Ministry of Education and Science of Ukraine
Dnipro University of Technology

FACULTY OF GEOLOGICAL PROSPECTING

DEPARTMENT OF OIL AND GAS ENGINEERING AND DRILLING

"APPROVED"
Head of Department
Davidenko A._____
"____" _____ 2018

WORK PROGRAM OF THE ACADEMIC DISCIPLINE
"Drilling in Geological Engineering"

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.……..	3 ECTS credits (90 hours)
Type of final assessment.....	Exam
Period of study.....	5nd semester
Language of study.....	English

Lecturers: prof. Sudakov A.

Prolonged: for 20 __ / 20__ academic year _____ (_____) "__" ___ 20__.
(Signature, name, date)

for 20 __ / 20__ academic year _____ (_____) "__" ___ 20__.
(Signature, name, date)

Dnipro
NTU "DP"
2018

Work program of the academic discipline “Drilling in geological engineering” for bachelor’s specialty 185 “Oil and Gas Engineering and Technology”/Sudakov A./ NTU “Dnipro Polytechnic” Department of oil and gas engineering and drilling. - DA: NTU «DP» 2018 - 12 p.

Authors:

Sudakov A., professor of department of oil and gas engineering and drilling

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 № 4 from 27.06.2018).

Recommended for publication by the editorial board of NTUDP (protocol № ___ from ___.____.2018).

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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 " Drilling in geological engineering":

SC 1.3	Ability to calculate optimal drilling modes for oil and gas wells
SC 1.4	Ability to use in practice methods of diagnostics of the level of efficiency of the equipment for drilling of oil and gas wells
SC 1.5	Ability to ensure the safety of drilling operations in accordance with the operating rules
SC 1.6	Ability to evaluate and restore the quality of the process of construction of oil and gas wells

The objective of discipline - formation of theoretical knowledge and practical skills to determine the technology of drilling engineering-geological wells

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
SC1.3	SC1.3-F1.5-1	determination of engineering-geological, physical and mechanical properties of rocks by the results of laboratory and production tests of rock samples
	SC1.3-F1.5-2	to analyze geological and technical conditions of drilling of engineering-geological wells, to calculate parameters of drilling technology
	SC1.3-F1.5-3	analyze geological and technical conditions and choose drilling technology, select the composition of the drilling projector for specific drilling conditions
SC1.4	SC1.4-F1.5	to determine the effective types of rock destroying tool taking into account the mechanical properties of rocks
SC1.5	SC1.5-F1.5	to meet the requirements of well technology
SC1.6	SC1.6-F1.5	to calculate rational technological modes of drilling

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

Subjects	The acquired learning outcomes
	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**, *hours*					
		Full-time		**Part-time**		**Distance**	
		Classes (C)	Individual work (IW)	Classes (C)	Individual work (IW)	Classes (C)	Individual work (IW)
lecture	80	26	54	14	66	6	74
practical	40	13	27	6	34	4	36
laboratory	-	-	-	-	-	-	-
workshops	-	-	-	-	-	-	-
TOGETHER	120	39	81	20	100	10	110

5 DISCIPLINE PROGRAM BY TYPES OF CLASSES

Ciphers DRN	**Types and topics of training sessions**	**The volume of components,** *hours*
	LECTURES	**60**
SC1.3-F1.5-1 SC1.3-F1.5-2 SC1.3-F1.5-3 SC1.4-F1.5	1. Foreword. Engineering-geological classifications of rocks.	5
	General information about soils, physical and mechanical properties	
	Technical reclamation of rocks	
SC1.5-F1.5 SC1.3-F1.5-1 SC1.3-F1.5-2 SC1.3-F1.5-3 SC1.4-F1.5	2. Geological engineering studies	5
	Engineering-geological wells and their feature.	
	Typical designs	
	3. Column drilling of geological engineering wells	5
	4. Slow-rotary drilling of engineering-geological wells.	5
	5. Screw drilling of engineering-geological wells.	5
	6. Impact drilling	5
	7. Vibration drilling. Vibration-rotary drilling	5
	8. Drilling of sandy-gravel and boulder-pebble soils	5
	9. Drilling by submersible pneumatic punches. Drilling technology	5
	10. Technologies for immersing and removing casing pipes	5
	11. Drilling of engineering-geological wells in the waters	5
	12. Drilling machines and installations	5
	PRACTICAL TRAINING	**30**
SC1.3-F1.5-1 SC1.3-F1.5-2	1. The study of the classification of rocks on the drill for different methods of drilling. Engineering-geological classification of soils	6
SC1.3-F1.5-3 SC1.4-F1.5	2. Experimental field engineering-geological works to determine the deformation and strength characteristics of rocks.	6
SC1.5-F1.5 SC1.3-F1.5-1 SC1.3-F1.5-2 SC1.3-F1.5-3 SC1.4-F1.5	3. Machine tools and installations for drilling of shallow wells. Studying of machines and installations for drilling of reconnaissance wells with depth from 5 to 30 m. Studying of machines and installations for drilling of exploration wells more than 30m deep.	6
	4. Study of soil structures	6
	5. Calculations of technological parameters of drilling of engineering-geological wells.	6
	TOGETHER	**90**

6 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.

6.1 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

Rating	Institutional
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.

6.2 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; CCW performance during the examination at the request of the student
practical	control tasks for each topic	tasks during practical classes		
	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.

6.3 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
Knowledge		
♦ Conceptual knowledge acquired during the training and professional activities, including some knowledge of modern achievements; ♦ critical understanding of the main theories, principles, methods, and concepts in education and careers	- 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
	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
Ability		
♦ 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

descriptors NLC	Requirements for knowledge, communication, autonomy and responsibility	Indicator evaluation
	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
Communication		
♦ 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; 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	95-100
	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	60-64

descriptors NLC	Requirements for knowledge, communication, autonomy and responsibility	Indicator evaluation
	strategy of faults (total not implemented 10 requirements)	
	The level of poor communication	<60
Autonomy and responsibility		
♦ management actions or complex projects, responsible for decision-making in unpredictable conditions; ♦ responsible for the professional development of individuals and/or groups ♦ the ability to continue study with a high degree of autonomy	- Excellent individual ownership management competencies focused on: 1) management of complex projects, providing: - exploratory learning activities marked the ability to independently evaluate various life situations, events, facts, detect and defend a personal position; - the ability to work in a team; - control of their own actions; 2) responsibility for decision-making in unpredictable conditions, including: - justify their decisions the provisions of the regulatory framework of sectoral and national levels; - independence while performing tasks; - lead in discussing problems; - responsibility for the relationship; 3) responsible for the professional development of individuals and/or groups that includes: - use of vocational-oriented skills; - the use of evidence from independent and correct reasoning; - possession of all kinds of learning activities; 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	95-100
	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

7 TOOLS, EQUIPMENT, AND SOFTWARE

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

8 RECOMMENDED BIBLIOGRAPHY

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