

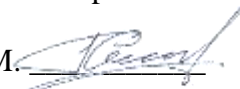
Ministry of Education and Science of Ukraine
Dnipro University of Technology

Department of Construction, Geotechnics and Geomechanics

"APPROVED"

Head of Department

Hapieiev S.M.



"09" July 2018

WORK PROGRAM OF THE ACADEMIC DISCIPLINE
"Soil Mechanics, Bases and Foundations"

Field of study.....	19 Architecture and Construction
Specialty.....	192 Building and Civil Engineering
Academic degree.....	Bachelor
Educational program.....	Building and Civil Engineering
Type of discipline.....	Basic
Total workload.....	13 credits ECTS (390 hours)
Type of final assessment.....	exam
Period of study.....	5-th semester
Language of study.....	English

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

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

Dnipro
DUT
2018

Work program of the academic discipline «**Soil Mechanics, Bases and Foundations**» for Bachelor's program 192 Building and Civil Engineering / Dnipro University of Technology, Department of CGG – D. : DUT, 2018. – 14 p.

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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;
- basic disciplines;
- scope and distribution of the discipline workload by different types of classes;
- the discipline program (thematic plan by different types of classes);
- an algorithm for assessing the level of achievement of disciplinary learning outcomes (scales, tools, procedures and evaluation criteria);
- tools, equipment and software;
- recommended sources of information.

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 192 Building and Civil Engineering (record №4 by 06.07.2018).

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1. DISCIPLINE GOAL

In the educational and professional programs of the Dnipro University of Technology specialty 192 Building and Civil Engineering, the distribution of program learning outcomes (PLO) for the organizational forms of the educational process is done. In particular, the following learning outcomes are attributed to the discipline M12 “Soil Mechanics, Bases and Foundations”:

PH07	Use and develop technical documentation, including the use of modern information technology.
PH11	Determine and evaluate the load and stress-strain state of soil foundations and load-bearing structures of buildings, including with the use of modern information technology.
PH12	To develop constructive solutions of the object of construction on the basis of knowledge of the nomenclature and constructive forms, ability to calculate and create building constructions and knots of their connection.
PH14	Adhere to modern requirements of regulatory documents in the construction industry.

The goal of the discipline - to form students' knowledge in soil properties and methods of calculating deformations of bases.

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. EXPECTED DISCIPLINARY LEARNING OUTCOMES

PLO code	Disciplinary learning outcomes (DLO)	
	DLO code	Content
PH07	PH07 - 1	To be able to use modern regulations (DBN, DSTU, etc.)
	PH07 - 2	To be able to compile reports on data from tests of soil properties and build geological sections
	PH07 - 3	Have the skills to develop drawings of the work project of bases and foundations (including the generation of drawings using a computer).
PH11	PH11-1	Determine and evaluate the load and stress-strain state of soil foundations and load-bearing structures of buildings using analytical and graphical-analytical methods.
	PH11-2	Determine and evaluate the load and stress-strain state of soil foundations and load-bearing structures of buildings using modern software packages.
PH12	PH12 - 1	Be able to perform calculations and construction of shallow foundations, taking into account the design pressure on the foundation, its bearing capacity, the possibility of pushing the foundation, its cracking and subsidence in different soil conditions during new construction and reconstruction.
	PH12 - 2	Have the skills to determine the load-bearing properties of piles and sediments of pile foundations, as well as their design and engineering in different soil conditions in new construction and reconstruction.

	PH12 - 3	Have the skills to calculate and design pits, retaining structures, foundations of deep foundation and soil structures in different soil conditions in new construction and reconstruction.
PH14	PH14-1	Have the skills to work with Ukrainian Regulations (DBN, DSTU, VBN, etc.)
	PH14-2	Have the skills to work with European Regulations, in particular with Eurocode 7.

3. BASIC DISCIPLINES

Subjects	The acquired learning outcomes
M3 Construction material science	Demonstrate the ability to effectively apply modern building materials, products and structures based on knowledge of their technical characteristics and manufacturing technology.
M1 Architecture of Buildings and Structures	To develop constructive decisions of the object of construction on the basis of knowledge of the nomenclature and constructive forms, ability to calculate and construct building constructions and knots of their connection. Adhere to modern requirements of regulatory documentation in the field of construction.
M2 Structural Mechanics	Apply the basic theories, methods and principles of mathematical and natural sciences in the field of professional activity.

4. SCOPE AND 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	78	26	52	12	66	6	72
practical	156	52	104	28	128	14	142
laboratory	156	52	104	28	128	14	142
seminars	-	-	-	-	-	-	-
TOTAL	390	130	260	68	322	34	356

5. DISCIPLINE PROGRAM BY TYPES OF CLASSES

PLO code	Types and topics of training sessions	Volume of components, hours
	LECTIONS	78
PH7-1, PH7-2, PH7-3,	Introduction. Course structure. Calculation schemes, mechanical models and physical properties of soils. The concept of the laws of porosity.	6

PLO code	Types and topics of training sessions	Volume of components, hours
PH14-1 PH14-2		
PH11-1, PH11-2	Regularities of stress distribution in soil bases.	9
PH12-1, PH12-2, PH14-1	Calculation of subsidence of foundations.	9
PH7-1, PH7-2, PH7-3, PH14-1	Soil strength. Soil pressure on retaining walls. Stability of soil slopes.	9
PH12-1, PH14-1	Calculation and design of foundations on a natural basis.	9
PH12-2, PH14-1	Design of pile foundations and deep foundations.	9
PH12-3	Artificial bases.	9
PH12-1, PH12-2, PH12-3, PH14-1	Foundations of buildings and structures in special engineering and geological conditions.	9
PH12-1, PH12-2, PH12-3, PH14-1	Reconstruction and strengthening of bases and foundations. Construction in tight conditions.	9
	PRACTICAL	156
PH7-1, PH7-2, PH7-3, PH14-1	Physico-mechanical characteristics of soils. Calculation formulas of physical characteristics of soils, which are most often used in practice. Solving relevant practical problems.	22
PH11-1, PH11-2	The strength of soils in a complex stress state. Construction of soil compression graphs. Regularities of stress distribution in soil bases. Solving relevant practical problems.	24
PH12-1, PH12-2, PH14-1	Calculation of subsidence of foundations. Construction of soil consolidation schedules. Calculation of subsidence of foundations by the method of layer-by-layer assembly. Calculation of subsidence of foundations.	22
PH7-1, PH7-2, PH7-3, PH14-1	Calculation of strength, stability and bearing properties of soil foundations of slopes and slopes.	22

PLO code	Types and topics of training sessions	Volume of components, hours
PH7-1, PH7-2, PH7-3, PH14-1	Determination of soil pressure on enclosing structures.	22
PH12-1, PH14-1	Calculation and design of shallow foundations on a natural basis.	22
PH12-2, PH14-1	Calculation and design of deep foundations on a natural basis.	22
LABORATORY		156
PH7-1, PH11-1, PH12-1	Modern rapid methods for determining the physical and mechanical characteristics of soils. Laboratory work № 1. Limit resistance of soil to shear. Condition of soil strength (Coulon's law).	40
PH7-1, PH11-1, PH12-1	Modern rapid methods for determining the physical and mechanical characteristics of soils. Laboratory work № 2. Current quality control of soil compaction of the ground and additional layers of the foundations of roads, airfields and other earthworks.	40
PH7-1, PH11-1, PH12-1	Experimental determination of physical characteristics of soil.	20
PH7-1, PH11-1, PH12-1	Experimental determination of soil deformation characteristics.	20
PH7-1, PH11-1, PH12-1	Experimental determination of filtration characteristics of soil.	18
PH7-1, PH11-1, PH12-1	Experimental determination of soil rheological characteristics.	18
TOTAL		390

6. DISCIPLINE PROGRAM BY TYPES OF CLASSES

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.

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
lections	control tasks for each topic	task during lectures	comprehensive reference work (CRW)	determining the average results of intermediate controls;
practical	control tasks for each topic	tasks during practical classes		CRW performance during the examination at the request of the student
	or individual task	tasks during independent work		
laboratory	control tasks for each topic	performing tasks during practical classes		

	or individual task	tasks during independent work	
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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 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 CRW, which contains tasks covering key disciplinary learning outcomes.

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

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

The integral value of the CRW performance assessment can be determined by considering the weighting factors established by the department for each NQF 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 practical 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 NQF for the Bachelor's level of higher education (given below).

General criteria for achieving learning outcomes for the 7th qualification level for NQF

Integral competence is the ability to solve complex problems and specialized practical problems in 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.

NQF descriptors	Requirements for knowledge, communication, autonomy and responsibility	Indicator evaluation
Knowledge		
<ul style="list-style-type: none"> ♦ 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		
<ul style="list-style-type: none"> ♦ 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

NQF descriptors	Requirements for knowledge, communication, autonomy and responsibility	Indicator evaluation
	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; - - pure; - - 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

NQF descriptors	Requirements for knowledge, communication, autonomy and responsibility	Indicator evaluation
	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
Autonomy and responsibility		
<ul style="list-style-type: none"> ♦ 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 	<ul style="list-style-type: none"> - Excellent individual ownership management competencies focused on: 1) management of complex projects, providing: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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

NQF descriptors	Requirements for knowledge, communication, autonomy and responsibility	Indicator evaluation
	The level of autonomy and responsibility poor	<60

7. TOOLS, EQUIPMENT AND SOFTWARE

Technical training aids.

8. RECOMMENDED SOURCES OF INFORMATION

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