

Ministry of Education and Science of Ukraine
STATE HEI "NATIONAL MINING UNIVERSITY"

Department of Construction, Geotechnics and Geomechanics



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CURRICULUM WORKING PROGRAM
"Subways and tunnels"
for a bachelor's degree in 192 Building and Civil Engineering

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INTRODUCTION

The program results of the bachelor's degree in construction and civil engineering are defined in the standard of higher education in the specialty 192 Building and Civil Engineering [1].

The program results of the bachelor's degree in 192 Building and Civil Engineering are defined in the educational and professional program of higher education [2] of the State University "National Mining University", where the distribution of program learning outcomes by type of educational activity of the applicant. The discipline "Subways and tunnels" includes the following learning outcomes:

The purpose of the discipline " Subways and tunnels" - to form students' knowledge of modern methods and technology of construction of subways and tunnels.

Achieving the goal requires the transformation of program learning outcomes into disciplinary, and the selection of the content of the discipline according to this criterion.

Requirements for the structure of working programs of disciplines are given in [3].

1 FIELD OF USE

The work program extends to the departments entrusted with the teaching of the discipline by order of the rector.

The work program is designed to:

- implementation of the competency approach in the formation of the structure and content of the discipline;
- internal and external quality control of training;
- accreditation of the educational program by specialty.

The work program sets:

- the scope and timing of teaching the discipline;
- designation of physical quantities;
- disciplinary learning outcomes and their level of complexity;
- thematic plan and volume distribution by types of educational activity;
- requirements for the structure and content of individual tasks;
- tasks for independent work of the applicant;
- generalized diagnostic tools, criteria and procedures for assessing the academic achievements of applicants;
- the composition of the complex of educational and methodological support of the discipline;
- form of final control.

2 REGULATORY REFERENCES

The work program of the discipline is developed on the basis of the following regulations:

1) Standard of higher education for bachelor's degree in 192 Construction and Civil Engineering.

2) Educational program for bachelor's degree in specialty 192 "Construction and Civil Engineering" / Ministry of Education and Science of Ukraine, Nat. mining. un-t. - D.: NMU, 2017.

3) Resolution of the Cabinet of Ministers of Ukraine of December 30, 2015 № 1187. "Licensing conditions for educational activities of educational institutions."

4) Regulations on the organization of the educational process of the State Higher Educational Institution "National Mining University".

References to these regulations are included in the text of the current work program of the discipline.

3 SCOPE OF THE DISCIPLINE

Total - 3 ECTS credits (90 academic hours).

4 SYMBOLS USED

According to DBN B.2.3-7-2010 Transport facilities. Subways.

5 EXPECTED DISCIPLINARY LEARNING OUTCOMES

Expected disciplinary learning outcomes are provided in Table 5.1.

Table 5.1 - Expected learning outcomes disciplinary discipline "subways and tunnels"

Code	The content of learning outcomes in the educational program	Code	The content of learning outcomes in the discipline
BP1.11	Possess methods of engineering surveys, design technology using universal and specialized computer systems and systems of automated design and calculation of elements and objects of transport structures on the roads.	BP1.11-1	Classify the construction of subways and tunnels and choose the rational technology of their construction, taking into account current regulations on design, construction and operation

Code	The content of learning	Code	The content of learning
		BP1.11-2	To substantiate rational constructive decisions at construction of subways and tunnels
		BP1.11-3	Determine the need for special methods of construction of subways and tunnels and appropriate measures for waterproofing and water suppression

6 THEMATIC PLAN AND DISTRIBUTION OF TIME BY TYPE OF TRAINING

The thematic plan and distribution of the amount of time by type of training is given in table 6.1.

Table 6.1 - Plan of distribution and the amount of time for the kinds of lessons on discipline "subways and tunnels".

Courses, quarters	№ s / n	Types, topics of training, codes and content of learning outcomes in the discipline	Volume, hours		
			audit.	CPC	TOTAL
4th year, 1 quarter, 6 + 1 weeks		Lectures	12	31	43
	1	Regulatory framework, general information, definition and classification of subways and tunnels			
	2	Fundamentals of work organization in the construction of subways and tunnels			
	3	Means of mechanization in the construction of subways and tunnels			
	4	Basic constructions of distillation and station tunnels			
	5	Communication of metro stations with the earth's surface and transplants between stations			
	6	Construction of tunnels and subway stations in an open way			

	7	Construction of deep-seated subway stations			
	8	Construction of tunnels by panel board method			
	9	Construction of tunnels at full cross-section without the use of shields			
	10	Special methods of work in the construction of subways and tunnels			
		Practical / seminar classes	12	31	43
	1	Station and distillery tunnels and subway structures			
	2	Technological schemes of construction of station and distillation tunnels and subway structures			
	3	Design solutions for the construction of subways and tunnels			
	4	Cyclical and calendar schedules of work organization in the construction of subways and tunnels			
	5	Special methods of construction of subways and tunnels and measures for waterproofing and water suppression			
		Control measures	4		
Контроль підсумковий, чверті		TOTAL	24	62	90
		Lectures	12	31	43
		Practical / seminar classes	12	31	43
іспит	залік	Laboratory classes			
13		Control measures	4		

7 REQUIREMENTS FOR INDIVIDUAL TASKS

7.1 COURSE PROJECT

COURSE PROJECT "PROJECT NAME" (OR NOT IMPLEMENTED).

7.2 INDIVIDUAL TASKS

INDIVIDUAL TASKS ARE PERFORMED IN QUANTITIES ACCORDING TO [4]. (OR NOT PERFORMED).

8 TASKS FOR INDEPENDENT WORK OF THE APPLICANT

The main tasks for independent work:

- 1) preliminary processing of information support for each module (topic);
- 2) preparation for the current control - solving tasks of self-control on each topic;
- 3) performance of an individual task;
- 4) preparation for the defense of an individual task;
- 5) preparation for the final control.

9 FORM OF FINAL CONTROL, DIAGNOSTIC TOOLS, CRITERIA AND EVALUATION PROCEDURES

9.1 Form of final control

The form of final control is an exam.

Assessment of the level of formation of disciplinary competencies is carried out in accordance with [4].

Control measures in the discipline include: current, semester and final control, rector's control, liquidation of academic debt.

9.2 Forms of current control

Determining the level of formation of disciplinary learning outcomes during the current control is carried out by [4]:

- a certain section of the work program of the discipline;
- practical classes (control work or inspection and defense of an individual task);
- laboratory work (inspection and protection);
- computer tests.

9.3 Diagnostic tools

9.3.1 Generalized diagnostic tools

The expected learning outcomes are used to form generalized diagnostic tools [1, 2, 4].

9.3.2 Specified diagnostic tools

Concretized diagnostic tools are formed on the basis of generalized by numerical or other specification of the original data.

9.4 Evaluation criteria and procedures

9.4.1 Lecture material

Assessment of the results of the tasks is carried out by comparing them with standards - samples of correct and complete answers by identifying the level of competences based on the analysis of the student's response, using the percentage of mastery, which adapts the value of assessment to the ECTS scale:

$$P_i = a / m, \%,$$

where - a the number of correct answers or performed significant operations based on the standards of decisions; m - the total number of questions or significant operations of the decision standard.

The results of students' achievements obtained in the described scheme (in percent) are presented by the teacher in the assessments of the ECTS scale according to table 9.1.

Table 9.1 - Scale for assessing the academic achievements of higher education students

Marks, %	Grade
90 – 100	A
82 – 89	B
74 – 81	C
64 – 73	D
60 – 63	E
35 – 59	Fx
1 – 34	F

If the student's achievement level is below 60% or if the student does not show up for the test, he / she will be given an "Fx" grade. In such cases, the student is required to further master this topic and re-evaluate his learning outcomes.

9.4.2 Practical classes

Practical classes are assessed by the quality of the individual task using the coefficient of mastering or expert method.

In the latter case, the maximum score is set under the following conditions:

- correctness of solutions;
- completeness of the structure of calculations (problem statement, calculation scheme, solution algorithm, its evaluation);
- literacy, conciseness and logical sequence of presentation of results;
- registration of work according to the current standards;
- availability of links to sources of information;
- independence of execution (it is found out during protection).

During the examination, the assessment of the individual task is determined by the percentage of implementation of the requirements regulated by the work program of the discipline and guidelines.

9.4.3 Laboratory work

Each laboratory work is evaluated by the quality of the report using the coefficient of assimilation or expert method, when the maximum score is set subject to the following conditions:

- compliance of the report on the implementation of laboratory work with methodological recommendations;

- possession of theoretical information on which the subject of research is based;
- mastery of experimental research methods;
- general and professional literacy, conciseness and logical sequence of presentation of the material;
- compliance of the report with current standards.

The level of achievements based on the results of a set of laboratory work in the discipline is defined as the average value of the results of the current control of each.

During the examination, the assessment for laboratory work is determined by the percentage of correct steps of the algorithm for its implementation.

Integral assessment of achievements in all laboratory work is considered positive (the level of student achievement is not less than 60% or not less than 60 points) only if all laboratory work provided by the work program of the discipline, performed and evaluated.

9.4.4 Integral level of student achievements in the discipline

The integrated level of student achievement in mastering the material of the discipline as a whole is calculated as the weighted average value of the level of formation of competencies in lectures, practical and laboratory classes:

$$IP = \sum_{i=1}^n (P_i \times T_i) / T, \%$$

where n – number of content modules;

P_i – level of achievements in the i -th module, %;

T_i – the volume of the i -th module, including the individual task;

T – the total amount of discipline.

A student's achievements in mastering a particular discipline as a whole cannot be assessed positively if the student has not received a positive assessment from any planned control measure in this discipline.

If the level according to the results of any current control measure is lower than 60%, then the discipline is given grades "Fx" and, if below 35%, then "F".

10 COMPOSITION OF THE COMPLEX OF EDUCATIONAL AND METHODOLOGICAL SUPPORT OF THE DISCIPLINE

The complex of educational and methodical support of the discipline should be located on the website of the Department of Construction, Geotechnics and Geomechanics and should contain the following:

- 1) the working program of the discipline;
- 2) educational content (information support of lectures);
- 3) methodological support of practical and seminar classes;
- 4) tasks and methodological support of laboratory works;

5) materials of methodical support of independent work of the student concerning:

- preliminary processing of information support of lectures;
- solving self-control tasks on each topic;
- performance of an individual task;
- preparation for the defense of an individual task;

6) generalized tasks for the current control of the level of formation of disciplinary competencies;

7) tasks for post-certification monitoring of the level of formation of disciplinary competencies.

11 SUGGESTED INFORMATION SOURCES

11.1 Basic literature

1. ДБН В.2.3-7-2010. Transport facilities. Subways.

11.2 Additional literature

1. Construction of the subway and underground structures in the working areas: A textbook for universities / Ed. Prof. B.A. Lysikova - Donetsk: Nord-Press, 2003. - 303 p.

2. Filippov I I Tunnels constructed by panel board and special methods: Textbook. Pos. - RGOTUPS, 2004. - 212 p.

3. Mine and underground construction. Technology of construction of horizontal and inclined workings: Textbook. manual / Shakhtinsky Institute of YURGTU. Novocherkassk: YURGTU, 2002. 430 p.

4. Cymbal S.J. Underground construction. К .: КНУБА - 2004. - 148 p.