>15</b>
<b>CP9-F14</b> <b>BP1.1-F14</b> <b>BP1.2-F14</b>	1. Geological and technical conditions of drilling.	15
	2. Selection and justification of the well design.	
	3. The method of drilling.	
	4. Choosing a rocking tool.	
	5. Drill string.	
	6. Choice of drilling mode.	
	7. Well washing.	
	8. Choice of drilling rig, rope hoist and hoist system.	
	<b>TOGETHER</b>	<b>15</b>

## 6 REQUIREMENTS FOR THE COURSE PROJECT

Course project - an individual task, the implementation of which in accordance with the educational program relates to the design and design competencies of the specialist. This type of educational work may include elements of the terms of reference, sketches and technical projects, development of working, operational, repair documentation, design justification for technical solutions, etc. The course project is governed by the relevant standards.

Course projects (works) are carried out in order to consolidate, deepen and summarize the knowledge acquired by students during their studies, their application for the complex solution of a specific professional problem. This form of educational

work is used in the final stage of studying the discipline. Course projects (works) contribute to the acquisition of experience of practical use of theoretical knowledge for independent solving of specific tasks.

The topic of course projects (works) is developed by the department, and the task for students is the teacher who is in charge of this type of activity.

The student is given the right to propose for the consideration of the department his own topic of the course project (work), for example, on the materials of industrial practice, to choose a task that has a specific practical meaning, ie to execute a real course project (work).

In order to develop analytical skills, it is advisable to give the student the opportunity to formalize the raw data independently, to choose the decision-making methods with the obligatory justification of assumptions, to evaluate their results. Under any circumstances, the task should be formulated in such a way that the student has the need to analyze, compare, evaluate options for decisions, to systematize the material, to summarize it, to draw conclusions.

Specification of requirements for drawings, software, structure and content of the explanatory note is concentrated in the methodological recommendations for students to complete course projects (works).

Responsibility for organizing the course project (work) lies with the department, which is obliged to create appropriate conditions for consultations, methodological and information support.

The course project (work) is performed by the student independently under the guidance of the teacher.

## 7 KNOWLEDGE PROGRESS TESTING

Certification of student achievement is accomplished through transparent procedures based on objective criteria in accordance with the University Regulations “On Evaluation of Higher Education Applicants' Learning Outcomes”.

The level of competencies achieved in relation to the expectations, identified during the control activities, reflects the real result of the student's study of the discipline.

### 7.1 GRADING SCALES

Assessment of academic achievement of students of the Dnipro University of Technology is carried out based on a rating (100-point) and institutional grading scales. The latter is necessary (in the official absence of a national scale) to convert (transfer) grades for mobile students.

*The scales of assessment of learning outcomes of the NTUDP students*

<b>Rating</b>	<b>Institutional</b>
90 ... 100	Excellent
74 ... 89	Good
60 ... 73	Satisfactory
0 ... 59	Failed

Discipline credits are scored if the student has a final grade of at least 60 points. A lower grade is considered to be an academic debt that is subject to liquidation in accordance with the Regulations on the Organization of the Educational Process of NTUDP.

## 7.2 DIAGNOSTIC TOOLS AND EVALUATION PROCEDURES

The content of diagnostic tools is aimed at controlling the level of knowledge, skills, communication, autonomy, and responsibility of the student according to the requirements of the National Qualifications Framework (NQF) up to the 7th qualification level during the demonstration of the learning outcomes regulated by the work program.

During the control activities, the student should perform tasks focused solely on the demonstration of disciplinary learning outcomes (Section 2).

Diagnostic tools provided to students at the control activities in the form of tasks for the intermediate and final knowledge progress testing are formed by specifying the initial data and a way of demonstrating disciplinary learning outcomes.

Diagnostic tools (control tasks) for the intermediate and final knowledge progress testing are approved by the appropriate department.

Type of diagnostic tools and procedures for evaluating the intermediate and final knowledge progress testing are given below.

### *Diagnostic and assessment procedures*

INTERMEDIATE CONTROL			FINAL ASSESSMENT	
training sessions	diagnostic tools	procedures	diagnostic tools	procedures
lectures	control tasks for each topic	task during lectures	comprehensive reference work (CCW)	determining the average results of intermediate controls;
practical	control tasks for each topic	tasks during practical classes		CCW performance during the examination at the request of the student
	or individual task	tasks during independent work		

During the intermediate control, the lectures are evaluated by determining the quality of the performance of the control specific tasks. Practical classes are assessed by the quality of the control or individual task.

If the content of a particular type of teaching activity is subordinated to several descriptors, then the integral value of the assessment may be determined by the weighting coefficients set by the lecturer.

Provided that the level of results of the intermediate controls of all types of training at least 60 points, the final control can be carried out without the student's immediate participation by determining the weighted average value of the obtained grades.



Regardless of the results of the intermediate control, every student during the final knowledge progress testing has the right to perform the CDF, which contains tasks covering key disciplinary learning outcomes.

The number of specific tasks of the CDF should be consistent with the allotted time for completion. The number of CDF options should ensure that the task is individualized.

The value of the mark for the implementation of the CDF is determined by the average evaluation of the components (specific tasks) and is final.

The integral value of the CDF performance assessment can be determined by taking into account the weighting factors established by the department for each NLC descriptor.

### 7.3 EVALUATION CRITERIA

The actual student learning outcomes are identified and measured against what is expected during the control activities using criteria that describe the student's actions to demonstrate the achievement of the learning outcomes.

To evaluate the performance of the control tasks during the intermediate control of lectures and practicals the assimilation factor is used as a criterion, which automatically adapts the indicator to the rating scale:

$$O_i = 100 a / m,$$

where a - number of correct answers or significant operations performed according to the solution standard; m - the total number of questions or substantial operations of the standard.

Individual tasks and complex control works are expertly evaluated using criteria that characterize the ratio of competency requirements and evaluation indicators to a rating scale.

The content of the criteria is based on the competencies identified by the NLC for the Bachelor's level of higher education (given below).

#### **General criteria for achieving learning outcomes 7th qualification for LDCs (BA)**

**Integral competence** is the ability to solve complex problems and specialized practical problems in a particular area of professional activities or in a learning process that involves the use of certain theories and methods of the relevant scientific areas and characterized by complexity and conditions uncertainty.

descriptors NLC	Requirements for knowledge, communication, autonomy and responsibility	Indicator evaluation
<b>Knowledge</b>		
♦ Conceptual knowledge acquired during the training and professional activities, including some	- A great - proper, reasonable, sensible. Measures the presence of: - conceptual knowledge; - a high degree of state ownership issues; - critical understanding of the main theories, principles, methods and concepts in education and careers	95-100

<b>descriptors NLC</b>	<b>Requirements for knowledge, communication, autonomy and responsibility</b>	<b>Indicator evaluation</b>
knowledge of modern achievements; ♦ critical understanding of the main theories, principles, methods, and concepts in education and careers	A non-gross contains mistakes or errors	90-94
	The answer is correct but has some inaccuracies	85-89
	A correct some inaccuracies but has also proved insufficient	80-84
	The answer is correct but has some inaccuracies, not reasonable and meaningful	74-79
	A fragmentary	70-73
	A student shows a fuzzy idea of the object of study	65-69
	Knowledge minimally satisfactory	60-64
	Knowledge unsatisfactory	<60
<b>Ability</b>		
♦ solving complex problems and unforeseen problems in specialized areas of professional and/or training, which involves the collection and interpretation of information (data), choice of methods and tools, the use of innovative approaches	- The answer describes the ability to: - identify the problem; - formulate hypotheses; - solve problems; - choose adequate methods and tools; - collect and interpret logical and understandable information; - use innovative approaches to solving the problem	95-100
	The answer describes the ability to apply knowledge in practice with no blunders	90-94
	The answer describes the ability to apply knowledge in practice but has some errors in the implementation of a requirement	85-89
	The answer describes the ability to apply knowledge in practice but has some errors in the implementation of the two requirements	80-84
	The answer describes the ability to apply knowledge in practice but has some errors in the implementation of the three requirements	74-79
	The answer describes the ability to apply knowledge in practice but has some errors in the implementation of the four requirements	70-73
	The answer describes the ability to apply knowledge in practice while performing tasks on the model	65-69
	A characterizes the ability to apply knowledge in performing tasks on the model, but with uncertainties	60-64
	The level of skills is poor	<60
<b>Communication</b>		
♦ report to specialists and non-specialists of information, ideas, problems, solutions and their experience in the field of professional activity; ♦ the ability to form an effective communication strategy	- Fluent problematic area. Clarity response (report). Language - correct; - - net; - - clear; - - accurate; - - logic; - - expressive; - - concise. Communication strategy: coherent and consistent development of thought; availability of own logical reasoning;	95-100

descriptors NLC	<b>Requirements for knowledge, communication, autonomy and responsibility</b>	<b>Indicator evaluation</b>
	relevant arguments and its compliance with the provisions defended; the correct structure of the response (report); correct answers to questions; appropriate equipment to answer questions; the ability to draw conclusions and formulate proposals	
	Adequate ownership industry issues with minor faults. Sufficient clarity response (report) with minor faults. Appropriate communication strategy with minor faults	90-94
	Good knowledge of the problems of the industry. Good clarity response (report) and relevant communication strategy (total three requirements are not implemented)	85-89
	Good knowledge of the problems of the industry. Good clarity response (report) and relevant communication strategy (a total of four requirements is not implemented)	80-84
	Good knowledge of the problems of the industry. Good clarity response (report) and relevant communication strategy (total not implemented the five requirements)	74-79
	Satisfactory ownership issues of the industry. Satisfactory clarity response (report) and relevant communication strategy (a total of seven requirements not implemented)	70-73
	Partial ownership issues of the industry. Satisfactory clarity response (report) and communication strategy of faults (total not implemented nine requirements)	65-69
	The fragmented ownership issues of the industry. Satisfactory clarity response (report) and communication strategy of faults (total not implemented 10 requirements)	60-64
	The level of poor communication	<60
<b>Autonomy and responsibility</b>		
<ul style="list-style-type: none"> <li>◆ management actions or complex projects, responsible for decision-making in unpredictable conditions;</li> <li>◆ responsible for the professional development of individuals and/or groups</li> <li>◆ the ability to continue study with a high degree of autonomy</li> </ul>	<ul style="list-style-type: none"> <li>- Excellent individual ownership management competencies focused on:</li> <li>1) management of complex projects, providing:               <ul style="list-style-type: none"> <li>- exploratory learning activities marked the ability to independently evaluate various life situations, events, facts, detect and defend a personal position;</li> <li>- the ability to work in a team;</li> <li>- control of their own actions;</li> </ul> </li> <li>2) responsibility for decision-making in unpredictable conditions, including:               <ul style="list-style-type: none"> <li>- justify their decisions the provisions of the regulatory framework of sectoral and national levels;</li> <li>- independence while performing tasks;</li> <li>- lead in discussing problems;</li> <li>- responsibility for the relationship;</li> </ul> </li> <li>3) responsible for the professional development of individuals and/or groups that includes:               <ul style="list-style-type: none"> <li>- use of vocational-oriented skills;</li> <li>- the use of evidence from independent and correct reasoning;</li> <li>- possession of all kinds of learning activities;</li> </ul> </li> </ul>	95-100

descriptors NLC	Requirements for knowledge, communication, autonomy and responsibility	Indicator evaluation
	4) the ability to further study with a high degree of autonomy, which provides: - degree possession of fundamental knowledge; - independent evaluation judgments; - high level of formation of general educational skills; - search and analysis of information resources	
	Confident personality possession competency management (not implemented two requirements)	90-94
	Good knowledge management competencies personality (not implemented three requirements)	85-89
	Good knowledge management competencies personality (not implemented the four requirements)	80-84
	Good knowledge management competencies personality (not implemented six requirements)	74-79
	Satisfactory ownership of individual competence management (not implemented seven requirements)	70-73
	Satisfactory ownership of individual competence management (not implemented eight claims)	65-69
	The level of autonomy and responsibility fragmented	60-64
	The level of autonomy and responsibility poor	<60

## 8 TOOLS, EQUIPMENT, AND SOFTWARE

Technical training tools via multimedia software.  
Distance learning platform Moodle.

## 9 RECOMMENDED BIBLIOGRAPHY

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Educational edition

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