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

Department of
Geoengineering

DESIGN OF METRO TRANSPORT SYSTEMS

Work program of the discipline (Syllabus)

Details of the Disciplines	
Level of higher education	***Second (Educational and scientific)***
Branch of knowledge	*18. Production and technology*
Specialty	*184 Mining*
Educational program	*Geoengineering*
Discipline status	*Selective*
Form of study	*distance learning /mixed form*
Year of study, semester	*1-st semester*
Discipline scope	*3 credits/90 h (lections -6. Practice– 6,.)*
Semester control / control measures	*Eкsamination*
Lessons schedule	*According to the training schedule (two weeks)*
Language of Lecture	*/Englich/*
Information about course leader / lehrer	*Supervisor of the graduate student prof. Kravets VG*
Course placement	Link to remote resource (Google classroom)

Program of the discspline

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

The program of the discipline The design of transport systems of subways is compiled in accordance with the educational program of the second (master's) level of higher education of the degree of master of specialty 184

Academic discipline refers to the cycle of professional and practical training.

The subject of the discipline is a system of knowledge and skills for the implementation of a set of works and measures to organize the design, construction, development and operation of the subway, designed for high-speed movement of large masses of passengers in the vertical, horizontal and inclined planes of geospace, in compliance with the requirements of relevant regulations, rules and norms. . The discipline considers modern trends in the development of the transport infrastructure of the metropolis, the methodology for designing metro transport systems based on the needs and prospects for the development of large cities, their development regimes, master plans for settlements, detailed plans for territories, zoning plans and requirements for the conditions for providing safe, comfortable and efficient transport services.

The educational component includes consideration of the regulatory requirements for ensuring the coordination of safe transportation modes by the subway, taking into account the throughput of the subway, the requirements for the design of routes and stations, compliance with the requirements for the reliability of rolling stock and other objects and technical means of the subway.The assimilation by applicants of the priorities that determine the adoption of successful project decisions should contribute to the

development of the creative approach of young researchers, the disclosure of their scientific potential within the educational and qualification level of the master,

Interdisciplinary connections: the discipline is based on the system of knowledge and skills of intellectual creative activity previously acquired by the student in the process of studying the disciplines "Technology, mechanization and organization of geotechnical construction", "Building materials", "Geoengineering management", etc., focuses on obtaining and using new knowledge. Mastering the discipline contributes to the implementation of research on the topic of master's work.

The purpose of studying the discipline in accordance with the requirements of the OKH is to acquire knowledge, skills and abilities in the main provisions that are typical for a novice geoengineer in design and research work in the field of prospective development of metro transport systems in the context of the development of a metropolis.The objectives of the discipline are

- assimilation of modern directions of organization of the transport infrastructure of the metropolis in the process of intensive urbanization and rational development of urban underground space;

- study of patterns linking the development of housing and business construction with the transport infrastructure of a large city and its competitiveness in terms of the quality of education, the level of culture, transport accessibility and investment attractiveness;

- development of modern technologies for adaptive management of metro transport systems with the aim of a comprehensive balanced organization of the transport system of the metropolis;

- acquisition of the necessary design and research experience in the modernization of the metro transport network based on clustering, greening and economic feasibility;

According to the requirements of the educational and professional program, after mastering the academic discipline, students must demonstrate the following learning outcomes:

knowledge:

- legal framework and technical rules that allow a young specialist to go from abeginner to a qualified designer armed with analytical skills;

- methodology and methodology for designing and organizing the metro transport system while ensuring the reliability of rolling stock, other facilities and technical means within the infrastructure of the metro space

skill:

- select and analyze the necessary information to ensure the harmonious and safe functioning of the underground transport infrastructure in combination with the functioning of ground passenger transportation;

- to put forward new scientific ideas and technical solutions,

-accumulate and generalize world and domestic experience in the design and construction of metro transport networks based on the development strategy of the metropolis, determined by urban planning needs;

experience:

- application of the acquired knowledge on the basics of organizing the design, construction of new and reconstruction of existing2**.**

2. Prerequisites and postrequisites of the discipline (place in the structural and logical scheme of training in the corresponding educational program)

The discipline is taught in the first year of master's training, belongs to the cycle of professional and practical training and requires students to have basic training in natural and technical sciences (geoengineering disciplines).

The discipline is based on the system of knowledge and skills of intellectual creative activity previously acquired by the student, directed to the acquisition and use of new knowledge by the student. The assimilation of the discipline contributes to the implementation of research on the topic of master's work

3. The content of the academic discipline

Topic 1. General trends, problems and rules in organizing the movement of metro trains (2 hours).

Topic 2. The problem of balanced design of metro transport (4 hours)

4, **Training Materials and Resources**

Main literature

1. Zakon Ukrainy pro miskyj elektrychnyj transport. https://metro.kyiv.ua

2. Gromadsky transport I zupynky.- Public education /

. https.http //narodna-osvita.com.ua

3. Pro metropoliten LIGA:ZAKON-IPS LIGA: LAW

https://ips.ligazakon.net

4. Derzhavni budivelni normy Ukrainy. Sporudy transportu Metropoliteny. DBN V.2.3.-7-2003. Derzhavnyj Komitet Ukrainy z budivnyctva i Architectury. K.: 2003.-263s.

5. Derzhavni budivelni normy Ukrainy. Subway Metropoliteny Osnovni polozhennya DBN V.2.3.-7:2018. M.: Ministerstvo Regionalnogo rozvytku, budivnyctva I ghytlovo-komunalnogo gospodarstva Ukrainy. 2018.-70p.

Supporting literature

6. Mnatsakanov V. A. Napolnenije vagonov metropolitena v ekspluataciji I provoznaja sposobnost linij. // Problemy transportnych I inginenych communicacij 1999. No. 3. S. 33-35.

7. Mnatsakanov V.A. Metrotramvay. http://www.metro.ru> Library. Analytics

1. 8. Leturner M. Prototype novych tramvajnych setej. // Public Transport International - 5/2000. C. 30-32.

9. Recomendaciji po modernizacyji transportnoj systemy gorodov

MDS 30-2.2008. Moscow 2008.-73p.

10. Luchko Artem. 9 tendencij razvitija transporta v blighajshem budushchem. https://daily.afisha.ru>brain>5340_9-trendov-gorods

Educational content

Recommended lecture topics

5. Methodology for mastering an academic discipline (educational component)

Topic 1. General trends in the development of the public transport system of the metropolis, problems and rules for organizing the movement of metro trains. Interaction in the transport system of large cities.

Topic 2. The task of balanced design of metro transport. Metro capacity. Features and standards for the design of track facilities, transport interchange nodes of the metro route. Automation, telemechanics and digitalization of the subway. Passenger safety.

6. Recommended topics of practical classes

The purpose of the practical classes is to consolidate the knowledge gained by students in the study of the discipline, to acquire the skills and abilities for the practical application of the acquired knowledge in the framework of the main issues of designing metro transport systems, the assimilation of standards for the arrangement of the main and auxiliary components of metro transport, the use in the applied aspect of information about the mechanism and features the functioning of the rolling stock and the maintenance of the life of the service units of the underground metro complex.

Practical lesson-1. Energy saving. Energy recovery. (2 years).

Practical lesson -2. Escalator farm. (2 years).

Practical lesson -3. Protective measures in the subway

Independent work

The curriculum for the discipline "Design of transport systems of subways" provides for the implementation of abstracts by students on the subject of the course, which should post an analytical review of publications on the chosen topic. Self-composed essays are carried out on a topic chosen by the student: the values of modernization and the development of transport in large cities; the place of the subway in the transport infrastructure of the metropolis; flexible transport systems; metro network; analysis and organization of traffic flows; new means of personal transportation; the concept of courier drones; autonomous vehicles; unmanned municipal systems; operational parameters of metro lines; zone movement of trains; shallow laying lines; metro infrastructure; passenger space and passenger traffic; passenger comfort indicators; at tunnel and station structures; air exchange in the subway; escape routes; control systems and early detection of emergency situations; fire protection; alarm, centralization, blocking.

7. Course policy (educational component)

• the graduate student is obliged to attend scheduled lectures, in case of skipping classes the graduate student provides a summary of the missed lecture;

in the classroom is welcome learning activity , prior knowledge of the topics of the lecture, the use of means of communication to search for information on the Internet, dialogic forms of communication; questions with the specifics of graduate dissertation research.

• rules of defense of individual assignments: deadline - two weeks before the end of the semester, defense of individual assignments takes the form of an interview;

• in case of skipping classes without good reason for the topic of the missed lecture is an abstract of 10-12 pages);

• at the end of the semester there is an additional opportunity to pass / retake test scores;

• policy on academic integrity - borrowing materials without reference to the author's work is not allowed , attempts at plagiarism are taken into account when passing the test.

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

Current control is carried out in the form of a modular test (score 15 points), 3 practical work (each score 5 points), abstracts in the framework of independent work (4 essays, each score 5 points) Distribution of study time by types of classes and tasks in the discipline according to the working curriculum.

Form of study	Credit modules	Total		Distribution of study time by types of classes				Semester certification
		credits	hours	Lectures	Practical (seminar) classes	Laboratory works (computer workshops)	IWS	
Corresp	*Total*	*3*	*90*	*6*	*6*			
	1	*3*	*90*	*6*	*6*			*examination*

Modular tests

Student rating in the discipline consists of points that he receives for:
1) practical classes;
2) modular tests
3) answer the exam
The system of rating (weight) points and evaluation criteria
Student rating in the discipline consists of the following points:

1. Work in practical classes.

Work in a practical lesson: weight score - 5. The maximum number of points in all practical lessons is: 5 points × 3 \u003d 15 points

2. Implementation of practical work - 5 points. The maximum number of points in all practical exercises is: 5 points × 3 \u003d 15 points

3. Essays on independent work of applicants - 5 points. The maximum number of points for 4 abstracts is 20 points

2. Modular control.
Weight score - 10. The maximum number of points for all tests is: 20 points × 2 = 40 points
- "excellent" complete answer (at least 90% of the required information) -19-20 points;
"very good", a fairly complete answer with minor inaccuracies (at least 90% of the required information) – 16-18 points;
- "good", sufficiently complete answer with minor inaccuracies (not less than 75% of the required information) – 14-15 points,
- "satisfactory", incomplete answer (not less than 60% of the required information) -10-13 points;
- "unsatisfactory", unsatisfactory answer (less than 60% of the required information) - 0 points;
4. Exam - 40 points.
Incentive points for:
- for the tasks of improving didactic materials in the discipline is given from 5 to 10 incentive points.

Calculation of the scale (R) rating:
The sum of weight points of control measures during the semester is:
Rc =15+15+10+20 = 60 points.
The examination component of the scale is equal to 40% of R, namely: 40
points
Thus, the rating scale of the discipline is points.

A prerequisite for admission to the exam is the processing of all missed lectures and practical classes, as well as a starting rating (RC) of not less than 40% of, ie 24 points. assessment with the definition of 4-5 levels.
To obtain the graduate student appropriate grades (ECTS and traditional), his rating R is translated according to the table:

$R = R_C + R_E$	**Rating ECTS**	**Traditional rating**
95...100	A – perfectly	perfectly
85...94	B – very good	good
75...84	C – good	
65...74	D – satisfactorily	satisfactorily
60...64	E – enough (meets the minimum criteria)	
less than 60	Fx – unsatisfactorily	unsatisfactorily
less than 35	F – unsatisfactorily (additional work is required)	not allowed

The method of semester certification is to establish the number of points (the amount of weight points of control measures) for RSO at the time of certification. If the specified amount does not exceed 50% of the maximum value for this period, the student is considered uncertified

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Compiled by: Professor of Geoengineering, DSc., prof. Kravets VG

Approved by the department (protocol № _15_23.06.2021_)

Approved by the Methodical Commission of the faculty [1] (protocol № 7_23.06.2021_)