Project

NATIONAL TECHNICAL UNIVERSITY
"KHARKIV POLYTECHNIC INSTITUTE"

METHODOLOGICAL GUIDELINES

for independent work in the discipline

"Introduction to the Specialty"

for full-time and part-time students

major: 274 "Automobile Transport"

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INTRODUCTION

The subject **"Introduction to the Specialty"** is the first specialized course that should give the student a deeper understanding of the future profession.

The ultimate goal of studying at the university is to become a highly qualified specialist in the field of automobile transport**.**
The profession of an automobile transport engineer is very diverse since, in addition to technical knowledge (the ability to design, test units and equipment, operate, maintain, and repair machinery), it is also necessary to possess management skills. These are aimed at meeting the needs of the country, enterprises, and individuals in transportation. Increasing the efficiency and quality of rolling stock operation is one of the urgent tasks of the transport process.

Acquiring the necessary knowledge at the university begins with the ability to organize one's activities, including issues of independent study of additional sections of the discipline. This is especially important since the curriculum of each subject contains a significant number of hours allocated for independent work.

1. PURPOSE AND TASKS OF STUDENTS' INDEPENDENT WORK

The formation in students of a system of ideas about the importance and necessity of the disciplines studied at a higher educational institution for acquiring scientific, professional knowledge and skills in the field of automobile transport, aimed at the application of new economic and organizational systems in the national economy. These systems ensure the possibility of using automobile transport with rational material and energy expenditures.

Independent student work is the most important part of the training of a higher education specialist.

Main tasks:

- formation of skills of independent creative work;
- gaining experience in planning and organizing working time;
- the ability to independently solve complex professional tasks.

For full-time students, **58 hours of independent work** are provided.

2. GENERAL RECOMMENDATIONS

Independent student work is a form of study that each student organizes for themselves.

It is important to use:

- the library and electronic catalog,
- periodicals and the NTU “KhPI” repository,
- electronic resources (including the university and department websites).

It is recommended to:

- keep lecture notes, recording the main concepts and definitions.

Students may receive consultations from the teacher during designated hours.

3. CONTENT OF TOPICS FOR INDEPENDENT WORK

3.1. Activities of NTU “KhPI” during the Second World War

- formation of companies and battalions of the people’s militia to fight fascist aggression;
- evacuation of the institute and organization of the educational process;
- return from evacuation and the first Heroes of the Soviet Union;
- new grades of steel for tanks and technologies for shell production;
- the price of victory of the polytechnic staff over fascism.

3.2. Content and requirements for the training of automobile profile specialists

- analysis of the syllabus of the discipline “Introduction to the Specialty”;
- organizational management structures of the University;
- structure of the NND MIT and management methods;
- principles of student self-government.

3.3. Analysis of the activities of world automobile companies

- leaders of the European car market;
- development of the American car market;
- features and prospects of the Asian car market.

3.4. History of the development of the Ukrainian automobile market

- the first cars of Ukraine;
- development of automobile manufacturing during the Soviet period;
- development of the automobile market during the independence period since 1991;
- development of the automobile market from 2000 to 2021;
- state of the automobile market during the full-scale Russian aggression.

3.5. World and domestic bus manufacturing

- origin of bus transport (late 19th – early 20th century);
- key global innovations in bus creation;
- modern world bus manufacturing;
- current state and prospects of the Ukrainian bus market.

3.6. Analysis of the development of the motorcycle manufacturing market

- the first motorcycle prototypes;
- development of the motorcycle industry in different countries;
- the role of motorcycles in military actions;
- design features of motorcycles and their evolution;
- classification of motorcycles;
- leading global motorcycle manufacturers;
- modern trends and development prospects.

3.7. Car tuning

- history and concept of car tuning;
- types of tuning;
- technical and operational aspects of car tuning;
- legal and regulatory aspects of tuning;
- social and cultural impact of tuning.

3.8. Hydrogen engines for cars

- history and stages of hydrogen engine development;
- design and principle of operation of the hydrogen engine;
- advantages and disadvantages of the hydrogen engine;
- current state and development prospects of the hydrogen engine.

3.9. World motorsport

- origin and stages of development of world motorsport;
- directions and types of motorsport;
- evolution of sports cars, new technologies;
- modern trends and prospects of motorsport.

3.10. International motor shows

- history and role of motor shows;
- the largest international auto shows: Geneva, Paris, Munich, Detroit, Tokyo, Shanghai, and Beijing;
- themes and expositions;
- impact of motor shows on the car market;
- modern trends in car development.

4. TEST QUESTIONS FOR MODULE WORK

1. Explain what professional knowledge, skills, and abilities a higher education specialist in the field of automobile transport should have.
2. Justify the importance of meeting professional requirements for the training of modern specialists for the development of automobile management.
3. Give the definition of the transport process and name its main elements.
4. Characterize the stages of organizing the transport process.
5. Explain the role of rolling stock and infrastructure in ensuring the efficiency of the transport process.
6. Justify the importance of planning and managing transportation for the transport process.
7. Name the main stages of the development of road transport in Ukraine and worldwide.
8. Characterize the impact of scientific and technological progress on the development of automobile transport.
9. Explain the role of road infrastructure in shaping the transport system.
10. Justify the importance of road transport development for the economy and society.
11. Give the definition of an internal combustion engine and name its main types.
12. Characterize the principle of operation of a four-stroke internal combustion engine.
13. Explain the main differences between gasoline and diesel engines.
14. Justify the role of internal combustion engines in the development of automobile transport.
15. Name the main stages of the formation and development of automobile manufacturing worldwide.
16. Characterize the development of automobile manufacturing in Ukraine.
17. Explain the impact of scientific and technological progress on the design and production of cars.
18. Justify the importance of automobile manufacturing for the development of the economy and the transport sector.
19. Give the definition of automobile transport and explain its place in the transport system.
20. Name the main components of the automobile transport structure.
21. Characterize the differences between freight and passenger automobile transport.
22. Explain the role of auxiliary services and enterprises in the structure of automobile transport.
23. Give the definition of “vehicle operability” and name the main indicators of its assessment.
24. Characterize the main factors affecting the operability of vehicles.
25. Explain the importance of maintenance and repair for maintaining vehicle operability.

26. Justify the role of diagnostics in the system of ensuring vehicle operability.
27. Give the definition of vehicle technical operation and reveal its subject and tasks.
28. Characterize the main directions of technical operation as a scientific field.
29. Explain the importance of vehicle technical operation in the system of training specialists in the transport industry.
30. Justify the role of technical operation as an academic discipline in shaping students' professional competencies.
31. Give the definition of "branded vehicle maintenance" and explain its features.
32. Name the main types of work performed during branded vehicle maintenance.
33. Characterize the advantages and disadvantages of branded maintenance compared to independent service stations.
34. Explain the role of branded maintenance in ensuring vehicle reliability and durability.
35. Give the definition of a modern auto center and name its main functions.
36. Characterize the structure of a modern auto center and the purpose of its main departments.
37. Explain the importance of auto center infrastructure in ensuring quality customer service.
38. Justify the role of modern auto centers in the development of automobile transport and service.
39. Give the definition of alternative fuels and provide examples of their use in automobile transport.
40. Characterize the main advantages and disadvantages of alternative fuels compared to traditional ones.
41. Explain the role of environmentally safe fuels in reducing the harmful impact of transport on the environment.
42. Justify the prospects for the development and implementation of alternative fuels in automobile management.
43. Give the definition of technical and operational characteristics of a vehicle and explain their differences.
44. Name the main technical characteristics of a vehicle and explain their significance.
45. Characterize the main operational indicators of a vehicle and the factors influencing them.
46. Explain the importance of technical and operational characteristics for the selection and use of a car.
47. Give the definition of vehicle technical operation and its main tasks.
48. Name the principles of organizing vehicle technical operation.
49. Characterize the main activities of the technical operation system.
50. Explain the importance of technical operation for ensuring vehicle reliability and safety.
51. Give the definition of an electric vehicle and name its main components.
52. Characterize the principle of operation of a car's electric drive.

53. Explain the main advantages and disadvantages of electric vehicles compared to ICE cars.
54. Justify the prospects for the development of electric vehicles in the global and Ukrainian transport systems.
55. Give the definition of a filling station and name its main functions.
56. Characterize modern types of electric vehicle charging terminals and their features.
57. Explain the differences in the organization of work between traditional filling stations and EV charging stations.
58. Justify the importance of developing the infrastructure of filling stations and charging terminals for the future of automobile transport.
59. Name the leading world automobile companies and characterize their role in the development of the automobile industry.
60. Explain the main factors of successful activity of global automobile corporations.
61. Characterize modern trends in the development of the global automobile business.
62. Justify the importance of innovations and environmental standards in the strategies of leading automobile companies.
63. Name the main stages of the formation of the automobile market in Ukraine.
64. Characterize the impact of economic and political factors on the development of the Ukrainian automobile market.
65. Explain the role of domestic manufacturers in shaping the national automobile market.
66. Justify the importance of imports and international cooperation for the development of the Ukrainian automobile market.
67. Name the main stages of the development of world bus manufacturing and its key trends.
68. Characterize the history of the formation and development of bus manufacturing in Ukraine.
69. Explain the differences between design solutions of global and domestic bus manufacturers.
70. Justify the role of bus manufacturing in the development of passenger transportation.
71. Give a description of the current state of the world motorcycle market.
72. Name the main motorcycle manufacturers in the world and characterize their products.
73. Explain the features of the development of the domestic motorcycle industry.
74. Justify the influence of demand, environmental, and technological factors on the formation of the motorcycle market.
75. Give the definition of car tuning and name its main directions.
76. Characterize technical tuning and its impact on vehicle performance.
77. Explain the features of external (design) car tuning.
78. Justify the advantages and possible risks of applying tuning in car operation.
79. Give the definition of a hydrogen engine and name its main types.

80. Characterize the principle of operation of an internal combustion engine running on hydrogen fuel.
81. Explain the advantages and disadvantages of using hydrogen engines in transport.
82. Justify the prospects for the development of hydrogen technologies in automobile manufacturing.
83. Name the main stages of the formation and development of world motorsport.
84. Characterize the most important international motorsport competitions and their significance.
85. Explain the influence of motorsport on the development of automobile manufacturing and new technologies.
86. Justify the role of motorsport in shaping the popularity of automobile culture worldwide.
87. Give the definition of an international motor show and name its main functions.
88. Characterize the history of the development of international motor shows.
89. Explain the importance of international motor shows for the development of the automobile industry and market.
90. Justify the role of motor shows in introducing innovations and promoting new technologies.

5. ABSTRACT WORK (REPORT)

In the first half of the autumn semester, the student performs an abstract work.

Purpose of this work:

- broader acquaintance with the world of automobile manufacturing;
- analysis of global markets for the sale of passenger and freight vehicles;
- analysis of the problems of the modern Ukrainian automotive industry;
- acquaintance with novelties of the world automobile industry;
- acquaintance with the features of sports and racing cars.

6. REQUIREMENTS FOR THE CONTENT AND DESIGN OF THE ABSTRACT

The explanatory note of the abstrac**t** is prepared using the *Word* text editor with the insertion of fragments from other programs.

Sequence of preparation:
1 – title page (see Appendix A);
2 – content of the explanatory note;

3 – disclosure of the topic of the abstract (abstract topics – in Appendix B);
4 – list of references used.

Requirements:

- The explanatory note must be submitted in printed form on A4 sheets.
- Font – *Times New Roman*, size 14, line spacing – 1.5.
- Number of pages – 10…15 p.
- Text formatted to page width.
- The text part should be formatted in accordance with the NTU "KhPI" standard [9].

The abstract must include:

- text part,
- explanatory material in the form of drawings, photographs, comparative tables, graphs, and diagrams.

If the chosen topic is presented in the form of a report, a **presentation (pptx format)** is provided with the text part, drawings, photographs, diagrams, etc.

LIST OF SOURCES USED

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Appendix A

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

National Technical University ‘KhPI’

Department of ‘Automobile and Tractor Engineering’

ABSTRACT

on the subject

‘Introduction to the Speciality’

topic

«_____»

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Reviewed by: Associate Professor Agapov O.M.

Kharkiv

2025

Appendix B

TOPICS FOR ESSAYS (REPORTS) TO BE FREELY CHOSEN BY STUDENTS

1 The motor vehicle fleet of Ukraine

2 Freight transport in Ukraine

3 Urban transport in Kharkiv

4 Motor vehicles and the environment

5 Container transport

6 Transport and passengers.

7 Bus fleet of Ukraine in the pre-war period

8 Comprehensive programme for the development of motor transport in Ukraine

9 The importance of modern motor shows

10 Road safety

11 Forecasting the road traffic situation.

12 Collective safety on the road

13 Hydrogen car engine

14 The influence of motor sports on the design of car components and assemblies

15 Modern service stations (STO)

16 Fuel economy in motor transport.

17 Motorisation and transport culture

18 Passenger cars: development prospects, new developments.

19 Fuel and energy problems in transport.

20 New types of fuel for cars

21 Car tuning

22 The emergence of the driving profession and its prospects

23 Technical devices that monitor driver performance

24 The car of the future.

25 ATP, structure, organisation of work

26 Modern trends in passenger car design

27 The history of the development of the car

28 The history of the development of the motorcycle

29 Flying cars

30 Electric cars

31 Active and passive car safety

32 Petrol stations and petrol station complexes

33 Gas filling stations

34 Modern types of car parks and parking lots

35 The ‘Assistance’ programme of leading automotive corporation