Syllabus
of the elective component

Modeling of transport systems

Discipline	**Modeling of transport systems**
Higher education level	**first (bachelor's degree)**
Moodle course web-page	*https://dl.khadi.kharkov.ua/course/view.php?id=756*
Educational component volume	**4 credits (120 hours)**
Final control form	**test**
Consultations	**according to the schedule**
Department	**Transport Systems and Logistics Department**
Language of teaching	**English**
Course leader	**Kolii Oleksandr, PhD, Associate Professor**
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Educational Component Summary:

The purpose: training of specialists for independent solution of problems on building models of transport systems, of functioning in the field of passenger and freight transportation with different levels of detailing.

The subject of the study : the study of the discipline is an adapted system of concepts of methods and approaches to modeling transport systems at the micro and macro levels, a system of indicators for evaluating the results of the functioning of transport systems and the basis for conducting experimental research on them.
The main tasks of the academic discipline are.

The main task of the academic discipline is: to master the basic approaches, models and software products in the field of modeling transport systems at the micro and macro levels with the ability to assess the consequences of their functioning.

Prerequisites for studying the educational component:
Higher mathematics, Theory of Probability and mathematical statistics, Research of operations in transport systems, Fundamentals of systems theory and management, Freight transport, Passenger transport, Fundamentals of the theory of transport processes and systems.

Competencies acquired by the applicants:

*General competencies***:**
- Skills in using information and communication technologies.
- Ability to conduct research at an appropriate level.
- Ability to generate new ideas (creativity).
- Desire to preserve the environment.
- Ability to work independently and in a team
- Ability to abstract thinking, analysis and synthesis.
- Ability to communicate in the national language both orally and in writing
- Ability to communicate in a foreign language.

Knowledge and understanding of the subject area for understanding professional activity.

Special (professional) competences;

Ability to analyze and predict the parameters and performance of motor transport systems and technologies, taking into account the impact of the external environment.

Ability to organize and manage the transportation of passengers and luggage by road transport.

Ability to manage operationally the movement of traffic flows.

Ability to design transport (transport and production, transport and storage) systems and individual elements...

Ability to evaluate the operational, technical, economic, technological, legal, social and environmental components of the transportation organization.

Ability to use modern information technologies, automated control systems and geo-information systems at organizing the transportation process.

Ability to consider the human factor in transport technologies.

Training results:

To assess critically the scientific values and achievements of society in the development of transport technologies.

To apply, use modern information and communication technologies to solve practical problems of organizing transportation and designing transport technologies.

To formulate, modify, develop new ideas to improve transport technologies

To develop, design, manage projects in the field of transport systems and technologies.

To develop, plan, implement methods for ensuring safe activities in the field of transport systems and technologies

To develop and use transport technologies taking into account preservation requirements to them

To organize and manage cargo transportation in various combinations. To choose the type, brand, type of vehicles and traffic routes. To monitor the progress of transportation. To organize and manage the transportation of goods in different messages. To choose the type, brand, type of vehicles and routes. To control the progress of transportation.

To organize and manage the transportation of passengers and luggage in various combinations. Choose the type, brand, type of vehicles and traffic routes.

To evaluate the parameters of traffic flows. Design schemes and transport networks Organize and manage the transportation of passengers and luggage in various connections. Choose the type, brand, type of vehicles and traffic routes.

To evaluate the parameters of traffic flows. Design schemes and networks of transport systems. Develop technologies for operational management of traffic flows.

To research the types and kinds of transport systems. Find solutions for optimizing the parameters of transport systems. To evaluate the efficiency of the infrastructure and the technology of the functioning of transport systems.

To explain operational, technical-economic, technological, legal, social and environmental efficiency of transportation organization

To research transport processes, experimenting, analyzing and evaluating the parameters of transport systems and technologies

To classify and identify transport processes and systems. To evaluate parameters of transport systems. To carry out system analysis and forecasting of the operation of transport systems

Thematic plan

Theme №	Themes (L, LW, PW, SEW)	Hours	
		full-time training	part-time training
1	L. Parametrization of the external environment at modeling cargo transportation	6	2
	PW. Construction of a model for forecasting the volume of cargo transportation by road	2	2
	SEW. Modeling of alternative variants of cargo delivery systems at international communication	25	30
2	L. Parameterization of the external environment at modeling passenger transportation	6	-
	PW. Formation of a matrix of passenger correspondence when holding mass events in cities.	2	-
	SEW. Simulation of extreme states of demand for urban passenger transport services.	25	37
3	L. Macro models of the process of transporting passengers in cities	6	2
	PW. Simulation modeling of passenger travel time along the city's route network.	4	2
4	L Evaluation of the functioning of route networks of cities.	6	-
	PW. Assessment of the efficiency of the city's route network.	4	-
5	L. Experimental studies of transport models.	8	-
	PW. Experimental study of changes in the cost price of freight transportation. .	4	-
	SEW Methods and criteria for assessing the effectiveness of the freight transport systems. functioning.	22	45
Total		**120**	**120**

Individual educational and research task: not provided

Teaching methods:
1) verbal:
    1.1 traditional: lectures, explanations, stories, etc.;
    1.2 interactive: discussions;
2) visual: illustration method, demonstration method;
3) practical (traditional): practical classes.

Evaluation system and requirements:

Ongoing achievements
1 The applicants' ongoing achievement in the performance of the both educational activities and self-education work while training is evaluated using a four-point scale with the further conversion into the 100-point scale. While evaluating all kinds of works provided by the educational program are taken into account.
1.1 Lectures are evaluated by determining the quality of specific tasks performance.
1.2 Practical classes are evaluated by the quality of performance of the tests or individual tasks, execution and design of the report on practical works.
2 The final evaluation of the discipline is determined as a sum of points on:
    - passed standard tests, verbal questioning, attendance and communication activity

level;

- in-class practical tasks execution and theoretical preparation.

Applicants' evaluation score scale according to the ongoing control is given in table1.

Table 1 – Points distribution under the themes defining a final test score according to the discipline ongoing assessment

Ongoing Assessment					Discipline total score
Theme 1	Theme 2	Theme 3	Theme 4	Theme 5	100
20	20	20	20	20	

Final estimation

1 The final test score is got by the applicant at the last double-lesson according to the discipline ongoing assessment. The condition to pass the test is not less than 60 points score.

2 Higher education applicants who have an ongoing assessment score less than 60 points can increase it at the last class by taking a combination of written and oral tests that comprise both answering 2 professionally-oriented question and a problem solution with further commenting the work done or standard tests. The applicants who made the tasks previewed by the practical classes are allowed to pass the final test.

3 Extra-points are awarded to the applicants for participation in scientific events.

3.1 Extra-points are added to the achieved sum of points by the higher education applicant for the current educational activity.

3.2 The number of extra-points awarded for different types of individual tasks depends on their volume and importance:

– discipline prize-winning places on the at the international / all-ukrainian competition of scientific students' works – 20 points;

– discipline prize-winning places at all-Ukrainian olympiads – 20 points;

– participation in the international / all-Ukrainian competition of scientific students' works – 15 points

– participation in international / all-Ukrainian scientific conferences of students and young scientists – 12 points;

– participation in all-Ukrainian discipline competitions – 10 points

– participation in KhNAHU discipline competitions and scientific conferences – 5 points;

– implementation of individual scientific and research (educational and research) tasks of increased complexity – 5 points.

3.3 The number of extra points might not exceed 20 points.

4 The result of the study is evaluated on a two-point scale (passed/failed) according to table 2. The total score comprising the extra-points might not exceed 100 points.

Table 2 – Conversion of the score into national evaluation system

According to 100-point scale	According to the national scale
between 60 scores and 100 scores	Passed
Less than 60 scores	Failed

Course policy:

– the course involves working in the team, the environment in the audience is friendly, creative, open to constructive criticism;

–the discipline requires mandatory attendance of lectures and practical classes, as well as self-education work;

– self-education work involves studying certain discipline themes, which are submitted in accordance with the program for self-education work, or have been considered briefly;

– all the tasks provided by the program must be completed within the prescribed time-frame;

– if the higher education applicant is absent for valid reasons, he/she passes the completed tasks during the self-education work and consultations provided by the teacher;

– while studying the course, higher education applicants should follow the rules of academic integrity set out in such documents: «Rules of academic integrity of participants of the KhNAHU Education process» (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_dobroch_1.pdf), «Academic integrity. The text check of academic, scientific and qualification works for the plagiarism» (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_85_1_01.pdf), «Moral and ethical code of participants of the KhNAHU educational process» (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_MEK_1.pdf).

– in case of detecting the plagiarism, the applicant receives 0 points for the task and must retake the tasks provided in the syllabus;

– cheating during control works and examinations is prohibited (including mobile devices). Mobile devices are only allowed to be used during online testing.

Recommended literature:

1. Alessandrini A. Implementing Automated Road Transport Systems in Urban Settings. Elsevier, 2018. 325 p.

2. Лащених О.А., Кузькін О.Ф., Грицай С.В. Імовірнісні і статистико-експериментальні методи аналізу транспортних систем : навчальний посібник. Запоріжжя : ЗНТУ, 2011. 420 с.

3. Горбачев П.Ф., Макарічев О.В., Колій О.С. Раціональне розташування зупиночних пунктів автобусних та тролейбусних маршрутів відносно регульованих перехресть : монографія. Харків: ХНАДУ, 2018. 131 с.

4. Любий Є.В., Колій О.С. Оцінка точності синтетичних моделей розрахунку пасажирських кореспонденцій на прикладі малих міст. *Сучасні технології в машинобудуванні та транспорті*. 2019. №1(12). С. 99–106.

Additional sources:

1. Horbachov P., Naumov V., Kolii O. Estimation of the bus delay at the stopping point on the base of traffic parameters. *Archives of Transport*, 2015. Vol. 35(3). P. 15–25.

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