

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
LVIV POLYTECHNIC NATIONAL UNIVERSITY**

«APPROVED»

Rector of Lviv Polytechnic National
University

_____ /Y. Bobalo/

«___» _____ 2021

EDUCATIONAL AND SCIENTIFIC PROGRAM

**Of third (educational and scientific) level of higher education
in specialty 274 "Automotive transport"
fields of knowledge 27 "Transport"**

**Qualification: Doctor of Philosophy in the field of "Transport"
in the specialty "Motor Vehicle Transport"**

Considered and approved by
University Academic Council
(Protocol No. _____
from «___» _____ 2021)

AGREEMENT LETTER
Of educational and scientific program

High Education level
Knowledge field
Speciality
Qualification

Third (educational and scientific)
27: Transport
274 «Motor Vehicle Transport»
Philosophy Doctor of Motor Vehicle transport

DEVELOPED AND APPROVED

By scientific and methodical commission of
«Automotive transport» speciality
Protocol No. _____

Head of SMC of speciality
_____ B. Kindratskyy

APPROVED

Vice-rector of scientific work of Lviv Polytechnic
National University

_____ I. Demydov

«____»_____2021

Head of the Educational and Methodological
Department of the University

_____ V. Sviridov

«____»_____2021

RECOMMEND

By scientific and methodical council
of university
Protocol No. _____

«____»_____2021

Head of SMC of university

_____ A. Zagorodniy

Director of Institute of Mechanical Engineering
and Transport

_____ O. Lanets

«____»_____2021

PREFACE

It was developed by the working group for ensuring educational and scientific program quality, according to which studying of applicants at the third (educational and scientific) level of higher education in the specialty 274 «Motor Vehicle Transport» is carried out as part of:

Head of working group (guarantor):

B. Kindratskyy - Doctor of Sciences, professor, head of motor vehicle transport department

Members:

G. Gudz - Doctor of Sciences, professor, professor of motor vehicle transport department
V. Brytkovskiy - Candidate of Technical Sciences, associate professor, associate professor of motor vehicle transport department
I. Dmytriv - Candidate of Technical Sciences, associate professor, associate professor of motor vehicle transport department
M. Globchak - Candidate of Technical Sciences, associate professor, associate professor of motor vehicle transport department
R. Kachmar - Candidate of Technical Sciences, associate professor, associate professor of motor vehicle transport department
S. Niemyi - Candidate of Technical Sciences, associate professor, associate professor of motor vehicle transport department
Y. Porohovskiy - Candidate of Technical Sciences, associate professor, associate professor of motor vehicle transport department
N. Zinkevych - general director of «Галичина-авто» PJSC
M. Shkurgan - general director of «Фіакр-Львів» LLC
Y. Baranets - director of «УКРКАРС» LLC
V. Omelchuk - director of «Радар Сервіс» LLC
A. Stetsiuk - member of student board and professional bureau of the Institute of Mechanical Engineering and Transport

The project of the educational and scientific program was discussed and approved at the session of the Academic Council of the Educational and Scientific Institute of Mechanical Engineering and Transport

Protocol No. ____ of «____» _____ 2021

Chairman of the Scientific Council of IMET

Doctor of Sciences, professor

(signature)

O. Lanets

Approved and brought into force

By order of the Rector of Lviv Polytechnic National University

from «____» _____ 2021 No. _____.

This educational and scientific program may not be fully or partially reproduced, duplicated and distributed without the permission of Lviv Polytechnic National University.

I. EDUCATIONAL COMPONENT OF THE EDUCATIONAL AND SCIENTIFIC PROGRAM

1. Profile of the Doctor of Philosophy program from the field of knowledge 27 Transport specialty 274 Motor Vehicle Transport

1. General information	
Full name of the higher education institution and structural unit	Lviv Polytechnic National University
The full title of the qualification in the original language	Доктор філософії з галузі <i>Транспорт</i> за спеціальністю <i>Автомобільний транспорт</i> Doctor of Philosophy in <i>Transport</i> by Specialty of <i>Motor Vehicle Transport</i>
The official name of the educational and scientific program	АВТОМОБІЛЬНИЙ ТРАНСПОРТ Motor Vehicle Transport
Type of diploma and scope of the educational program	Diploma of Doctor of Philosophy, single, 43 ECTS credits of the educational and scientific program educational component, the time of the educational and scientific program educational component is 1.5 years
Cycle/level	8th level of Ukraine NQF, third cycle of FQ-EHEA, 8th level of EQF-LLL
Prerequisites	Master level of higher education
Language(s) of teaching	Ukrainian
Basic concepts and their definitions	The educational and scientific program uses the main concepts and their definitions in accordance with the Law of Ukraine "On Higher Education" dated 07/01/2014 No. 1556-VII as amended, the Law of Ukraine "On Scientific and Scientific and Technical Activities" dated 11/26/2015 No. 848-VIII with changes and additions, Order of higher education applicants for the degree of doctor of philosophy and doctor of sciences in higher educational institutions (scientific institutions), approved by Resolution of the Cabinet of Ministers No. 261 dated 03/23/2016
2. The purpose of the educational and scientific program	
	To deepen theoretical knowledge, practical skills and abilities in the field of Transport with a specialization in Motor vehicle transport, to develop philosophical and linguistic competences, to form universal skills of a researcher, sufficient for the conduct and successful completion of scientific research and further professional and scientific activities
3. Characteristics educational and scientific programs	
Subject area (field of knowledge, specialty)	Field of knowledge is 27 Transport, specialty is 274 Motor vehicle transport
Orientation of the educational and scientific program	The educational and scientific program is based on fundamental postulates mechanics and the results of modern scientific research in the field of management, operation and service of road transport. It is aimed at the development of the theoretically methodological and methodologically applied base of transport with focusing on the latest trends in the development of transport, which deepens the professional scientific outlook and provides the basis for conducting scientific research and further professional and scientific activities
Features of the program	Educational and scientific the program covers a wide range of modern innovative vectors of the development of the theory and practice of

	transport, which forms an actual theoretical and applied basis for conducting scientific research
4. Suitability graduates educational and scientific programs to employment and further education	
Suitability for employment	Jobs in public and private higher education institutions, scientific and research institutions as teachers and researchers, in enterprises and organizations of various types of activities and forms of ownership in manager positions
Further education	Scientific program of the fourth (scientific) level of higher education, Doctor of Science
5. Teaching and assessment	
Teaching and learning	A combination of lectures and practical classes, pedagogical practice, consulting with a scientific supervisor, a scientific and pedagogical community, and independent scientific and educational work
Assessment	Exams, credits, current control
6. Software competencies	
Integral competence (INT)	The ability to produce innovative scientific ideas, to master the methodology of scientific and pedagogical activity, to solve complex problems in the process of innovative research and professional activity, to conduct original scientific research in the field of transport at the international and national level.
General competences (CG)	<ol style="list-style-type: none"> 1. Mastering general scientific (philosophical) competences aimed at forming a systematic scientific worldview, professional ethics and a general cultural worldview; application of modern information technologies in scientific activities (work with scientific metric databases, automatic generation of links to literary sources, etc.). 2. Acquisition of linguistic competences sufficient to present and discuss the results of one's scientific work in a foreign language in oral and written form, as well as to fully understand foreign language scientific texts in the relevant specialty, use of modern information technologies (presentation of scientific results). 3. Acquisition of universal skills of a researcher, in particular, organization and conduct of training sessions, use of modern information technologies (working with virtual education environment (VEE), Microsoft Teams, Zoom, etc.). 4. Acquisition of universal researcher skills, in particular speaking and written presentation of the results of one's own research in Ukrainian, management of scientific projects and/or preparation of proposals for financing scientific research, registration of intellectual property rights, application of modern information technologies. 5. Acquisition of universal skills of a researcher, in particular, organization and conduct of training sessions, use of modern information technologies (working with VEE, Microsoft Teams, Zoom, etc.).
Professional competences (PC)	<ol style="list-style-type: none"> 1. Acquiring in-depth knowledge of the specialty in which the graduate student conducts research, in particular, assimilation of basic concepts, understanding of theoretical and practical problems, the history of development and the current state of scientific knowledge in the chosen specialty, mastering the terminology of the researched scientific direction. 2. Thorough knowledge of the optimal management methods of the working condition maintaining processes of the fleet of motor vehicles and designing the appropriate system for their effective operation. 3. In-depth knowledge of the patterns of changes in the technical condition

	<p>of the fleet of motor vehicles, methods of maintaining a serviceable technical condition, the methodology of forming a system of indicators of their reliability.</p> <p>4. Ability to apply knowledge of methods of analysis, synthesis and optimization of complex objects and systems using modern information technologies.</p> <p>5. Deep knowledge operational properties, natural and mathematical modeling of intelligent car systems.</p> <p>6. Thorough knowledge of the regulatory and legal basis of decommissioning cars, methods and technologies of recycling and disposal of operating fluids, materials, parts and units of the car.</p> <p>7. Knowledge of ways to improve the operational properties of devices and devices of automotive on-board automation, a complex of automated means that ensure the receipt, transformation and transmission of information for remote control of the technical condition and functioning of automotive vehicles.</p> <p>8. Thorough knowledge of the theory of calculation of working processes and indicators of operational efficiency of hybrid and electric cars, features of their diagnosis, maintenance and repair.</p> <p>9. Acquiring in-depth knowledge of the theory of mechanical vibrations, the methodology of research of vibrational phenomena in drives and suspension systems of cars, dynamics of movement, stability and controllability of vehicles.</p> <p>10. Knowledge of modern methods of planning an experiment, conducting it and processing the obtained results.</p>
7. Program learning outcomes	
Knowledge (KN)	<p>1. Ability to demonstrate in-depth knowledge of historical and modern conceptual-methodological and methodical foundations of transport.</p> <p>2. Ability to demonstrate in-depth knowledge of domestic and foreign research and practical experience in the field of transport.</p> <p>3. Ability to demonstrate in-depth knowledge of processes receiving, transforming and transmitting information for remote control of the technical condition and motor vehicles functioning.</p> <p>4. The ability to demonstrate in-depth knowledge and understanding in the field of real-life and mathematical modeling of intelligent car systems, planning and conducting experiments.</p> <p>5. The ability to demonstrate knowledge and understanding of the philosophical methodology of scientific knowledge, psychological and pedagogical aspects of professional and scientific activity, one's own scientific outlook and moral and cultural values.</p> <p>6. The ability to demonstrate sufficient knowledge of the English language, necessary for oral and written presentation of the results of scientific research, conducting a professional scientific dialogue, full understanding of English-language scientific texts.</p> <p>7. The ability to develop methods and technologies of recycling and disposal of operating fluids, materials, car parts and units.</p> <p>8. Ability to develop, plan and implement methods of safe activity in the field of road transport.</p>
Skill (SK)	<p>1. Choose and apply the methodology and tools of scientific research when conducting theoretical and empirical research in the field of transport.</p> <p>2. Conduct scientific research and implement scientific projects based on the identification of current scientific problems, definition of goals and</p>

	<p>objectives, formation and critical analysis of the information base, substantiation and commercialization of research results, formulation of author's conclusions and proposals.</p> <p>3. Develop a system for maintaining the working condition of the fleet of motor vehicles.</p> <p>4. Solve scientific and applied problems and make informed decisions in the field of transport.</p> <p>5. Develop and apply information transfer standards and protocols for remote monitoring of the technical condition and functioning of motor vehicles.</p> <p>6. Carry out real-life and mathematical modeling of intelligent car systems using modern methods and tools.</p> <p>7. To develop methods and technologies of recycling and disposal of operating fluids, materials, parts and units of the car.</p> <p>8. Conduct a scientific conversation and discussion in Ukrainian and English at an appropriate professional level, present the results of scientific research in oral and written form, organize and conduct training sessions.</p>
Communication (COM)	<p>1. The ability to communicate in business scientific and professional language, to use different speech styles, communication methods and techniques, to demonstrate a wide scientific and professional vocabulary.</p> <p>2. The ability to use modern information and communication tools and technologies to ensure effective scientific and professional communications.</p>
Autonomy and responsibility (A&R)	<p>1. Ability to independently conduct scientific research and make decisions.</p> <p>2. Ability to formulate own author's conclusions, proposals and recommendations.</p> <p>3. The ability to realize and bear personal responsibility for the obtained research results.</p>
8. Resource support for the implementation of the educational program	
Specific characteristics of staffing	100% of scientific and pedagogical workers involved in teaching a cycle of disciplines that provide special (professional) competencies of a graduate student have scientific degrees and academic titles.
Specific characteristics of material and technical support	Use of modern software: MATLAB, Simulink, Mathcad, Autodesk AutoCAD, Microsoft Teams, Zoom (Video Communications)
Specific characteristics of informational and methodological support	The use of the virtual learning environment of the Lviv Polytechnic National University and author's developments of research and teaching staff
9. Academic mobility	
National credit mobility	On the basis of bilateral contracts between Lviv Polytechnic National University and universities of Ukraine
International credit mobility	Within the framework of the EU Erasmus+ program on a bilateral basis contract between Lviv Polytechnic National University and educational institutions of partner countries
Education of foreign graduate students	It is possible after studying the Ukrainian language course

2. Distribution of the educational component content of the educational and scientific program by component groups and educational cycles

No a/o	Educational cycles	The amount of study load of a graduate student (credits / %)		
		Mandatory components of the educational component	Elective components of the educational component	In total for the entire teaching term
1	Cycle of disciplines that form general scientific competences and universal skills of the researcher	21/49	3/7	24/56
2	Cycle of disciplines forming professional competences	10/23	6/14	16/37
3	Cycle of subjects of free choice of a graduate student	–	3/7	3/7
Total for the entire period of study		31/72	12/28	43/100

3. List of parts of the educational component of the educational and scientific program

Code e/d	Parts of the educational component	Number of credits	Form summary control
Mandatory components of the educational component			
<i>Cycle of disciplines that form general scientific competences and universal skills of the researcher</i>			
MD1.1.	Philosophy and methodology of science	3	exam
MD1.2.	A foreign language for academic purposes, part 1	4	credit
MD1.3.	A foreign language for academic purposes, part 2	4	exam
MD1.4.	Professional pedagogy	3	credit
MD1.5.	Academic entrepreneurship	4	credit
MD1.6.	Pedagogical practice	3	not diff. credit
Total per cycle:		21	
<i>Cycle of disciplines forming professional competences*</i>			
MD2.1.	System analysis on transport	4	exam
MD2.2.	Research seminar in the field of transport	3	credit
MD2.3.	Modeling and optimization of road transport processes and systems	3	credit
Total per cycle:		10 (3+3+4)	
Elective components of the educational component			
<i>Cycle of disciplines that form general scientific competences and universal skills of the researcher*</i>			
SD1.1	Business Foreign Language	3	credit
SD1.2	Psychology of creativity and invention	3	credit
SD1.3	Management of scientific projects	3	credit
SD1.4	Technology of grant applications and patent rights registration	3	credit
SD1.5	Rhetoric	3	credit
SD1.6	Modern inventions in research activities	3	credit
SD1.7	Open scientific practices	3	credit
SD1.8	Academic integrity and quality of education	3	credit
SD1.9	Methodology of scientific publications preparation	3	credit
SD1.10	Quality of higher education (formation of internal quality assurance systems)	3	credit
Total per cycle:		3	

<i>Cycle of disciplines forming professional competences**</i>			
SD2.1	Scientific concepts of cars operation and maintenance organization	3	exam
SD2.2	Hybrid and electric vehicles	3	exam
SD2.3	Intelligent vehicle systems	3	exam
SD2.4	Autonics and telematics	3	exam
SD2.5	The latest technologies of recycling and disposal of cars	3	exam
SD2.6	Theory and practice of scientific research in the field of transport	3	exam
SD2.7	Sustainable development of road transport	3	exam
SD2.8	Innovative technologies in the automotive industry	3	exam
SD2.9	Theory of mechanical vibrations	3	exam
SD2.10	Planning the experiment and processing the obtained results	3	exam
Total per cycle:		6 (3+3)	
<i>Disciplines of the graduate student's free choice***</i>			
SD3.1	Discipline of the graduate student's free choice	3	
Total per cycle:		3	
Together:		43	

Note: * – pedagogical practicum can take place in the II or III year of study;

** – a graduate student can choose disciplines from clause 1.2; clause 2.2, clause 3 (selective and free-choice), while the share of these subjects must be at least 25% of the total number of ECTS credits.

4. Matrix of correspondence of program competences educational components

	MD1.1	MD1.2	MD1.3	MD1.4	MD1.5	MD1.6	MD2.1	MD2.2	MD2.3	SD1.1	SD1.2	SD1.3	SD1.4	SD1.5	SD1.6	SD1.7	SD1.8	SD1.9	SD1.10	SD2.1	SD2.2	SD2.3	SD2.4	SD2.5	SD2.6	SD2.7	SD2.8	SD2.9	SD2.10	
INT	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
GC1	+																+													
GC2		+	+							+								+												
GC3				+										+	+															
GC4					+						+	+	+	+		+														
GC5						+													+											
PC1							+	+	+											+	+	+	+	+		+	+	+		
PC2									+												+							+		
PC3							+														+							+		+
PC4							+		+												+									+
PC5									+													+								+
PC6																							+				+			
PC7																						+	+							
PC8									+												+	+	+							
PC9																										+			+	+
PC10																				+										+

Description: MDi is a mandatory discipline, SDi is a selective discipline, i is the number of the discipline in the list of components of the educational component, INT is integral competence, GCj is general competence, PCj is professional (special) competence, j is the competence number in the list of competencies of the educational component.

**5. Matrix of provision of program learning results
relevant components of the educational component**

	MD1.1	MD1.2	MD1.3	MD1.4	MD1.5	MD1.6	MD1.7	MD2.1	MD2.2	MD2.3	SD1.1	SD1.2	SD1.3	SD1.4	SD1.5	SD1.6	SD1.7	SD1.8	SD1.9	SD1.10	SD2.1	SD2.2	SD2.3	SD2.4	SD2.5	SD2.6	SD2.7	SD2.8	SD2.9	SD2.10	
KN1									+							+					+								+		
KN2								+													+		+	+	+				+		
KN3																								+	+						+
KN4										+																				+	
KN5	+			+							+						+	+	+		+										
KN6		+	+																												
KN7																										+					
KN8																						+						+			+
PR1									+																		+				+
PR2					+						+		+				+		+								+				+
PR3																						+		+							
PR4										+															+			+			+
PR5																									+						
PR6										+													+				+			+	+
PR7																						+				+					
PR8		+	+	+		+			+																						
COM1															+	+					+										
COM2				+		+																									
A&R1										+																	+			+	+
A&R2								+															+								
A&R3									+								+	+	+							+					+

Description: MDn – mandatory discipline, SDn – selective discipline, n – number of the discipline in the list of components of the educational component, KNm – program results (knowledge), PRm – program results (skills), m – number of the program result in the list of program results of the educational component.

II. The scientific component of the educational and scientific program

The scientific component of the educational-scientific program involves the postgraduate student conducting his own scientific research under the guidance of one or two academic supervisors and the preparation of his results in the form of a dissertation.

The dissertation for obtaining the Doctor of Philosophy degree is an independent detailed study that offers a solution to an actual scientific and applied task in the specialty 274 Motor Vehicle transport, the results of which are characterized by scientific novelty and practical value and are published in relevant publications.

The scientific component of the educational-scientific program is drawn up in the form of an individual plan of scientific work of a postgraduate student and is an integral part of the postgraduate curriculum.

Preparation and publication of scientific articles, speeches at scientific conferences, scientific professional seminars, round tables, symposia are an integral part of the scientific component of the postgraduate educational and scientific program.

Subjects of scientific research in specialty 274 "Motor Vehicle Transport"

1. Development of new and improvement of existing science-based strategies, regimes and programs for maintenance and repair of means of transport.
2. Justification of operational requirements for transport equipment, determination of the parameters of the necessary repair and operation infrastructure.
3. Creation of scientific foundations and methods of parameter calculation and resource management, reliability and technical condition of transport equipment.
4. Development of methods of increasing the efficiency of the operation of vehicles and their functional systems, equipment and means of ensuring their efficiency.
5. Research methods and technological processes of maintenance and repair of transport equipment.
6. Development of technical means of mechanization and automation of maintenance and repair processes, improvement of organization, methods, means and technologies of repair works.
7. Research and development of complex methods of guaranteeing safety in transport: traffic safety, safety of use of vehicles, environmental safety.
8. Development of resource-saving, environmentally friendly operating technologies, methodological principles and engineering methods for identifying the causes of transport accidents and their prerequisites.
9. Study of the efficiency of the functioning of energetic vehicle control systems, development and implementation of engineering measures, means and methods of improving the quality of operation, maintenance and repair of transport equipment.
10. Research and development of methods of increasing the efficiency of control of the technical condition of transport equipment, establishing regularities of changes in

condition parameters during operation.

11. Development and implementation of methods, tools for diagnosing and forecasting the technical condition of means of transport, which ensure high efficiency of their use and reliability of work.

12. Research and development of methods of improving the tactical and technical and operational characteristics of vehicles, substantiation of operational requirements for their maintainability and repair technology.

13. Research and development of a set of technical measures for the development and effective use of transport facilities, substantiation of requirements for transport facilities and their equipment.

14. Improvement of means, technology, conditions of transportation of goods, passengers and luggage, methods of operational management of overloading processes at nodes of the transport network.

15. Study of the influence of operational factors on the performance of vehicles, their optimization.

16. Development of methods for increasing fuel efficiency, improving the environmental performance of vehicles in operating conditions.

17. Development of rational systems and substantiation of means of complex mechanization and automation of loading and unloading operations on transport.

18. Protection of the environment from the harmful effects of means of transport at all stages of the life cycle. Development of methods of disposal and recycling of means of transport.

19. Creation of scientific foundations of technical operation and service of vehicles running on alternative sources of energy.

20. Development of algorithms and methods of mathematical and computer modeling of intelligent car systems.

21. Calculation of working processes and indicators of operational efficiency of hybrid and electric cars, features of their diagnosis, maintenance and repair.

22. Development of standards and data transfer protocols between electronic control units, types of diagnostics of electronic control systems of units and car systems.

III. Attestation of graduate students

Attestation of higher education applicants with the degree of doctor of philosophy is carried out by a specialized scientific council, permanently active or formed for a one-time defense, on the basis of a public defense of scientific achievements in the form of a dissertation.

A mandatory condition for admission to the defense is the successful completion of the graduate student's individual study plan.

Candidates of higher education for the degree of Doctor of Philosophy defend their dissertations, as a rule, in a permanent specialized academic council for the relevant specialty, which functions in the higher educational institution where the graduate student

was trained. The academic council of a higher educational institution has the right to submit documents to the National Agency for Quality Assurance of Higher Education for the accreditation of a specialized academic council formed for a one-time defense, or to apply to another higher educational institution where a permanent specialized academic council in the relevant specialty operates.

The minimum volume of the main text of the dissertation is 4.0 author's pages.

Candidates of higher education with the degree of Doctor of Philosophy are obliged to comply with the norms of the "Regulations on academic integrity at the Lviv Polytechnic National University" while studying and conducting scientific research. The dissertation cannot contain academic plagiarism, falsification, or plagiarism.

The dissertation must be in the repository of the Lviv Polytechnic National University.

Dissertations that contain information with limited access should be published in accordance with the requirements of current legislation

