Syllabus

Course Program

Modern Directions of Road Transport Infrastructure Development

Specialty
274 – Automobile transport

Institute
Institute of Education and Science in Mechanical Engineering and Transport

Educational program
Motor vehicles and motor car industry

Department
Car and Tractor Industry (152)

Level of education
Master's level

Course type
Profile training, Optional

Semester
2

Language of instruction
English

Lecturers and course developers

Andrii Kozhushko

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Doctor of Engineering Technical Sciences, Associate Professor, Associate Professor of the Automobile and Tractor Engineering Department of KhPI National Technical University

Work experience - 10 years. Author of more than 100 scientific and educational and methodological works. Leading lecturer in the disciplines: "Mathematical models and basics of JSC automation", "Oscillations and vibration protection in tractor construction", "Numerical methods and basics of optimization", "Ergonomic properties and ecology of self-propelled machines".
More about the lecturer on the department's website

Anatolii Mamontov

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PhD, Associate Professor
Department of Car and Tractor Industry
National Technical University "Kharkiv Polytechnic Institute"

Work experience - 16 years. Author of more than 40 scientific and educational methodological works. Leading lecturer in the disciplines: "Technology of the production of cars and tractors", "Technology of the production and repair of cars", " Technological Planning of Automobile Operating Enterprises".
More about the lecturer on the department's website

General information

Summary

Course "Modern Directions of Road Transport Infrastructure Development " directly based on the formed knowledge about the current state and prospects for the development of road transport infrastructure, the main and alternative types of burning, which will ensure a reduction in environmental stress. The current gas stations and complexes in the areas of providing motor transport with traditional and alternative types of fuel are examined.

Course objectives and goals

Compliance with a high level of professional training in molding student of the scientific world and giving a broad outlook in the professional field, and in the food industry itself, the development of infrastructure for automobile transport enterprises.

Format of classes

Lectures, practical classes, consultations, self-study. Final control in the form of an tests.

Competencies

PC 12 Construction before construction, development and design of road transport infrastructure facilities, management of industrial processes, organization of corporate car servicing, including a specialized dry goods warehouse.

Learning outcomes

PLO 12 Incorporate, insure and design objects of automobile transport infrastructure. Know the theoretical ambushes of management industrial processes, organization of corporate car servicing, including a specialized dry goods warehouse.

Student workload

The total volume of the course is 120 hours (4 ECTS credits): lectures - 32 hours, practical classes - 32 hours, self-study- 56 hours.

Course prerequisites

To successfully complete the course, it is necessary to have maternal knowledge and practical skills in the disciplines: “Car design and their analysis”, “Ecology”, “Fundamentals of occupational safety and human health”, “Theory and fundamentals of vehicle design”, “Management” to the virtual activity of motor transport enterprises"

Features of the course, teaching and learning methods, and technologies

Lectures are conducted interactively using multimedia technologies. On practical ones a project approach to learning is used in classes.

Program of the course

Topics of the lectures

Topic 1. General characteristics of road transport enterprises.
An analysis of the problems arising in connection with the increase in the number of cars in the country is provided, one of these problems is the lag in the growth of the automobile infrastructure. The main types of road transport enterprises are considered.
Topic 2. Methodology of formation of road transport enterprises.
The production and technical bases (VTB) and the main production assets (OVF), types of wear and tear of the OVF, the concept of the amount of depreciation deductions are considered. Ways of development of VTB are considered.
Topic 3. Technical and economic justification of the development and improvement of the production and technical base of car service enterprises.
The "quality of life" of a car is determined by the quality of its infrastructure subsystems. Types of work performed for each car. The concept of production capacity.
Topic 4. Service stations (STO).
Microclimate in the car interior. Composition of air and harmful impurities. Mechanical factors affecting traffic safety. Additional car equipment.
Topic 5. Car parking lots.
Characteristics of car storage methods. Types of car parking. Modern projects of parking lots.

Topic 6. Features of the formation of the production and technical base of motor transport enterprises (ATP).

The current state and main problems of VTB ATP. The general order of ATP design. Calculation of the production program, the scope of work and the number of production workers.

Topic 7. Production and technical infrastructure of urban passenger road transport.

City passenger transport. VTI of commercial transport. Trends in the development of VTI, maintenance and repair of commercial vehicles. Taxi services. Car sharing.

Topic 8. The current state of the infrastructure of enterprises providing motor vehicles with energy sources. Main and alternative types of fuel.

Classification of enterprises supplying cars with various types of fuel. Comparison of different types of fuel for cars. Checking the content of toxic components.

Topic 9. Gas stations (gas stations) and complex gas stations (gas stations).

Types, characteristics and classification of gas stations and filling stations. Types of additional work and services that can be performed at gas stations. Features of the layout of gas station premises. Normative safety requirements during design.

Topic 10. Technological equipment of gas stations.

Characteristics and operation of technological equipment. Treatment plant. Means of delivery of oil products.

Topic 11. Analysis of placement of gas stations on highways.

The concept of traffic intensity. Classification of highways. Methodology for calculating the number of gas stations on a road section.

Topic 12. AGZS - filling station for liquefied hydrocarbon gases propane-butane (LPG).

The main properties of liquefied petroleum gas. The composition of the main equipment of the AGZS. General information about gas reducers. Gas cylinder equipment. Peculiarities of equipment repair and maintenance.

Topic 13. AGNKS is a compressed natural gas (CNG) gas filling station.

The main properties of methane natural gas. Components of gas cylinder equipment. Conversion of gasoline engines to gas. The issue of safe operation of cars with gas cylinder equipment.

Topic 14. Electric vehicles and their infrastructure.

Evaluation of the electric car market by the population. The current state of the electric vehicle market. Trends in the development and use of electric vehicles.

Topic 15. Charging stations for electric cars.

Technological aspects of charging infrastructure. Standards of charging stations. AC and DC charging. Description of charging types.

Topic 16. The development of alternative sources of energy for cars is a component of the ecological security of mankind.

Environmental situation on the planet. The impact of cars on the environment. The question of disposal of cars. Ways to reduce environmental load.

Topics of the practical classes

Topic 1. Growth of the car fleet and ways to solve emerging problems.
Topic 2. The main production assets of the enterprise.
Topic 3. Production capacity of the enterprise and types of work of the car service.
Topic 4. The concept of mass service theory.
Topic 5. Development of parking infrastructure abroad.
Topic 6. Requirement for ATP planning decisions.
Topic 7. Production and technical infrastructure of road transport enterprises.
Topic 8. Analysis of the effectiveness of the use of petroleum and alternative fuels in the automotive industry.
Topic 9. Quantitative and qualitative accounting of motor fuels at gas stations.
Topic 10. Fuel dispensers and fuel storage tanks at gas stations.
Topic 11. Modular gas stations.
Topic 12. Analysis of techniques for estimating technological losses of liquefied hydrocarbon gas (LHG) at gas supply facilities.
Topic 13. Typical configuration of AGNKS
Topic 14. Features of hybrid systems and electric cars.

Topic 15. Technological aspects of charging infrastructure for electric vehicles.
Topic 16. Pricing policy for charging electric cars. "Car-network" technology and blockchain technology.

Topics of the laboratory classes

Laboratory classes within the discipline is not provided. This field is filled in the same way if the curriculum includes laboratory classes.

Self-study

Students are also recommended additional materials (videos, articles) for independent study and analysis.

Course materials and recommended reading

1. European Environment Agency. Environmental indicator report in support to the monitoring of the 7th Environment Action Programme. 2016. EEA Report No 30.55 p.
2. World Economic Forum. The Global Competitiveness Report 2016—2017. 2017. URL: http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf
3 Conception of the State Targeted Economic Program for Road Transport Development. (2018). URL: http://ukravtodor.gov.ua/4489/oholoshennia/povidomlennia_pro_opryliudnennia_proektu_rozporiadzhennia_kabinetu_ministriv_ukrainy__pro_skhvalennia_kontseptsii_derzhavnoi_tsilovoi_ekonomichnoi_prohramy_rozvytku_avtomobilnykh_dorih_zahalnoho_korystuvannia_derzhavnoho_znachennia_na_2018-2022_roky/proekt_kontseptsii.doc
4. Road transport infrastructure development program of the region: improvement of main areas/Oleksandr Mordovtsev, Marian Tripak, Iaroslava Levchenko, Oksana Dmytriieva, Igor Britchenko//Innovative development of the road and transport complex: problems and prospects: monograph//Kharkiv: PC TECHNOLOGY CENTER, 2023. – P. 16-32
5. The National Road Construction Programme for 2014 – 2023 (with an outlook to 2025). annex to the resolution no. 156/2015 of the council of ministers of 8 september 2015, amended by the resolution no.76/200 of the council of ministers of 16 June [online:] https://www.gov.pl/web/infrastruktura/program-budowy-drog-krajowych-na-lata-2014-2023-z-perspektywa-do-2025-r
6. Fediai, N. (2018). Features of the integration of ukrainian transport infrastructure into the trans-european network transport. Efektyvna Ekonomika, 12. doi: https://doi.org/10.32702/2307-2105-2018.12.93
7. Levchenko, Ia., Dmytriiev, I., Dmytriieva, O., Shevchenko, I., Britchenko, I., Tripak, M. et al.; Dmytriiev, I., Levchenko, Ia. (Eds.) (2021). Problems and prospects of development of the road transport complex: financing, management, innovation, quality, safety – integrated approach. Kharkiv: PC TECHNOLOGY CENTER, 180.
8. Rudchenko, A. Yu., Polishchuk, O. N. (2017). Mechanism of the Megalopolis TransportInfrastructure Development State Regulation. Universytetski naukovi zapysky, 61, 93–100.
9. Dmytriieva, O. I. (2019). Spatial inequality and industry-regional asymmetry of innovative development of transport infrastructure in Ukraine. Bulletin of Sumy National Agrarian University, 3 (81), 51–58. doi: https://doi.org/10.32845/bsnau.2019.3.9
10. Holubka, S., Ovcha, P. (2018). Mechanisms of regulation of motor transport in the system of national economy. Ekonomika ta Derzhava, 9, 4–10.
11. Ovchynnikova, V. O., Ostroverkh, H. Ye., Pasich, Ya. V. (2017). Formation of personnel strategydomestic enterprises of autotransport. Visnyk ekonomiky transportu i promyslovosti, 60, 178–185
12. Jiang, X., Zhang, L., Xiong, C., Wang, R. (2015). Transportation and Regional Economic Development: Analysis of Spatial Spillovers in China Provincial Regions. Networks and Spatial Economics, 16 (3), 769–790
13. Polen: Straßentransport boomt, Infrastruktur schwach.- https://www.verkehrsrundschau.de/nachrichten/transport-logistik/polen-strassentransport-boomt-infrastruktur-schwach-2991989

Assessment and grading

Criteria for assessment of student performance, and the final score structure

Description of the final score structure, course requirements, and necessary steps to earn points, especially paying attention to self-study and individual assignments.

Grading scale

Total points	National	ECTS
90–100	Excellent	A
82–89	Good	B
75–81	Good	C
64–74	Satisfactory	D
60–63	Satisfactory	E
35–59	Unsatisfactory (requires additional learning)	FX
1–34	Unsatisfactory (requires repetition of the course)	F

Norms of academic integrity and course policy

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": to demonstrate discipline, good manners, kindness, honesty, and responsibility. Conflict situations should be openly discussed in academic groups with a lecturer, and if it is impossible to resolve the conflict, they should be brought to the attention of the Institute's management.
Regulatory and legal documents related to the implementation of the principles of academic integrity at NTU "KhPI" are available on the website:http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/

Approval

Approved by 30.08.2023 _____ Head of the department
Oleksii REBROV

30.08.2023 _____ Guarantor of the educational program
Mykola MITTSEL