Національний технічний університет України
«КИЇВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ
імені ІГОРЯ СІКОРСЬКОГО»

Department of geoengineering

DESIGN OF CITY UNDERGROUND STRUCTURES (course project)

Working program of the academic discipline (Syllabus)

Educational details disciplines	
Level of higher education	***Second (master's)***
Branch of knowledge	*18 Production and technologies*
Specialty	*184 Mining*
Educational program	*Geoengineering*
Discipline status	*Normative*
Form of education	*full-time/part-time/distance/mixed*
Year of training, semester	*First year, fall semester*
Scope of the discipline	*45 hours (45 hours – SRS)*
Semester control/ control measures	*Credit / defense of the course project*
Lessons schedule	*http://rozklad.kpi.ua/*
Language of teaching	*English*
Information about the course leader / teachers	*Lecturer: Doctor of Technical Sciences, Zuievska Natalia Valerievna, (+38)0509821770, znata1770@gmail.com* *Laboratory / Seminary Doctor of Technical Sciences, Zuievska Natalia Valerievna, (+38)0509821770, znata1770@gmail.com*
Placement of the course	

Educational programdisciplines

1. Description of the educational discipline, its purpose, subject of study and learning outcomes

Course project on the educational discipline "Design of urban underground structures - this is the final result of the development of a new product (the project of organizing the construction of an underground structure) based on the results of studying the theoretical course of the same name. It is carried out by the student independently under the guidance of the teacher during the set term in one semester in accordance with the technical task based on the knowledge and skills acquired from this and related disciplines, as well as project materials of research and project institutions and organizations. The course project is a set of materials and consists of an explanatory note and drawings made in compliance with the relevant requirements.

the purpose course design is for the student to acquire the skills to quickly and confidently use relevant reference literature, state standards, tables, typical projects and other materials that the specialist uses during his professional activity, to instill in students the skills of performing calculations, drawing up technical and economic justifications, explanatory notes, etc.

The subject of the course project is methods and means of designing urban underground structures for various purposes.

Learning outcomes are the acquisition of the following program competencies and skills:

ZK1. The ability to act in a new situation related to work by profession and the ability to generate new ideas in the field of mining.

SK1. Ability to identify, pose, solve problems and make informed decisions in professional activities.

SK4. Ability to develop project documentation (technical assignment, technical proposals, sketch

project, technical project, working project) for mining and geoconstruction systems;

SK6. Ability to carry out design works of special methods of construction, objects of mineral development, take special measures for the reconstruction of underground structures and mining enterprises;

SK7. Ability to implement general principles of complex optimization during project development;

PH1. To act in a new situation related to work by profession and the ability to generate new ideas in the field of mining;

PH6. Identify, pose, solve problems and make informed decisions in professional activities;

PH9. Develop project documentation (technical assignment, technical proposals, sketch project, technical project, working project) for mining and geoconstruction systems;

PH11. Carry out design works for special construction methods, mineral development facilities, take special measures for the reconstruction of underground structures and mining enterprises

PH12. Implement general principles of complex optimization during project development.

After completing the course project, the student should be able to:

– use basic knowledge about the purpose and characteristic features of underground structures to choose the organization, method and technology of construction of underground structures;

– perform calculations of elements of building structures in accordance with the existing requirements (according to the limit states of the first and second groups);

– apply the acquired knowledge and skills in calculations of construction structures of underground structures, taking into account the load and influences, purpose and their characteristic features;

– use software to display the results of calculations in graphic form.

2. Pre-requisites and post-requisites of the discipline (place in the structural and logical scheme of training according to the relevant educational program)

The discipline is in the first part of the structural and logical scheme of the educational and professional master's training program in specialty 184 "Mining" under the educational program "Geoengineering".

The implementation of the course project in the educational discipline "Design of urban underground structures" is preceded by the disciplines from the bachelor's training program in the specialty 184 "Mining" (prerequisites): "Technology, mechanization and organization of geotechnical construction", "Building materials and structures of underground structures",
"Geoengineering of the metropolis".

Upon completion of the study of this discipline, the knowledge, skills and abilities obtained as a result of the training are required for successful mastering (post-requisites) of the following educational components - "Special methods of construction", elective disciplines and the completion of a master's thesis.

3. Content of the academic discipline

The course project is an individual task from the discipline "Design of urban underground structures" and is being prepared for defense at the final stage of theoretical training.

The explanatory note includes the following components:

– title page;

– tasks for a course project;

– table of contents, including names of all sections and items with page numbers;

– the introduction, in which the purpose and tasks of the course project are indicated;

– the theoretical part, which describes the theoretical information on the topic of the project;

– settlement part;

– conclusion based on the results of the work

– drawings for the project.

4. Educational materials and resources

Basic literature

1. Pustovoytenko V.P. Geotechnical provision of underground construction in Ukraine / V.P. Pustovoytenko National mountain Acad. of Ukraine. -K. : Sciences. opinion, 1999. -262 c.

2. Pankratova N. D., Hayko G. I., Savchenko I. O. Development of underground urbanism as a system of alternative project configurations. -K. : Scientific opinion, 2020. -136 p.

3. Tetior A.M. Design and construction of underground structures / A.M. Tetior, V.F. Loginov. - K.: Budivelnyk, 1990. - 167 p. Tetior A.M. Design and construction of underground structures / A.M. Tetior, V.F. Loginov. - K.: Budivelnyk, 1990. - 167 p.

4. Basics and foundations. Study guide for students of the specialty "Construction and civil engineering / I.O. Parfentieva, O.V. Vereshko, D.A. Husachuk Lutsk: LNTU, 2017. – 296 p.

5. Cymbal S.Y. Underground construction: Study guide / S.Y. Cymbal. - K.: KNUBA, 2004.-148 p.

6. Samedov A. M. Calculation and design of shallow underground structures - K.: NTUU "KPI", 2013. - 852 p.

7. Samedov A. M. Calculation and design of deep underground structures - K.: NTUU "KPI", 2012. - 630 p.

Optional literature

8. DBN A.2.2-3-2014. Composition and content of project documentation for construction. - K.: Ministry of the Region of Ukraine, 2014. -33 p.

9. DBN B.2.1-10:2018. Bases and foundations of buildings and structures. Substantive provisions. - K.: Ministry of the Region of Ukraine, 2019. -35 p.

10. DBN B.2.3-7:2018. Metropolitans. Substantive provisions. - K.: Ministry of the Region of Ukraine, 2019. -33 p.

11. DBN A.2.1-1-2014 Engineering searches for construction.

12. DBN V.2.5-75:2013 Sewerage. External networks and structures. Basic provisions of design.

13. DSTU B V.2.1-19:2009 Foundations and foundations of buildings and structures. Methods of laboratory determination of granulometric (grain) and microaggregate composition.

14. Technical regulation of construction products, buildings and structures / Decree of the Cabinet of Ministers of Ukraine No. 1764 dated 12.20.2006.

15. DBN A.2.2-1-2003 Design. The composition and content of environmental impact assessment materials (EIA) in the design and construction of enterprises, buildings and structures.

Information resources

1. *Library of NTUU "KPI",http://kpi.ua/library.*
2. *National Library of Ukraine named after V.I. Vernadsky,www.nbuv.gov.ua/.*
3. *National Parliamentary Library of Ukraine,http://www.nplu.org/.*
4. *State Scientific and Technical Library of Ukraine,www.gntb.gov.ua*

Educationalcontent

5. Methods of mastering an educational discipline (educational component)

The general methodical approach to teaching an academic discipline is defined as professionally oriented, according to which the center of the educational process is the student, as a subject of study and a future specialist. Methods of analysis and synthesis, comparison, analytical and factor analysis are used to master the educational discipline.

The output data for the task is given individually to each student.

Semester		Educationalt ime

week	Approximate names of work stages	Aud.	SRS
2	*Getting a topic and task*		*2*
3-4	*Justification of the need for the construction of an underground structure, selection of a construction site*		*5*
5-6	*Establishment of engineering-geodetic, engineering-geological, hydrogeological and hydrological construction conditions*		*4*
7-8	*Justification of adopted volume-planning decisions and architectural and construction design*		*4*
9-10	*Definition and description of underground construction technology*		*6*
11-13	*Calculation and design section*		*12*
14-15	*Determination of technical and economic indicators*		*6*
16	*Safety technology and environmental protection*		*2*
17	*Submission of a course project for review*		*2*
18	*Protection of course project*		*2*

6. Independent work of student

The course project is an independent work and represents a complex task during the performance of which the theoretical knowledge of this discipline is acquired, consolidated, deepened and generalized, the skills of their practical application, independent and complex solving of specific professional tasks are developed.

Politics andCONTROL

7. Policy of academic discipline (educational component)

The course project must be prepared for defense within the deadline set by the teacher. An explanatory note and a drawing are provided for the defense of the course project.

The design of the course project must meet the requirements for design documentation.

Drawings for the defense of the course project must be made using computer tools. The content of the explanatory note and the presented drawings must correspond to the initial data for the assignment and reflect the main provisions of the course project that are submitted for defense.

The level of training of the student and his assessment is established in the RSO and is determined by the results of the initial component and the defense component.

In the first lesson, the teacher familiarizes the students with recommendations on the organization of study and assimilation of learning outcomes.

In the case of distance learning, in order to conduct consultations and defend the course project, the student must have technical means that are connected to the Internet (laptop, tablet or smartphone), to access the Google Classroom web service and for online visual recording of the video conference via the Zoom platform.

Each video conference participant must be signed in to Zoom and the Google Classroom web service under their first and last name.

The student must familiarize himself with the syllabus of the course project on the platform "Sikorsky" (remote resource Google classroom) or in the "KPI Electronic Campus" system.

8. Types of control and rating system for evaluating learning outcomes (RSO)

The rating system for evaluating the course project is 100 points and has two components. The first component (starting) characterizes the student's work on course design and its result - the quality of the explanatory note, text and graphic material, compliance with the established course project implementation schedule, etc. The second component (defense) of the RSO characterizes the quality of the student's defense of the course project.

The scale of the starting component is 60 points, and the defense component is 40 points.

The condition of admission to the defense of a course project is its availability and the size of the

starting component of at least 30 points.

Starting component *consists of the sum of weighted points for individual indicators:*

– *analysis of literary sources on the topic of the course project - 10 points;*
– *modernity and reasonableness of adopted project decisions – 10 points;*
– *the correct choice of construction technology – 10 points;*
– *correct execution of the calculation and design section - 20 points;*
– *quality of design of the explanatory note and graphic material, compliance with the requirements of regulatory documents - 10 points.*

The evaluation criteria for each of them are as follows:

Analysis of literary sources on the topic of the course project

Evaluation criteria	Points
A complete and detailed review of literary sources on the topic	*9-10*
A fairly complete review of the literature on the topic of the project	*7-8*
Sufficient analysis of literary sources	*5-6*
A complete review of the literature is not enough	*3-4*
Not a complete analysis of literary sources.	*1-2*
Review of literary sources has not been performed	*0*

Modernity and reasonableness of adopted project decisions

Evaluation criteria	*Points*
Full and high-quality justification of the adopted project decisions	*9-10*
Sufficiently complete and up-to-date justification of project decisions	*7-8*
The justification of the adopted design decisions is well done	*5-6*
A full justification of project decisions is not enough	*3-4*
Incomplete justification of project decisions.	*1-2*
Justification of project decisions was almost never carried out	*0*

The correctness of the choice of construction technology

Evaluation criteria	Points
Detailed and complete justification of construction technology	*9-10*
The choice of construction technology is sufficiently justified	*7-8*
The construction technology is chosen correctly, but individual details of the technological scheme have not been clarified	*5-6*
When choosing a construction technology, external influencing factors are not taken into account	*3-4*
The correctness of the choice of construction technology is not substantiated	*1-2*
The construction technology was chosen incorrectly and has gross violations	*0*

Correctness of performance of the calculation and design section

Evaluation criteria	Points
All calculations are performed correctly and in detail, there are no errors	*18-20*
The student made minor mistakes, but they do not significantly affect the accuracy of the calculations	*14-17*
Mistakes were made in the calculations, which under certain conditions affect the selection of structural elements	*10-13*
The calculation and design section has shortcomings, the mistakes made affect the correctness of the selection of structural elements	*6-9*
The calculated part of the section has gross errors that negatively affect the further selection of the building's fastening elements	*1-5*
The calculation and design section was performed incorrectly	*0*

The quality of the design of the explanatory note and graphic material, compliance with the requirements of regulatory documents

Evaluation criteria	Points
The student issued an explanatory note and graphic material in full accordance with the current regulatory documentation	*9-10*
The student issued an explanatory note and/or graphic material with minor errors in accordance with the current requirements	*7-8*
The explanatory note and drawing have formatting errors that can be corrected	*5-6*
The design of the explanatory note and drawings has significant shortcomings	*3-4*
Gross violations were committed during the design of the explanatory note and graphic material	*1-2*
The explanatory note and drawing were made without complying with the current regulatory requirements for design and graphic documentation	*0*

A component of the course project defense has a weighted score of 40 and is evaluated as follows:

Evaluation criteria	Points
The project defense report is complete, high-quality, clear; the student showed deep knowledge of the discipline; answered all the questions correctly.	*37-40*
The course project was defendedcomplete; answers the questions are almost correct (at least 85% of the required information)	*30-36*
The student provided a sufficiently complete defense report; knowledge of the discipline is mediocre; the answers to the questions are not all correct	*22-29*
The project defense report is incomplete; the knowledge shown is mediocre; about 35% of the answers to the questions are incorrect	*14-21*
Protection of the course project is not complete; knowledge of the discipline is superficial; many answers to the questions are not correct (more than 50%)	*6-13*
The student has almost no knowledge of the specialty, does not orient himself in the content of the course project	*Less5*

The sum of the points of the two components is converted into a passing grade according to the table:

Rating evaluation of the acquirer (starting component + defense component)	University grade level scale acquired competencies
95...100	Perfectly
85...94	Very good
75...84	Fine
65...74	Satisfactorily
60...64	Enough
Less than 60	Unsatisfactorily
The course project is not allowed to be defended	Not allowed

Working program of the academic discipline (syllabus):

Compiled by Professor, Doctor of Technical Sciences, Zuievska N.V.

Approved by the Department of Geoengineering (protocol No 18 17.06.2022)

Approved by the Methodical Commission of the SR IEE (Protocol No. 12 of 24.06.2022)