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Studies and Report on curricula, needed to the labour market of Ukraine and Moldova

Deliverable D1.3

CONTENT

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1. Introduction

In order to clarify the demand to future specialists, the project partners provided a preliminary analysis of stakeholder's needs at the preparation stage of the project proposal. In WP1, Moldavian and Ukrainian universities have to finalise the survey of representatives of industry, research institutions, HEIs and professional association.
Moldavian and Ukrainian partners arrange a survey of potential employers using appropriate means for each group of stakeholders: internet forms, e-mail, interviews and focus groups. For this purpose, special questionnaires have been developed by the RTU and adopted by partner' university
The project partners have intention by the end of DIGITRANS to get additional feedback from MD and UA representatives in order to get more comprehensive analysis of the labour market.
Based on these inputs the matrix of competences and profile of the required specialists will be created in each MD-UA university
A Report – analyses of survey results should be submitted to MC members. Workshop 2 to be held in Athens for discussion and elaboration the finding of the Report, which will be used for curriculum, syllabuses, didactic materials.

2. Methodology

The overall approach aims to ensure that the curricula are developed and adjusted according to stakeholders' needs. This approach should be implemented in five key stages:

- Gap analysis includes existing curricula analyses, elaboration of best practices of EU partners, and input from the industry representatives.
- Development of new curricula: learning, teaching, didactic materials, and development of learning tools.
- Accreditation of the courses and education programs.
- Ongoing obtaining of the feedback from teachers and students.
- New and modernized course testing and feedback collection from stakeholders.
- Post-ante evaluation and feedback from potential employers, other stakeholders, and external quality assurance experts. Post-project enhancement of the curricula will be continued beyond the duration of the DIGITRANS project in cooperation with industrial partners and other potential employers.

As potential employers have been involved in the development of new curricula throughout the lifecycle of the project, we arrange two surveys: the first one in the beginning of the project in a frame of WP1, and second one at the final stage of the project, in WP4. For the project team, it is crucial to get an evaluation of the learning outcomes from the experts, who represent the industry and employers (see Fig.1).

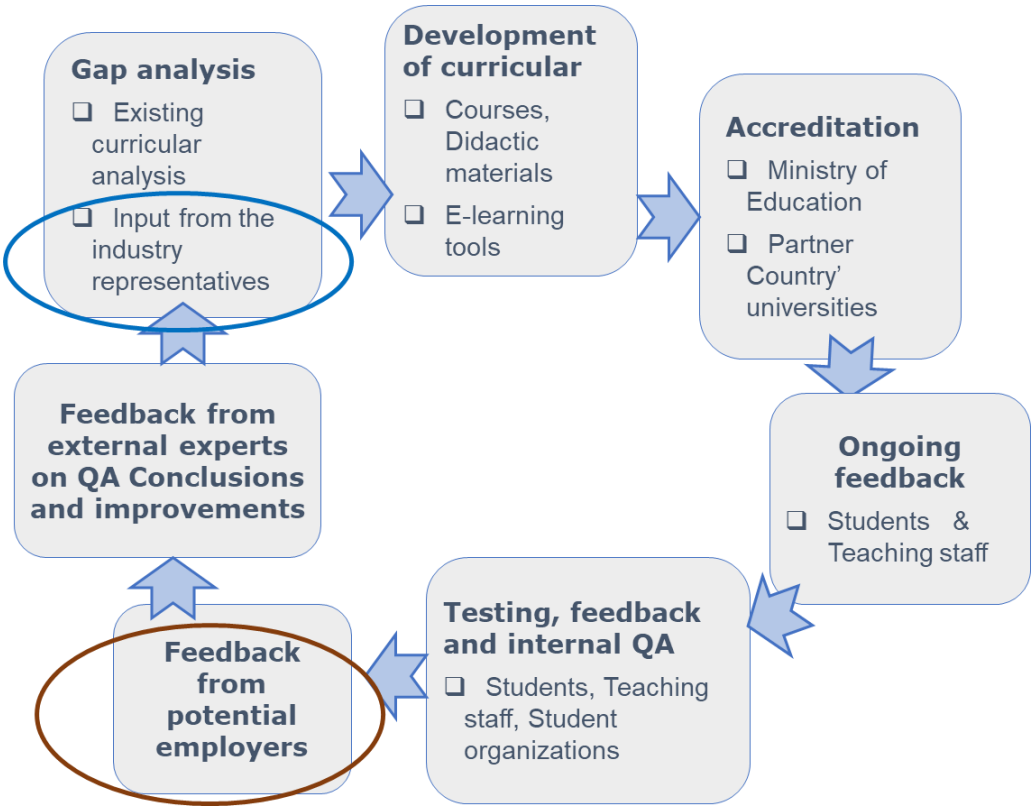

Figure 1. Feedback from stakeholders on learning outcomes

The objectives of this survey are:

- To review the study programmes and courses that MD and UA universities plan to develop and modernise in the DIGITRANS project.
- To clarify and develop a better understanding of the requirements that stakeholders impose on the training and qualification programs of graduates of a practice-oriented magistracy;

The survey data will be used by Moldavian and Ukrainian universities to evaluate the relevance of the proposed curricula and study programmes, courses, laboratory works in preparing and training current bachelor's and master's students and guiding them in becoming practice-oriented future employees in the digital world.

For the review, ***two types of questionnaires*** were proposed:

1. Questionnaire of peer review envisaged for the experts from from research, scientific institutes and academy (Attachment 1).
2. Questionnaire of peer review envisaged for the experts from enterprises, businesses, and NGOs (please refer to attachment 2).

Each questionnaire included two types of questions. The first type of question focused on soliciting demographic information on experts (e.g., age, position, professional experience in education, science and industry, and gender), while the second type of questions solicited information on experts' opinion on the quality of curricula and/or study programmes and suggestions for improving curricula and study programmes.

Each expert, depending on their experience in the field of education, should be offered several approved curricula and courses/laboratory study programs. The questionnaires, along with the approved curricula and (or) programmes, should be submitted to experts by the appropriate media.

The analysis of the results is presented in the form of two tables. The respondents were asked to provide comments on the need to clarify the programmes of the courses, which would allow tuning the programmes after the testing is completed.

Considering that the partner's universities developed new curricula for different areas of specialization and that a very broad range of stakeholders was involved in the survey, the partners could adjust the questionnaires and summary tables, according to their specific needs.

3. Obtaining feedback from the stakeholders

3.1 Chernihiv Polytechnic National University

Time of the survey

The survey of the representatives of academic and scientific staff, as well as the representatives of potential employers, was conducted in March 2024

Participants in the survey

In total, 6 academic staff representatives and 6 employers (including project partner - SNT Ukraine company) participated in the survey (see Tab. 3.1.1.).

The reason of selection of particular respondents:

The survey involved respondents who are experienced specialists in the fields of science related to digitalization processes, namely: computer engineering, industrial automation, electronics, electrical engineering and electromechanics, robotics, military equipment. Among representatives of industry, preference was given to representatives of enterprises that are interested in training specialists in the above areas, including military organizations. As for academic representatives, the heads of departments of leading technical universities of Ukraine and experienced scientists of the National Academy of Sciences of Ukraine took part in the survey. The general principles of the selection of experts for this survey were their high competence and broad representation both in terms of coverage of different regions of Ukraine and professional activity, including military-technical directions.

Table 3.1.1. List of Scientific, academic staff and employers who participated in the survey on the developed courses.

Number	Academic staff	Position
1	Oleh Bisikalo	Head of the Automation and Intelligent Information Technologies department, Vinnytsia National Technical University
2	Yurii Denysov	Head of Electronics, Automation, Robotics and Mechatronics department, Chernihiv Polytechnic National University
3	Volodymyr Opanasenko	leading researcher of Microprocessor Technology department, V/V Glushkov Institute of Cybernetics of the National Academy of Sciences of Ukraine
4	Oleksandr Shefer	Head of Automation, Electronics and Telecommunications department, National University "Poltava Polytechnic named after Yury Kondratyuk"
5	Volodymyr Voloschuk	Head of automation of energy processes department, National University "KPI named after Igor Sikorsky"
6	Heorhii Vorobets	Head of Computer Systems and Networks department, Yuriy Fedkovych Chernivtsi National University
	Employers	**Position**
1	Volodymyr Ivanov	Deputy chief designer, PJSC CheZaRa
2	Igor Lapygin	Director of IT departmnt, Joint Stock Company «Chernihvoblenergo»
3	Igor Lysenko	Director, Sid Studio LLC

Number	Academic staff	Position
4	Maxim Solodchuk	Colonel, head of Military Training department, Chernihiv Polytechnic National University
5	Oleg Starovoitenko	Head of the Marketing Department, SNT Ukraine
6	Olena Bursala	Senior researcher of the State Research Institute of Testing and Certification of Weapons and Military Equipment of Ukraine

Study programs, courses etc. that were evaluated by representatives of employers.

Table 3.1.2: The courses of the four study programs that were evaluated by representatives of Academic staff and employers

Course/Lab title	Updated or newly developed	Level (Bachelor, Master 5-year course)	ECTS credit points	The teaching/training methodologies developed/adopted e.g. e-learning/ training modalities, practical placements in enterprises, etc.	The link to the university's website	Date of accreditation	The status / document of accreditation
Study program "Computer Engineering"							
Microcontroller Systems Programming	new	Bachelor	6	Elected	https://stu.cn.ua/wp-content/uploads/2024/03/developed-courses.pdf	2024	In process
Systems on Chip	new	Bachelor	4	Elected	https://stu.cn.ua/wp-content/uploads/2024/03/developed-courses.pdf	2024	In process
Design of Digital Devices	new	Bachelor	5	Mandator	https://stu.cn.ua/wp-content/uploads/2024/03/developed-courses.pdf	2024	In process
Study program "Telecommunications and Radio Engineering"							
Electrical Circuit Design	updated	Bachelor	12	Mandator	https://stu.cn.ua/wp-content/uploads/2024/03/developed-courses.pdf	2024	In process
Study program "Telecommunications and Radio Engineering"							
Digital Systems of Telecommunications	updated	Master	5	Mandator	https://stu.cn.ua/wp-content/uploads/2024/03/	2024	In process

					developed-courses.pdf		
Study program "Electronics of robotic systems and complexes"							
Digital electronics devices	updated	Bachelor	11	Mandator	https://stu.cn.ua/wp-content/uploads/2024/03/developed-courses.pdf	2024	In process

Description of the means and channels used in the survey

The survey was conducted according to a previously prepared and distributed questionnaire, the same for both academic representatives and employers, online, considering the circumstances of wartime in Ukraine. In advance, requests were made to universities and enterprises of Ukraine, which represented different regions, to participate in the survey.

The responsible respondents answered the questions of the questionnaire and sent their signed answers to the address of the project manager Volodymyr Kazymyr for further analysis of survey results.

Results of the survey

In total, 6 academic and 6 employers' questionnaires were analysed. The analysis results are represented below.

Summary Table 3.1.3 of the answers included in the questionnaires for courses/ laboratory study programs by **academic and employers**.

PART 2 / ЧАСТИНА 2 ***Questions by courses/laboratory work study programs* / Питання за програмами курсів/лабораторних робіт**				
N	***Question* /Запитання**	**1**	**2**	***Justification and notes /Примітки, пояснення***
1	*Do you support the inclusion of such a discipline in the specified educational program: 1- «Yes», 2 - "No"? (If you answer is "No," please justify your answer)* Чи підтримуєте Ви включення такої дисципліни у вказану освітню програму: *1- «Так», 2 - «Ні»* (Якщо відповідь «Ні» – обґрунтуйте відповідь)			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем	12(100%)		
	Systems on Chip / Системи на чіпі	12(100%)		
	Design of Digital Devices / Проектування цифрових пристроїв	11(92%)		
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем	11(92%)		
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій	12(100%)		It is better to specify "Telecommunications systems"
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів	12(100%)		

2	*Which block should this course be assigned to: 1 - selected, 2 -mandatory?* *Чи згодні ви з віднесенням дисципліни до вказаного блоку дисциплін : 1 – вибіркові, 2 – обов'язкові*			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем	3(25%)		
	Systems on Chip / Системи на чіпі	6(50%)		
	Design of Digital Devices / Проектування цифрових пристроїв	7(58%)		
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем	4(33%)		
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій	2(16%)		
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів	2(16%)		
3	*In your opinion, what should be the percentage distribution of theoretical and practical training in this course 1- theoretical, 2 -practical?* *Яким на ваш погляд повинен бути розподіл теоретичної та практичної підготовки з даної дисципліни у відсотках: 1 – теортетична, 2 - практична?*			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			

	Microcontroller Systems Programming / Програмування мікроконтролерних систем	40%		
	Systems on Chip / Системи на чіпі	49%		
	Design of Digital Devices / Проектування цифрових пристроїв	45%		
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем	44%		
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій	54%		
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів	48%		
4	For each of the courses, its program should be aimed at the following (several options can be chosen): *1- «Yes», 2- "No"?* Для кожної дисципліни, її програма повинна бути спрямована на (можна обрати декілька варіантів): *1- «Так», 2- «Ні»*?			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем • formal use of knowledge (формальне використання знань) • development of critical thinking skills (розвиток критичного мислення)	6(50%) 4(33%) 8(67%) 11(92%)		

	• use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) • development of practical experience and skills (розвиток практичного досвіду та навичок) • development of new competencies (розвиток нових компетентностей) • development of independent thinking (розвиток самостійності мислення) • development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) • other (інше)	10(84) 10(84) 8(67%)		
	Systems on Chip / Системи на чіпі • formal use of knowledge (формальне використання знань) • development of critical thinking skills (розвиток критичного мислення) • use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) • development of practical experience and skills (розвиток практичного досвіду та навичок) • development of new competencies (розвиток нових компетентностей) • development of independent thinking (розвиток самостійності мислення) • development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до	4(33%) 4(33%) 6(50%) 12(100%) 11(92%) 10(84%) 11(92%)		

	нестандартних підходів у вирішенні проблем і прийнятті рішень) • other (інше)			
	Design of Digital Devices / Проектування цифрових пристроїв • formal use of knowledge (формальне використання знань) • development of critical thinking skills (розвиток критичного мислення) • use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) • development of practical experience and skills (розвиток практичного досвіду та навичок) • development of new competencies (розвиток нових компетентностей) • development of independent thinking (розвиток самостійності мислення) • development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) • other (інше)	6(50%) 9(75%) 7(58%) 9(75%) 8(67%) 11(92%) 12(100%)		
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем • formal use of knowledge (формальне використання знань) • development of critical thinking skills (розвиток критичного мислення)	8(67%) 8(67%) 10(84%)		

	• use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) • development of practical experience and skills (розвиток практичного досвіду та навичок) • development of new competencies (розвиток нових компетентностей) • development of independent thinking (розвиток самостійності мислення) • development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) • other (інше)	10(84%) 10(84%) 10(84%) 10(84%)		
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій • formal use of knowledge (формальне використання знань) • development of critical thinking skills (розвиток критичного мислення) • use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) • development of practical experience and skills (розвиток практичного досвіду та навичок) • development of new competencies (розвиток нових компетентностей)	6(50%) 6(50%) 8(67%) 10(84%) 11(92%) 10(84%)		

	• development of independent thinking (розвиток самостійності мислення) • development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) • other (інше)			
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів • formal use of knowledge (формальне використання знань) • development of critical thinking skills (розвиток критичного мислення) • use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) • development of practical experience and skills (розвиток практичного досвіду та навичок) • development of new competencies (розвиток нових компетентностей) • development of independent thinking (розвиток самостійності мислення) • development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень)	6(50%) 8(67%) 7(58%) 10(84%) 10(84%) 8(67%) 10(84%)		

	• other (інше)			
5	For each of the courses, its program should be aimed at the following (several options can be chosen): *1- «Yes», 2- "No"?* Для кожної дисципліни, її програма повинна бути спрямована нв (можна обрати декілька варіантів): *1- «Так», 2- «Ні»*?			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем • testing (тестування) • control works (контрольні роботи) • writing essays (творчі проектні роботи) • workshops (майстеркласи, практичні завдання) • additional (specify, which)	 9(75% 9(75% 6(50%) 11(92%) 2(16%)		consultations, specialized and problem-oriented tasks for computer systems and networks
	Systems on Chip / Системи на чіпі • testing (тестування) • control works (контрольні роботи) • writing essays (творчі проектні роботи) • workshops (майстеркласи, практичні завдання) • additional (specify, which)	 9(75%) 10(84%) 8(67%) 11(92%) 1(8%)		specialized and problem-oriented tasks for computer systems and networks
	Design of Digital Devices / Проектування цифрових пристроїв • testing (тестування) • control works (контрольні роботи) • writing essays (творчі проектні роботи) • workshops (майстеркласи, практичні завдання) • additional (specify, which)	 8(67%) 7(58%) 10(84%) 12(100%) 1(8%)		specialized and problem-oriented tasks for computer systems and networks
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем • testing (тестування)	 8(67%)		specialized and problem-oriented tasks for computer systems and networks

	• control works (контрольні роботи) • writing essays (творчі проектні роботи) • workshops (майстеркласи, практичні завдання) • additional (specify, which)	8(67%) 8(67%) 12(100%) 1(8%)		
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій • testing (тестування) • control works (контрольні роботи) • writing essays (творчі проектні роботи) • workshops (майстеркласи, практичні завдання) • additional (specify, which)	9(75%) 11(92%) 9(75%) 9(75%) 2(16%		consultations, specialized and problem-oriented tasks for computer systems and networks
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів • testing (тестування) • control works (контрольні роботи) • writing essays (творчі проектні роботи) • workshops (майстеркласи, практичні завдання) • additional (specify, which)	7(58%) 9(75%) 10(84%) 10(84%) 2(16%)		consultations, specialized and problem-oriented tasks for computer systems and networks
6	*Can your organization facilitate practical training in the specified discipline: 1- «Yes», 2 – "No"?* *Чи може ваша організація сприяти практичній підготовці за вказаною дисципліною: 1- «Так», 2- «Ні»?*			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			

	Microcontroller Systems Programming / Програмування мікроконтролерних систем	10(84%)		
	Systems on Chip / Системи на чіпі	8(67%)		
	Design of Digital Devices / Проектування цифрових пристроїв	8(67%)		
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем	9(75%)		
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій	11(92%)		
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів	10(84%)		
7	*Is your organization interested in specialists in the field of discipline: 1- «Yes», 2 -" No"?* *Чи зацікавлена ваша організація у фахівцях з напряму дисципліни: 1- «Так», 2- «Ні»?*			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем	11(92%)		
	Systems on Chip / Системи на чіпі	10(84%)		
	Design of Digital Devices / Проектування цифрових пристроїв	10(84%)		

	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем	10(84%)		
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій	11(92%)		
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів	9(75%)		
8	*What information resources, in your opinion, should be included in the teaching of this discipline? (Please, answer in the notes)* Які інформаційні ресурси, на вашу думку, слід долучити до викладання даної дисципліни? (будь ласка, надайте відповідь у примітках)			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			For all the mentioned disciplines: electronic libraries, electronic information systems of scientific and technical information, national, state, collective property resources, official websites, chats *.gpt, Internet resource and special educational literature, manufacturers' documentation and courses of foreign universities. Courses of leading universities, literature in a foreign language, corporate documentation. Palagin A.V., Opanasenko V.N. Reconfigurable computing systems. Kyiv: Prosvita. 2006. – 295 p. Integrated design environments from software and hardware manufacturers Intel (Altera), Xilinx, Arduino IDE. Development of author's practical courses. Integrated design environments from software and hardware manufacturers Intel (Altera), Xilinx, Arduino IDE. Development of author's practical courses.

	Microcontroller Systems Programming / Програмування мікроконтролерних систем			https://techmaker.ua/embedded-basic#description Arduino, Microchip Technology, STM32 Community, Cloud calculations, simulation models, videos, distance courses
	Systems on Chip / Системи на чіпі			https://www.arm.com/resources/education/education-kits/introduction-to-soc , Microchip Technology, Official websites of SoC manufacturers. Cloud calculations, simulation models, videos, distance courses
	Design of Digital Devices / Проектування цифрових пристроїв			https://ela.kpi.ua/items/2640b00e-dabc-488f-a8c6-f343d5bba22e platforms such as Coursera, Udemy, and Khan Academy, videos, distance courses
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			Internet resource and special educational literature, Documentation of manufacturers and courses of foreign universities, Kusry of leading universities, literature in a foreign language, company documentation, Integrated design environments from software and hardware manufacturers Intel (Altera), Xilinx, Arduino IDE. Development of author's practical courses. Integrated design environments from software and hardware manufacturers Intel (Altera), Xilinx, Arduino IDE. Development of author's practical courses
	Electrical Circuit Design / Проектування електричних схем			KiCad, Electronics Tutorials, All About Circuits, online courses on platforms, Coursera, Udemy, Eagle, Cloud calculations, simulation models, videos, distance courses
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			https://osvita.ua/master/vartist-navchannya/90916/ Internet resource and special educational literature, manufacturers' documentation and courses of foreign universities. Kusry of leading universities, foreign language literature, corporate documentation, official websites of telecommunications equipment manufacturers: Cisco, Huawei, Ericsson, Nokia. GitHub and open source repositories. Cloud calculations,

				simulation models, videos, distance courses, Integrated design environments from software and hardware manufacturers Intel (Altera), Xilinx, Arduino IDE. Development of author's practical courses / Integrated design environments from software and hardware manufacturers Intel (Altera), Xilinx, Arduino IDE. Development of author's practical courses
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			https://ist.kpi.ua/syllabuses/uk/Discipline?id=341 Official websites of manufacturers of robots and robotic equipment, ROS, Arduino or ESP32, Cloud computing, simulation models, videos, distance courses. Internet resource and special educational literature. Documentation of manufacturers and courses of foreign universities. Courses of leading universities, literature in a foreign language, company documentation, Integrated design environments from software and hardware manufacturers Intel (Altera), Xilinx, Arduino IDE. Development of author's practical courses. Integrated design environments from software and hardware manufacturers Intel (Altera), Xilinx, Arduino IDE. Development of author's practical courses
9	*The study of which software and hardware tools should be included for this discipline? (Please, answer in the notes)* *Вивчення яких програмних та апаратних засобів бажано включити для даної дисципліни? (Будь ласка, надайте відповдідь у примітках)*			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			Operating systems, databases and specialized software Manufacturers' documentation and courses of foreign educational institutions, programming languages
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			Architecture of microprocessors. Peripheral Architecture, New PIC Controllers and MicroChip, Intel, STM, Raspberry Pi, Embedded Linux, Virtex UltraScale+ VU19P FPGA Vivado Design Suite, integrated development environments (IDE),

				Python, STM32CubeMX, Kothlin
	Systems on Chip / Системи на чіпі			Interface architecture of integrated data transmission interfaces, New hardware of Infineon Technologies Cirrus Logic, SoC Altera/Xilinx, Virtex UltraScale+ VU19P FPGA. Vivado Design Suite, Verification and Simulation Tools, Python, Quartus (Quartus Prime 22.1std) Lite Edition Xilinx IDE, Verilog HDL, A-HDL, VHDL
	Design of Digital Devices / Проектування цифрових пристроїв			Algebra of logic and element base of computing devices, Programming language VERILOG and VDHL language, FPGA Altera/Xilinx, not old stands on Soviet microcircuits, Cadence OrCAD, Altium Designer, KiCad or Eagle, NI Multisim 14.x, Proteus 8.x, Altium Desinger, LabView - all versions for students
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем			Documentation of manufacturers and courses of foreign universities. Python Design programs Easily Applicable Graphical Layout Editor Multisim program, Altium Designer, Circuit simulators: Programs such as LTspice, Proteus, PSpice, Python, Matlab, NI Multisim 14.x, Proteus 8.x, Altium Designer, LabView – all versions for students
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			Operating systems, databases and specialized software, manufacturers' documentation and foreign university courses, Virtex UltraScale+ VU19P FPGA. Vivado Design Suite Основи передавання інформації. Апаратні пристрої кодування та декодування., Програма AutoCAD та MATLAB , Simulink, Безпровідні протоколи передачі даних – LoRa, Bluetooth, Програмування мікроконтролерів та FPGA,

				Python, Matlab, Packet Traicer, VisSim, NI Multisim 14.x, LabView – all versions for student
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			Documentation of manufacturers and courses of foreign universities. Documentation of manufacturers and courses of foreign universities Software for simulating the operation of executable mechanisms and devices, MATLAB, Simulink, Siemens industrial logic controllers, Virtex UltraScale+ VU19P FPGA Vivado Design Suite, Integrated Development Environments (IDE), Python, Matlab, NI Multisim 14.x, Proteus 8.x, Altium Designer, LabView – all versions for students
10	In your opinion, what is the importance of this course? (Please, answer in the notes) У чому, на вашу думку, полягає важливість цієї дисципліни? (Будь ласка, надайте відповідь у примітках)			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			There is a need for specialists who can program microcontroller systems, Acquisition of competencies in optimization of software code for applied mobile and embedded computer systems, Internet of Things and cyber-physical systems
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			Provides fundamental knowledge about the structure of microprocessors and microcontrollers, which gives a greater understanding of the functioning of software at any level of abstraction, lays the foundations of programming in computer engineering, modern design methods and a modern elemental base, practical skills of designing systems in C and working in Linux, Microcontrollern1 systems are widely used, Basis for electronic development,
	Systems on Chip / Системи на чіпі			Provides basic knowledge about the operation and functioning of various interaction interfaces of built-in digital modules, Organizes the study of the main elements of microcircuits and the

				logic of their combination, Modern design methods and a modern element base, Development of systems on modern FPGAs with built-in or soft processors, Systems on a chip have found wide application, Integration and miniaturization
	Design of Digital Devices / Проектування цифрових пристроїв			Gives an understanding of the operation of the basic principles of computer systems, studies the characteristic features of the composition and principle of operation of digital devices, modern electronic base and knowledge of the basics of design, development of FPGA systems and testing of these systems, design of digital devices is very important for modern systems, management of real devices
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем			There is a need for specialists who can program microcontroller systems, Acquisition of competencies in optimization of software code for applied mobile and embedded computer systems, Internet of Things and cyber-physical systems Study of the main components and the principles of their combination in electrical circuits, Modern electronic base and knowledge of the basics of design, Practical skills of designing electronic systems, Integration of components
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			There is a need for specialists who can program microcontroller systems, Acquisition of competencies in optimization of software code for applied mobile and embedded computer systems, Internet of Things and cyber-physical systems Explains the basic principles of reliable data transmission, gives basic concepts about the components of telecommunications systems and their purpose, Modern element base and knowledge

				of the basics of system construction, Working with modern wireless data protocols, Key role in communication
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			There is a need for specialists who can program microcontroller systems, Acquisition of competencies in optimization of software code for applied mobile and embedded computer systems, Internet of Things and cyber-physical systems Encourages the study of fundamental technical disciplines, Teaches the use of robots and computer systems for their control, feedback and automated information processing, Modern elemental base and knowledge of the basics of system construction, Development of industrial automation systems, Development of future technologies
, 11	Emphasize 3 main points that you consider the most important for mastering this course: (Please, answer in the notes) Визначить 3 основні моменти, які ви вважаєте найважливішими для опанування цієї дисципліни: (Будь ласка, надайте відповідь у примітках)			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			Practical work, availability of modern laboratory equipment, free access of the student to the equipment
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			Knowledge of the basics of programming, understanding of logic algebra, knowledge of the basics of digital electronics. Studying the composition of microcontroller systems, Application of programming languages, Acquisition of programming skills for these systems. Basic knowledge, creative thinking, laboratory equipment. Modern design methods, use of laboratory equipment and modern element base, Understanding of microcontroller architecture. Learning programming languages and APIs, Practical testing and debugging skills, Desire, creative and technical thinking, ability to program, understand algorithms. Basic knowledge of programming (Assembler, C++, C#, JS, Python, OOP, ...), Work in specialized

				programming environments and platforms of hardware resource manufacturers, Orientation of the laboratory workshop on applied problems of the Internet of Things and cyber- physical systems
	Systems on Chip / Системи на чіпі			Study of component systems on a chip; Principles of building systems; Prospects for their further development, Definition of digital devices. General principles and design features; Optimization and prospects, Basic knowledge, creative thinking, system, new software; Modern design methods, use of laboratory equipment and a modern element base, Design system of digital devices. Structure of FPGA chips; Knowledge of the HDL design language; Understanding SoC architecture and functionality. Study of integration and testing methods; Understanding the challenges and future directions of development; Desire, creative and technical thinking, ability to program. Work in specialized programming environments and platforms of hardware resource manufacturers; Orientation of the laboratory; workshop on applied problems of the Internet of Things and cyber-physical systems
	Design of Digital Devices / Проектування цифрових пристроїв			Knowledge of logic algebra, basic knowledge of electronics, basic knowledge of programming; Basic knowledge, creative thinking, new design programs; Modern design methods, the use of laboratory equipment and a modern element base, a system for designing digital devices. Structure of FPGA chips; Knowledge of VHDL design language, Understanding of digital logic and design. Use of specialized design tools; Desire, creative and technical thinking; Ability to program. Work in specialized programming environments and platforms of hardware resource manufacturers;

				Orientation of the laboratory; workshop on applied problems of the Internet of Things and cyber-physical systems
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем			Practical work, availability of modern laboratory equipment, free access of the student to the equipment; Separate elements of electrical circuits; Principles of optimal combination of elements in electrical circuits; Description of the operation of the obtained scheme, its advantages and disadvantages; Basic training, systematic knowledge, laboratory equipment and software; Modern design methods, use of laboratory equipment and a modern element base, knowledge of the basic principles of electronics. Use of CAD for design; Attention to practical aspects; Desire, creative and technical thinking, basic knowledge in the field of electrical circuits. Work in specialized programming environments and platforms of hardware resource manufacturers; Orientation of the laboratory; workshop on applied problems of the Internet of Things and cyber-physical systems
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			Basic knowledge of mathematics, digital technology, programming, basic training, system knowledge, laboratory equipment and software; Modern design methods, use of laboratory equipment and a modern element base; Understanding the principles of telecommunication systems. Study of network architecture; Practical skills of configuring and analyzing networks;

				Desire, creative and technical thinking, basic knowledge of the physics of signal transmission. Basic knowledge of information and telecommunication technologies, computer networks; Work in specialized programming environments and platforms of hardware resource manufacturers; Orientation of the laboratory workshop on applied problems of the Internet of Things and cyber-physical systems
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			Practical work; availability of modern laboratory equipment; free access of the student to the equipment. Understanding the basics of programming, mechanics, digital technology; Basic training, systematic knowledge, laboratory equipment and software; Modern design methods, use of laboratory equipment and a modern element base, Design system of digital devices. Structure of FPGA chips; Knowledge of the VHDL design language; Understanding the principles of robotics. Study of sensors and actuators; Study of microcontrollers and microprocessors; Desire, creative and technical thinking, basic knowledge in the field of electronics and robotics. Work in specialized programming environments and platforms of hardware resource manufacturers; Orientation of the laboratory; workshop on applied problems of the Internet of Things and cyber-physical systems
12	Do you have any suggestions for the implementation of this course? (Please, answer in the notes) Чи є у вас пропозиції щодо впровадження даної дисципліни? (Будь ласка, надайте відповідь у примітках)			

	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			Practical work, the availability of modern laboratory equipment, the student's free access to the equipment, Tasks are focused on real projects and the needs of the market and the state, Develop a program that covers the main theoretical aspects of programming microcontroller systems, such as the architecture of microcontrollers, programming languages (especially C/C++ languages), interaction with peripheral devices and other key concepts.
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			Study of component systems of telecommunications; Principles of combination of component digital systems; The application of digital telecommunications systems in practice, To give the basic concepts of programming languages and the main components of these systems, the introduction of microcontroller circuitry tools are becoming relevant for engineers and developers, More practice on a modern element base, Depending on the content, read after (or as separate modules) the discipline "Microcontrollers".
	Systems on Chip / Системи на чіпі			Consider in detail the components and the combination (architecture) of these components Need implementation in learning and this is the development of circuits on a single crystal More practice on a modern element base Develop a course that covers theoretical aspects of systems on a chip such as architecture, design, simulation and testing Depending on the content, read after (or as separate modules) computer circuits. Use basic modern platforms from Intel (Altera), Xilinx. It is advisable to practice the implementation of a course project
	Design of Digital Devices / Проектування цифрових пристроїв			The discipline has a fundamental nature and can be the basis for the formation of competencies in students of education, Lay the principles of designing digital devices, More practice on a modern element base, Develop a course that will cover the theoretical foundations of digital design, including Boolean algebra,

				combinational and sequential logic circuits, synthesis of logic schemes, communication protocols, etc Depending on the content, you can: 1) read after (or as separate modules) computer circuits; 2) in specialized educational and professional programs, it is possible to study instead of the course "Technology of designing computer systems"
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем			Tasks are focused on real projects and needs of the market and the state. Lay down the principles of designing electrical circuits, consider in detail the purpose of their components, It is necessary to develop, implement and how to develop the skills of the basics of circuit engineering, More practice on a modern element base, Develop a course that covers the main theoretical aspects of designing electrical circuits, such as working with resistors, capacitors, inductances , as well as the principles of operation of the main electronic components It is necessary to coordinate the content and sequence of teaching with the basic disciplines "Fundamentals of Electronics", "Amplifiers", "Digital Devices", etc.
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			Tasks are focused on real projects and needs of the market and the state. The discipline has a fundamental nature and can be the basis for the formation of competencies in the learners, Consider the principles of protection of telecommunication systems, The course considers the fundamentals of digital telecommunication systems, More practice on a modern elemental basis, Develop a course

				covering the theoretical foundations of digital telecommunication systems, including the principles of coding and signal modulation, structures and protocols of data transmission networks, wireless communication technologies, as well as security aspects of telecommunication systems. It is necessary to coordinate the content and sequence of teaching with the basic disciplines.
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			Tasks are focused on real projects and needs of the market and the state.
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			Tasks are focused on real projects and needs of the market and the state.

Summary Table 3.1.4 of the composition of participants in the analysis of courses/laboratory study programs

	Question	Area of professional activity	Experience in training		Comments about work experience	Work experience in scientific projects	
N			Yes	No		Scientific direction	Applied direction
1	What is your area of professional activity: a. Science b. Education c. Production of High-Tech Products d. other	7(58%) 7(58%) 5(42%) Director for IT					
2	Have you had previous or current experience in training specialists in the area of Cyber-Physical Systems (Automation, Computer Sciences, Cybernetics, IoT, AI, etc.)		8(67%)	4(33%)	online training, participation in zoom conferences, work in teams, experience in creating distance learning courses, development of digital competence frameworks for citizens, teachers and health care workers approved by the relevant ministries of Ukraine		
3	Have you had previous or current work experience in the area of Cyber-Physical Systems (Automation, Computer Sciences, Cybernetics, IoT, AI, etc.)		6(50%)	6(50%)	Information technologies, modeling of human associative figurative thinking, computer linguistics, development and implementation of the technology of "digital	Development of digital electric drive control systems based on microcontrollers	

					doubles" in the heat supply systems of buildings		

Summary Table 3.1.6
of the composition of participant's status in the analysis of courses/laboratory study programs

Status	Period			
Teaching experience	3-7 years	7-15 years	15-20 years	>20 years
	1(8%)	1(8%)		10(84%)
Work experience in science	3-7 years	7-15 years	15-20 years	>20 years
		2(16%)		10(84%)
Work experience in production	3-7 years	7-15 years	15-20 years	>20 years
	2(16%)	1(8%)		9 (75%)
Position in production	Developing -2	Developing 1		CEO -1 Director - 2 Developing -2 Marketing - 1 Testing -2 Researcher 1

Comments and suggestions

The conducted survey showed almost 100 percent support from the respondents of the planned non-relic courses developed during the implementation of the project. Regarding one course, it was proposed to change the name from "Digital Systems of Telecommunications" to "Telecommunications systems", which does not change the subject orientation of the course, but deserves attention.

As for the inclusion of courses in the curriculum as optional or mandatory, more substantial proposals have emerged here. Thus, the majority of interviewed (75%) experts spoke in favor of changing the positioning of the "Microcontroller Systems Programming" course. The same opinion is shared by half of the respondents (50%) regarding the "Systems on Chip" course. Instead, respondents with a slight advantage (58%) recommend that the "Design of Digital Devices" course be changed from mandatory to optional. Regarding all other courses, their classification as mandatory was supported.

According to experts, the distribution of theoretical and practical parts of the courses should be with a slight advantage over practical training in the ratio of 60/40% to 52/48%, and only for the course "Digital Systems of Telecommunications" 54% of respondents recommend spending more hours on theoretical training.

Regarding the direction of training programs for the courses declared in the project, here, according to experts (from 67% to 100%), attention should be paid to the development of practical experience and skills in all courses.

The distribution by types of control is proposed to be almost uniform with confirmation of proposed measures, but it is considered appropriate to additionally introduce consultations, specialized and problem-oriented tasks for computer systems and networks.

The vast majority of respondents (from 67 to 92%) agreed to facilitate practical training on the specified courses, and the interest in specialists studying these courses was from 75 to 92%.

Among the proposed information resources for each of the developed courses, the interviewed experts indicated electronic libraries, electronic information systems of scientific and technical information, national, state, collective property resources, official websites and Internet resources and special educational literature, manufacturers' documentation and courses of foreign universities, as well as sources of leading universities, literature in a foreign language, corporate documentation and a wide range of integrated design environments from software and hardware manufacturers with specific references. Development of author's practical courses was also proposed.

Recommendations on software and hardware to be studied were related to Operating systems, databases and specialized software, programming languages VERILOG and VDHL, New PIC Controllers and MicroChip from Intel, STM, Raspberry Pi, Embedded Linux, FPGA architecture, New hardware of Infineon Technologies Cirrus Logic, SoC Altera/Xilinx, Virtex UltraScale+. It was also pointed out the importance of using integrated development environments (IDE), Simulation Tools and design systems Vivado Design Suite, Cadence OrCAD, Altium Designer, KiCad or Eagle, Proteus Altium Desinger, LabView, Design programs Easily Applicable Graphical Layout Editor Multisim of the latest versions and Circuit simulators such as LTspice, Proteus, PSpice, Python, Matlab, Simulink, wireless data transmission protocols - LoRa, Bluetooth.

Experts confirmed the importance of the new and updeted courses, pointing to the need for specialists who can program microcontroller systems, the acquisition of competencies in optimization of software code for applied mobile and embedded computer systems, the Internet of Things and cyber-physical systems and the need to provides fundamental knowledge about the structure of microprocessors and microcontrollers, which gives a greater understanding of the functioning of software at any level of abstraction, lays the foundations of programming in computer engineering, modern design methods and a modern elemental base, practical skills of designing systems in C, C++, VHDL, Python, OOP and working in Linux, Microcontroller systems.

An important factor is acquisition of competencies in optimization of software code for applied mobile and embedded computer systems, study of the main components and the principles of their combination in electrical circuits, modern electronic base and knowledge of the basics of design, practical skills of designing electronic systems and integration of components.

General proposals regarding the implementation of the disciplines concerned practical work, the availability of modern laboratory equipment, the student's free access to the equipment, are that

the tasks will be focused on real projects and the needs of the market and the Ukraine. It is needed to develop a program that covers the main theoretical aspects of programming microcontroller systems, the application of digital telecommunications systems in practice. The courses have to have a fundamental nature and can be the basis for the formation of competencies in education of students and should be coordinated with the basic disciplines.

The vast majority of experts have experience in Science and Education (58%), and almost half of them (48%) in production of High-Tech products. Also, 67% of the respondents have previous or current experience in training specialists, and 50% work in the area of Cyber-Physical Systems (Automation, Computer Sciences, Cybernetics, IoT, AI, etc.) and have experience in development of digital electric drive control systems based on microcontrollers. According to their status, the vast majority of experts have many years of experience (more than 20 years) in Teaching experience, Work experience in science and production.

Therefore, their advice and suggestions will allow you to determine the directions of work on the creation of the developed courses and will undoubtedly ensure their high quality.

3.2 Kharkiv National Automobile and Highway University

Time of the survey

The survey of the representatives of academic and scientific staff, as well as the representatives of potential employers, was conducted in March 2024.

Participants in the survey

In total, 12 academic staff representatives, and 12 employers participated in the survey. The number of respondents from employers included representatives of associated partners, namely "Elcars" and "Avtodom Kharkiv" LLC (see Tab. 3.1.1.).

The reason of selection of particular respondents:
Respondents who are specialists in the fields of electric power, electrical engineering, and electromechanics participated in the survey. This includes both employers and scientific and academic staff. The professions and specializations of the respondents involved in the survey will enable us to gather constructive feedback, aiding in the development and modernization of the designated courses to align with the market's needs for which students are being prepared. Consequently, this contributes to enhancing the quality of the educational process and increasing the interest of market representatives in our students.

Table 3.1.1. List of Scientific, academic staff and employers who participated in the survey on the bachelor program "*Electric Vehicles and Automotive Electronics*".

Number	Academic staff	Position
1	Andrii Nechaus	Associate Professor of the Automotive Electronics Department, KhNAHU
2	Shchasiana Arhun	Professor of the Automotive Electronics Department, KhNAHU
3	Evgeny Chaplygin	Associate Professor of the Department of Physics, KhNAHU
4	Iryna Trunova	Associate Professor of the Automotive Electronics Department, KhNAHU
5	Ruslan Bagach	Chairman of the cycle commission "Electrical engineering and electromechanics" in the specialty 141 "Electroenergetics, electrical engineering and electromechanics" a teacher of the highest category of the Kharkiv State Polytechnic College
6	Anna Borysenko	Associate Professor of the Automotive Electronics Department, KhNAHU
7	Yuriy Borodenko	Associate Professor of the Automotive Electronics Department, KhNAHU
8	Oleksandr Dzyubenko	Associate Professor of the Automotive Electronics Department, KhNAHU
9	Vladyslav Latvian	Assistant of the Department of Automotive Electronics
10	Oleg Smirnov	Professor of the Automotive Electronics Department, KhNAHU
11	Svitlana Shynderuk	Associate Professor of the Department of Physics, KhNAHU

12	Valery Yagup	Professor of the Department of Computer Systems, KhNAHU
	Employers	**Position**
1	Ilya Lysak	AUTOVIT service station manager
2	Andreas Papachristodoulou	Researcher, KIOS
3	Oleh Sabokar	Snr. DSP developer, Individual entrepreneur O.Sabokar
4	Oleksandr Sarajev	Individual entrepreneur Saraev O.V.
5	Evgeny Gladun	Director of the SUZUKI "Technician-Center" car showroom
6	Oleksandr Dzyubenko	Director, "MOTOR TRANS" PE
7	Andrii Marchenko	Employee of "SOLLY PLUS" car service
8	Sergey Novikov	Assistant auto electrician TDM AVTO
9	Ihor Repievskyi	Standardization and quality engineer of "Avtodom Kharkiv" LLC
10	Pavlo Sokhin	Owner of the company "Elcars"
11	Dmytro Timoshevsky	Diagnostic electrician "Elcars"
12	Vladyslav Vasyliev	1st auto technician, after-sales service "TOYOTA Nederland Europe"

Study programs, courses etc. that were evaluated by representatives of employers.

Table 3.1.2: Study courses of the bachelor program "Electric Vehicles and Automotive Electronics" that were evaluated by representatives of Academic staff and employers

Course/Lab title	**Updated or newly developed**	**Level (Bachelor, Master 5-year course)**	**ECTS credit points**	**The teaching/training methodologies developed/adopted e.g. e-learning/ training modalities, practical placements in enterprises, etc.**	**The link to the university's website**	**Date of accreditation**	**The status / document of accreditation**
Electric vehicle infrastructure	New	Bachelor	4	Lecture, e-learning, practical, practical placements in enterprises	https://dl2022.khadi-kh.com/course/view.php?id=2827	spring 2024	Completed
Energy supply and energy saving systems	New	Bachelor	4	Lecture, e-learning, practical, lab practical	https://dl2022.khadi-kh.com/course/view.php?id=4849	spring 2024	Completed
Electric drive theory (Part 1)	Updated	Bachelor	5	Lecture, e-learning, practical, lab practical	https://dl2022.khadi-kh.com/course/view.php?id=3516	spring 2024	Completed
Electric drive theory (Part 2)	Updated	Bachelor	6	Lecture, e-learning, practical, lab practical	https://dl2022.khadi-	spring 2024	Completed

					kh.com/course/view.php?id=4716		
Electric machines and devices	Updated	Bachelor	5	Lecture, e-learning, practical	https://dl2022.khadi-kh.com/course/view.php?id=5789	spring 2024	Completed
Electronics and microcircuit engineering (Part 1)	Updated	Bachelor	4	Lecture, e-learning, lab practicals	https://dl2022.khadi-kh.com/enrol/index.php?id=3541	spring 2024	Completed
Electronics and microcircuit engineering (Part 2)	Updated	Bachelor	5	Lecture, e-learning, lab practicals	https://dl2022.khadi-kh.com/course/view.php?id=5022	spring 2024	Completed

Description of the means and channels used in the survey

Surveys by e-mail are used when it is necessary to survey a wide range of people on a large number of questions. It involves sending questionnaires to respondents (pre-selected through relevant directories or corporate customer databases) by e-mail as an attached file to the main letter with an appeal to the respondent.

The advantages of such a survey: low costs, convenience for both parties - all questions and answers are in electronic form, the possibility of covering a large number of respondents, ensuring the anonymity of respondents, lack of influence of the interviewer.

The survey was conducted according to pre-prepared questionnaire templates. Questionnaire templates were developed for academic and scientific staff, as well as for employers.

The respondents answered the questions in the questionnaire and the answers were sent to the mail of the head of the Department of Automotive Electronics of the KhNAHU, professor Andrii Hnatov.

Results of the survey

24 questionnaires were analysed, 12 of them - Scientific, academic staff and 12 employers.
The results of the analysis are collected in Table 3.1.3 - 3.1.6.
Among the respondents, the largest percentage, i.e. 25%, have Work experience in science - >20 years, and Work experience in production - 7-15 years.
At the same time, Teaching experience has the largest percentage among respondents with >20 years of work experience – 29.17%

Summary Table 3.1.3 of the "yes" and "no" answers included in the questionnaires for courses/ laboratory study programs by **academic and scientific** stakeholders.

PART 2 / ЧАСТИНА 2 ***Questions by courses/laboratory work study programs* / Питання за програмами курсів/лабораторних робіт**				
N	***Question* /Запитання**	**Yes**	**No**	***Justification and notes* /Примітки, пояснення**
1	*Do you consider it necessary for the learning of students in the bachelor's program "**Electric Vehicles and Automotive Electronics**": (If you answer is "no," please justify your answer)* Чи вважаєте Ви необхідним вивчення наступної дисципліни в бакалаврській програмі «**Електромобілі та автомобільна електроніка»:** (Якщо відповідь «ні» – обґрунтуйте відповідь)			
	Electric vehicle infrastructure / Інфраструктура електромобілів	12 (100%)		Currently, the discipline belongs to the selective block. I suggest supplementing the study prerequisites with the following disciplines: Theory of electric vehicles, Electric machines and devices, Energy supply and energy saving systems, Theory of electric drive
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	12 (100%)		
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	12 (100%)		
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	12 (100%)		
	Electric machines and devices / Електричні машини та апарати	12 (100%)		
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	12 (100%)		
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	12 (100%)		
2	*Do you agree with the wording of the purpose of this academic discipline (If your answer is "no" - justify your answer)?* Чи згодні ви з формулюванням мети даної навчальної дисципліни (Якщо ви відповіли «ні» - обґрунтуйте свою відповідь)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів	11 (91,67%)	1 (8,33%)	I suggest a STANDARD wording for all disciplines, for example, as in the OP: Formation of the personality of a specialist capable of solving complex specialized tasks and practical problems during

				professional activities in the field of design, operation and maintenance of electric vehicles and automotive electronics, which involve the application of theories and methods of electrical engineering and electromechanics in relation to the infrastructure of electric vehicles
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	11 (91,67%)	1 (8,33%)	Or: Training of specialists in the specialty 141 Electric power, electrical engineering and electromechanics, who are able to use knowledge of the principles of construction, operation and design of energy supply systems, as well as the principles of energy saving during their professional activities
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	11 (91,67%)	1 (8,33%)	Or: Studying the theoretical foundations and acquiring practical skills in electric drive, which are necessary for solving complex specialized tasks and practical problems during the professional activity of a specialist in electric vehicles and automotive electronics
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	11 (91,67%)	1 (8,33%)	Or: Studying the theoretical foundations and acquiring practical skills in electric drive, which are necessary for solving complex specialized tasks and practical problems during the professional activity of a specialist in electric vehicles and automotive electronics
	Electric machines and devices / Електричні машини та апарати	11 (91,67%)	1 (8,33%)	Or: Studying the theoretical foundations and acquiring practical skills in electric drive, which are necessary for solving complex specialized tasks and practical problems during the professional activity of a specialist in electric vehicles and automotive electronics
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	11 (91,67%)	1 (8,33%)	Or: Studying the theoretical foundations and acquiring practical skills in electric drive, which are necessary for solving complex specialized tasks and practical problems during the professional activity of a specialist in electric vehicles and automotive electronics

	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	11 (91,67%)	1 (8,33%)	Or: Studying the theoretical foundations and acquiring practical skills in electric drive, which are necessary for solving complex specialized tasks and practical problems during the professional activity of a specialist in electric vehicles and automotive electronics
3	*Do you agree with the wording of the tasks of this academic discipline (If your answer is "no" - justify your answer)?* Чи згодні ви з формулюванням завдань даної навчальної дисципліни (Якщо відповідь «ні» – відповідь обґрунтуйте)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів	11 (91,67%)	1 (8,33%)	A lot about electric cars
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	11 (91,67%)	1 (8,33%)	I also offer a standard formula with several subsections: - familiarization... - studying... - assimilation... - acquiring skills... capacity building...
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	11 (91,67%)	1 (8,33%)	I also offer a standard formula with several subsections: - familiarization... - studying... - assimilation... - acquiring skills... capacity building...
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	11 (91,67%)	1 (8,33%)	I also offer a standard formula with several subsections: - familiarization... - studying... - assimilation... - acquiring skills... capacity building...
	Electric machines and devices / Електричні машини та апарати	11 (91,67%)	1 (8,33%)	I also offer a standard formula with several subsections: - familiarization... - studying... - assimilation... - acquiring skills... capacity building...
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	11 (91,67%)	1 (8,33%)	I also offer a standard formula with several subsections: - familiarization...

				- studying... - assimilation... - acquiring skills... capacity building...
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	11 (91,67%)	1 (8,33%)	I also offer a standard formula with several subsections: - familiarization... - studying... - assimilation... - acquiring skills... capacity building...
4	*Do you agree with the formulation of the main competencies for which the development of this discipline is directed? (In your answer is "no," please specify which of the competencies need further clarification and/or modification):* Чи згодні Ви з формулюванням основних компетентностей, на які спрямований розвиток даної дисципліни:? (У відповіді «ні» - вкажіть, які з компетенцій потребують уточнення чи зміни):			
	Electric vehicle infrastructure / Інфраструктура електромобілів	11 (91,67%)	1 (8,33%)	General competences 7, 10; Professional competences 8
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	11 (91,67%)	1 (8,33%)	General competences 7, 10; Professional competences 8
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	11 (91,67%)	1 (8,33%)	General competences 7, 10; Professional competences 8
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	11 (91,67%)	1 (8,33%)	General competences 7, 10; Professional competences 8
	Electric machines and devices / Електричні машини та апарати	11 (91,67%)	1 (8,33%)	General competences 7, 10; Professional competences 8
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	11 (91,67%)	1 (8,33%)	General competences 3, 4, 10; Professional competences 8
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	11 (91,67%)	1 (8,33%)	General competences 3, 4, 10; Professional competences 8
5	*Do you agree that the ratio of the number of hours and hours for managed self-study (URS) of students in this program contributes to the full assimilation of this discipline (If your answer is "no," please give an explanation):* Чи згодні ви з тим, що співвідношення кількості аудиторних годин та годин на самостійну роботу студентів за цією програмою сприяє повноцінному засвоєнню даної дисципліни (При відповіді «ні» - дайте пояснення):			
	Electric vehicle infrastructure / Інфраструктура електромобілів	12 (100%)		

	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	12 (100%)		
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	12 (100%)		
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	12 (100%)		
	Electric machines and devices / Електричні машини та апарати	12 (100%)		
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	12 (100%)		
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	12 (100%)		
6	*Do you agree with the content of the training material in the program of this discipline or laboratory work (If your answer is "no" - specify which sections of the course need amendments or additions)?* Чи згодні Ви зі змістом навчального матеріалу в програмі даної дисципліни або лабораторної роботи (Якщо відповідь «ні» - вкажіть, які розділи курсу потребують змін чи доповнень)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів	7 (58,33%)	5 (41,67%)	I think the Connected Car theme should be added. The topic "Alternative power plants in road transport" should be added. There is a lot about electric cars and their systems, I think it is necessary to supplement the material about charging stations, V2G technology.
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	7 (58,33%)	5 (41,67%)	The topic Vehicle to Grid (V2G)) should be added - Technology from an electric car to the electric grid. Add electromagnetic compatibility on power circuits. Bring high-voltage technology, lightning protection, grounding, alternative energy sources into separate topics. Add a section for an in-depth study of renewable energy sources and their integration into energy supply systems.
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	10 (83,33%)	2 (16,67%)	Exclude topics that are not related to the academic discipline (RZA, electrical networks, etc.). In the topics of lectures and practical classes, expand the automotive topic. Add automotive actuators with an electric drive.
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	10 (83,33%)	2 (16,67%)	

				Include a section on digital control of electric drives and the use of programmable logic controllers.
	Electric machines and devices / Електричні машини та апарати	7 (58,33%)	5 (41,67%)	Add electric motors with an axial field. You can add the topic "Stepper motors". Exclude topics that are not related to the academic discipline (RZA, electrical networks, etc.). In the topics of lectures and practical classes, expand automotive topics, in particular about electric traction motors, hybrid generators. Very little about electrical appliances. It is possible to add topics about automotive sensors and actuators. The topic "Integration with renewable energy sources" can be added, which deals with the operation of electric machines and apparatus used in renewable energy systems, such as solar panels, wind turbines, etc.
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	10 (83,33%)	2 (16,67%)	Topic SR "Light-emitting diodes, photodiodes. Parameters and features of the use of optocouplers" to be considered at the lecture session. Redistribute the hours of topics 2, 3 and 5, combine topics 6, 7.
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	11 (91,67%)	1 (8,33%)	It is possible to translate topics 1, 2, 8 into 1 part.
7	*Do you agree with the distribution of discipline in hours by types of educational classes of this discipline (If your answer is "no" - specify requirements for changes or additions)?* Чи згодні Ви з розподілом годин за видами навчальних занять з даної дисципліни (Якщо відповідь «ні» - вкажіть вимоги щодо змін чи доповнень)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів	12 (100%)		
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	12 (100%)		
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	12 (100%)		
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	12 (100%)		
	Electric machines and devices / Електричні машини та апарати	12 (100%)		

	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	12 (100%)		
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	12 (100%)		
8	*Do you agree with the list of recommended basic literature in the Information/ Methodological Part of the discipline or laboratory work (If you answer is "no" - specify the list of main literature)?* Чи згодні Ви з Переліком рекомендованої основної літератури (При відповіді «ні» - вкажіть рекомендації)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів	10 (83,33%)	2 (16,67%)	A lot about electric cars, not enough about infrastructure. Literature should be updated, modern sources should be added.
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	12 (100%)		
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	12 (100%)		
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	12 (100%)		
	Electric machines and devices / Електричні машини та апарати	11 (91,67%)	1 (8,33%)	References to the literature of 2013, 2014.
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	11 (91,67%)	1 (8,33%)	Can a distance course be considered basic literature? References to the literature of 2009, 2014.
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	11 (91,67%)	1 (8,33%)	References to the literature of 2009, 2014.
9	*Do you agree with the list of recommended supporting (additional) literature in the Information and Methodological part of the course program or laboratory work (If you answer is "no" - specify the list of supporting literature):* Чи згодні Ви з Переліком рекомендованої допоміжної (додаткової) літератури (У разі відповіді «ні» - вкажіть перелік допоміжної літератури):			
	Electric vehicle infrastructure / Інфраструктура електромобілів	10 (83,33%)	2 (16,67%)	Possible: electrical networks and systems, conversion equipment, power electronics, technical documentation of charging stations. In my opinion, modern literature by foreign authors and links to electronic resources should be added.
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	11 (91,67%)	1 (8,33%)	Maybe: electrical equipment manuals.
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	11 (91,67%)	1 (8,33%)	Possible: electric cars, equipment for cars and electric cars.

	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	11 (91,67%)	1 (8,33%)	Possible: electric cars, equipment for cars and electric cars.
	Electric machines and devices / Електричні машини та апарати	10 (83,33%)	2 (16,67%)	Possible: several sources in the national language, reference books, technical documentation. You can add materials on energy efficiency and renewable energy sources and on digitalization and intelligent power management systems.
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	11 (91,67%)	1 (8,33%)	References to the literature of 2009, 2010. Maybe: theoretical basics of electrical engineering, electronic systems of cars and electric cars, electronic component handbooks.
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	11 (91,67%)	1 (8,33%)	References to the literature of 2009, 2010. Maybe: theoretical basics of electrical engineering, electronic systems of cars and electric cars, electronic component handbooks.
10	*What measures to control the quality of mastering knowledge in this discipline, given in the Information and Methodical part of the course program, do you consider necessary and sufficient (multiply options could be selected)*: Які заходи контролю якості засвоєння знань з даної дисципліни, наведені в інформаційно-методичній частині програми курсу, Ви вважаєте необхідними та достатніми: (можна обрати декілька):			
	☒ testing (тестування) – **12 (100%)** ☐ control works (контрольні роботи) – **5 (41,67%)** ☒ writing essays (творчі проектні роботи) – **9 (75%)** ☒ workshops (майстеркласи, практичні завдання) – **12 (100%)** ☐ additional (specify, which) – **1 (8,33%)**			The use of real practice cases in the educational process, which help students better understand how theoretical knowledge can be applied in real conditions.
11	*Do you agree with the recommendations for monitoring the quality of learning and attestation of what? (If your answer is"no," please provide further suggestions for improving this section of the program)?* Чи згодні Ви з рекомендаціями щодо контролю якості навчання та атестації (При відповіді «ні» – внесіть пропозиції щодо зміни цього розділу робочої програми)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів	12 (100%)		
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	12 (100%)		
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	12 (100%)		

	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	12 (100%)		
	Electric machines and devices / Електричні машини та апарати	11 (91,67%)	1 (8,33%)	You can add project and presentation protection.
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	12 (100%)		
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	12 (100%)		
12	*In your opinion, which set of skills is the program of this discipline aimed at developing (multiple options could be selected):* На що, на вашу думку, спрямована програма даної дисципліни (можна обрати декілька):			
	☐ formal use of knowledge (формальне використання знань) - 0 ☒ development of critical thinking skills (розвиток критичного мислення) – **10 (83,33%)** ☒ use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) – **10 (83,33%)** ☒ development of practical experience and skills (розвиток практичного досвіду та навичок) – **12 (100%)** ☒ development of new competencies (розвиток нових компетентностей) – **11 (91,67%)** ☒ development of independent thinking (розвиток самостійності мислення) – **11 (91,67%)** ☐ development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) – **4 (33,33%)** ☐ other (інше) - 0			
13	*In your opinion, what is the importance of this discipline:* У чому, на вашу думку, полягає важливість цієї дисципліни:			
	Electric vehicle infrastructure / Інфраструктура електромобілів			Acquiring and mastering new knowledge, skills and abilities of students on the basics and principles of building the infrastructure of electric vehicles. Formation of the students' set of knowledge, skills and ideas on the basics and principles of building the infrastructure of electric vehicles.

				The importance of this discipline is due to the fact that the infrastructure of electric vehicles is key to promoting the transition to sustainable and environmentally friendly transport. The discipline allows you to understand the connection between stationary power generation and the mobile on-board electrical system of an electric vehicle. Covers aspects of EV infrastructure development and implementation, including charging stations, maintenance, and safety and environmental requirements. It is important for the training of specialists in the field of electromobility. Formation of ideas and skills in applicants regarding the principles of construction and calculations of elements of the infrastructure of electric vehicles. Consideration of methods and principles of construction of electric vehicle infrastructure.
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			Acquiring and mastering new skills, knowledge, and abilities of students that will be needed when working with energy supply and energy saving systems Formation of students' knowledge, skills and ideas about design methods and basis of calculation of power supply systems of motor vehicle enterprises. Knowledge of energy supply systems and energy conservation is important for sustainable development and ensuring energy efficiency. The discipline provides fundamental knowledge, forms the outlook of a specialist in the specialty 141 Electric power, electrical engineering and electromechanics. Considers methods and technologies of efficient use, distribution of energy and its conservation. It includes the study of alternative energy sources, energy-saving technologies, which are key to sustainable development and reducing the impact on the environment. The formation of a set of knowledge, abilities and skills in the applicants regarding the methods of production, transportation and conversion of electricity.

				Consideration of systems of concepts about methods of analysis and calculation of power supply systems of motor vehicle enterprises, principles energy saving and energy efficiency, as well as measures for their implementation.
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			Acquiring and mastering basic skills, knowledge and skills of students about the electric drive, car construction and road traffic system. Acquisition by students of basic knowledge and practical skills regarding the electric drive and control of the movement of executive mechanisms of working machines. Knowing the main characteristics of an electric drive is of great importance, because well-designed electric drives have a long service life and a low level of wear, which is important for ensuring the reliability of mechanisms and equipment, especially in critical production and technical systems. Knowledge of the principles of the structure of an electric drive, its composition and characteristics, and mastery of methods for designing an electric drive according to its purpose The discipline provides fundamental knowledge, forms the outlook of a specialist in the specialty 141 Electric power, electrical engineering and electromechanics. The study of electric drive theory contributes to a deeper understanding of the processes occurring in electromechanical systems and the development of effective and innovative solutions for their improvement and optimization. This is necessary to ensure high productivity, energy efficiency and reliability of electric drive systems in modern technological processes and industrial production. The formation of a set of knowledge, abilities and skills in the students regarding the structure, functioning, calculation and methods of controlling an electric drive of various operating principles. Study of the law of mechanical motion and the equation of motion of an electric drive, mechanical and

				electromechanical characteristics of electric motors and actuators used in an electric drive, and ways and means of influencing them in order to control the movement of actuators of working machines.
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			Acquiring and mastering new skills, knowledge, and abilities of students about the electric drive, car design and traffic system. Acquisition by students of basic knowledge and practical skills regarding the electric drive and control of the movement of executive mechanisms of working machines. Knowing the main characteristics of an electric drive is of great importance, because well-designed electric drives have a long service life and a low level of wear, which is important for ensuring the reliability of mechanisms and equipment, especially in critical production and technical systems. The discipline provides fundamental knowledge, forms the outlook of a specialist in the specialty 141 Electric power, electrical engineering and electromechanics. Knowledge of the methods of designing the electric drive of motor vehicles. The study of electric drive theory contributes to a deeper understanding of the processes occurring in electromechanical systems and the development of effective and innovative solutions for their improvement and optimization. This is necessary to ensure high productivity, energy efficiency and reliability of electric drive systems in modern technological processes and industrial production. The formation of a set of knowledge, abilities and skills in the students regarding the structure, functioning, calculation and methods of controlling an electric drive of various operating principles. Study of the law of mechanical motion and the equation of motion of an electric drive, mechanical and electromechanical characteristics of electric motors and actuators used in an electric drive, and ways and means of

				influencing them in order to control the movement of actuators of working machines.
	Electric machines and devices / Електричні машини та апарати			Acquiring and mastering new skills, knowledge, and skills of students about electric machines and devices, as well as their principle of operation, structure and construction. Formation of the students' set of knowledge, skills and ideas about the basic concepts and laws regarding electric machines. Electric machines and devices play an important role in many aspects of modern technology and engineering, ensuring the efficient use of energy, the development of new technologies and ensuring the reliability of production processes Knowledge of the principles of construction, characteristics and design features of electrical machines and devices, acquisition of practical skills regarding their application. The discipline provides fundamental knowledge, forms the outlook of a specialist in the specialty 141 Electric power, electrical engineering and electromechanics. Focuses on the study of the basics of electrical machines and devices, their principles of operation, design, analysis and application in various electrical engineering systems. This discipline is important for understanding and practical use of electric machines in industry and everyday life. The formation of a set of knowledge, abilities and skills in the applicants regarding the design, principles of operation, parameters and characteristics of electrical machines and devices. Formation of the students' set of knowledge, skills and ideas about the basic concepts and laws regarding electric machines. Acquisition of theoretical and practical skills for conducting experimental research and working with electrical machines.
	Electronics and microcircuit engineering (Part 1,) / Електроніка та мікросхемотехніка (Ч.1)			Acquiring and mastering basic skills, knowledge, and abilities of students that will be needed when working with microcircuit technology.

				Training of students in the field of construction of automotive and industrial electronics devices. Electronics and microcircuit engineering are the basis for the development of new technologies and innovations in such areas as medicine, transport, energy and others. Knowledge of construction principles, characteristics and design features of discrete electronics components. The discipline provides fundamental knowledge and shapes the outlook of a specialist in automotive electronics. Focuses on the fundamentals of electronics and chip technology, including the design and analysis of electronic circuits. The study of this discipline allows a deeper understanding of electronic components and their application in modern electronic devices. The formation of a set of knowledge, abilities and skills in the applicants regarding the principles of functioning, parameters and characteristics of electronic components, drawing up and calculating electrical schematics. Formation of the ability to learn independently, acquire new knowledge and improve skills in working with modern equipment, measuring equipment and applied software.
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			Acquiring and mastering basic skills, knowledge, and abilities of students that will be needed when working with microcircuit technology. Training of students in the field of construction of automotive and industrial electronics devices. Electronics and microcircuit engineering are the basis for the development of new technologies and innovations in such areas as medicine, transport, energy and others. Knowledge of the principles of construction and characteristics of analog and digital circuit devices. The discipline provides fundamental knowledge and shapes the outlook of a specialist in automotive electronics. Focuses on the fundamentals of electronics and chip technology, including the design and analysis of electronic circuits. The study of this discipline allows a deeper

				understanding of electronic components and their application in modern electronic devices. The formation of a set of knowledge, abilities and skills in the applicants regarding the principles of functioning, parameters and characteristics of electronic components, drawing up and calculating electrical schematics. Formation of the ability to learn independently, acquire new knowledge and improve skills in working with modern equipment, measuring equipment and applied software.
14	*Emphasize 3 main areas that you consider the most important for mastering this discipline:* Визначить 3 основні моменти, які ви вважаєте найважливішими для опанування цієї дисципліни:			
	Electric vehicle infrastructure / Інфраструктура електромобілів			Theoretical material. Working out laboratory and independent tasks. Knowledge verification (testing, exam or credit). Joint work with students. Generalization and verification of the material passed. Attending classes according to the schedule, active participation and performance of assigned tasks, focus on maximum results. The desire to expand knowledge. Basics of electromobility. Charging infrastructure. Maintenance and safety. Performance of practical tasks.
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			Theoretical material. Working out laboratory and independent tasks. Knowledge verification (testing, exam or credit). Joint work with students. Generalization and verification of the material passed. Attending classes according to the schedule, active participation and performance of assigned tasks, focus on maximum results. The desire to expand knowledge. Efficient use of energy. Alternative Energy Sources. Energy audits and standards.

	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			Theoretical material. Working out practical, laboratory and independent tasks. Knowledge verification (testing, exam or credit). Joint work with students. Generalization and verification of the material passed. Attending classes according to the schedule, active participation and performance of assigned tasks, focus on maximum results. The desire to expand knowledge. Laws of mechanical motion and equations of motion of an electric drive. Mechanical and electromechanical characteristics of electric motors and actuators. Ways and means of controlling the movement of executive mechanisms of working machines. Modeling of the electric drive.
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			Theoretical material. Working out practical, laboratory and independent tasks. Knowledge verification (testing, exam or credit). Joint work with students. Generalization and verification of the material passed. Attending classes according to the schedule, active participation and performance of assigned tasks, focus on maximum results. The desire to expand knowledge. Principles of operation and classification. Technical characteristics and applications Operation and maintenance
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			Theoretical material. Working out practical, laboratory and independent tasks. Knowledge verification (testing, exam or credit). Joint work with students. Generalization and verification of the material passed. Attending classes according to the schedule, active participation and performance of assigned tasks, focus on maximum results.
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			

				The desire to expand knowledge. Principles of operation and classification. Technical characteristics and applications. Operation and maintenance.
15	*Do you have any suggestions for further improvement of this discipline?* Чи є у вас пропозиції щодо подальшого вдосконалення цієї дисципліни?			
	Electric vehicle infrastructure / Інфраструктура електромобілів			Add practice in production and service stations. Add practical training in production. Perhaps the purchase of a charging station and the creation of laboratory work on its research. Creation of internship and practice programs in companies working in the field of electromobility. Consider data transfer protocols of charging stations. Add an analysis of the circuitry of real charging stations.
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			Add practice in production and service stations. Add practical training in production. It is possible to purchase specialized software for modeling processes in electric power systems. Preparation of educational and methodical materials for conducting all types of training classes. Focus on renewable energy: An in-depth study of renewable energy sources and their integration into energy supply systems. Add study of alternative sources of electrical energy. I suggest that part of the classes be held at enterprises
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			It is possible to purchase specialized software for modeling processes in electromechanical systems. Creation of laboratory work on the basis of power units and executive bodies of modern cars. Inclusion of chapters on digital control of electric drives and the use of programmable logic controllers to modernize the course. Laboratory works on the study of methods of electronic control of various types of electric motors.

				It is possible to develop a cycle of laboratory work on the control of the electric drive of the windshield wipers and the electric adjustment of the seats in the car interior.
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			Extend the task to a course project using an electric drive for the needs of a service station. Expand the task to a course project using software. It is possible to purchase specialized software for modeling processes in electromechanical systems. Creation of laboratory work on the basis of power units and executive bodies of modern cars. Inclusion of chapters on digital control of electric drives and the use of programmable logic controllers to modernize the course.
	Electric machines and devices / Електричні машини та апарати			Add practice in production and service stations. Add practical training in production. It is possible to purchase specialized software for modeling processes in electromechanical systems. Creation of laboratory work on the basis of power units and executive bodies of modern cars. Inclusion of analysis of real cases from industry to better understand the application of theoretical knowledge.
	Electronics and microcircuit engineering (Part 1) /Електроніка та мікросхемотехніка (Ч.1)			It is possible to purchase specialized software for modeling electrical and electronic circuits. Purchase of electronic components for the creation of laboratory works on their research. Increasing the number of hands-on projects where students can apply knowledge by designing and building real electronic devices. Expand circuitry using modern analog microcircuits
	Electronics and microcircuit engineering (Part 2) /Електроніка та мікросхемотехніка (Ч.2)			Extend the task to the course project. It is possible to purchase specialized software for modeling electrical and electronic circuits. Purchase of electronic components for the creation of laboratory works on their research.

				Increasing the number of hands-on projects where students can apply knowledge by designing and building real electronic devices. Expand circuitry using modern analog microcircuits.

Summary Table 3.1.4 of the "yes" and "no" answers included in the questionnaires for courses/ laboratory study programs by **industrial** stakeholders.

PART 2 / ЧАСТИНА 2 ***Questions by courses/laboratory work study programs* / Питання за програмами курсів/лабораторних робіт**				
N	***Question* /Запитання**	**Yes**	**No**	***Justification and notes* /Примітки, пояснення**
1	*Do you consider it necessary for the learning of students in the bachelor's program "**Electric Vehicles and Automotive Electronics**": (If you answer is "no," please justify your answer)* Чи вважаєте Ви необхідним вивчення наступної дисципліни в бакалаврській програмі «**Електромобілі та автомобільна електроніка»:** (Якщо відповідь «ні» – обґрунтуйте відповідь)			
	Electric vehicle infrastructure / Інфраструктура електромобілів	12 (100%)		
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	12 (100%)		
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	12 (100%)		
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	12 (100%)		
	Electric machines and devices / Електричні машини та апарати	12 (100%)		
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	12 (100%)		
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	12 (100%)		
2	*Do you agree with the wording of the purpose of this academic discipline (If your answer is "no" - justify your answer)?* Чи згодні ви з формулюванням мети даної навчальної дисципліни (Якщо ви відповіли «ні» - обґрунтуйте свою відповідь)?			

	Electric vehicle infrastructure / Інфраструктура електромобілів	12 (100%)		
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	12 (100%)		
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	12 (100%)		
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	12 (100%)		
	Electric machines and devices / Електричні машини та апарати	12 (100%)		
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	12 (100%)		
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	12 (100%)		
3	*Do you agree with the wording of the tasks of this academic discipline (If your answer is "no" - justify your answer)?* Чи згодні ви з формулюванням завдань даної навчальної дисципліни (Якщо відповідь «ні» – відповідь обґрунтуйте)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів	12 (100%)		
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	12 (100%)		
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	12 (100%)		
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	12 (100%)		
	Electric machines and devices / Електричні машини та апарати	12 (100%)		
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	12 (100%)		
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	12 (100%)		
4	*Do you agree with the formulation of the core competencies to which the discipline is intended to be mastered? (In your answer is "no," please specify which of the competencies need further clarification and/or modification):* Чи згодні ви з формулюванням основних компетенцій, якими передбачається опанувати дисципліну? (У відповіді «ні» - вкажіть, які з компетенцій потребують уточнення чи зміни):			

	Electric vehicle infrastructure / Інфраструктура електромобілів	12 (100%)		
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	12 (100%)		
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	12 (100%)		
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	12 (100%)		
	Electric machines and devices / Електричні машини та апарати	12 (100%)		
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	12 (100%)		
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	12 (100%)		
5	*Do you think that the lecture material will allow students to reveal the essence of the discipline, will allow them to achieve the main goal and educational results of the discipline? (If your answer is "no," please give an explanation):* Як ви вважаєте, лекційний матеріал дозволить студентам розкрити сутність дисципліни, дозволить досягти основної мети та навчальних результатів дисципліни? (При відповіді «ні» - дайте пояснення):			
	Electric vehicle infrastructure / Інфраструктура електромобілів	12 (100%)		
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	12 (100%)		
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	12 (100%)		
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	12 (100%)		
	Electric machines and devices / Електричні машини та апарати	12 (100%)		
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	12 (100%)		
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	12 (100%)		
6	*Do you think that the proposed list of laboratory and practical works will help to develop all practical competence, declared by the discipline program? (If your answer is "no" - specify which sections of the course need amendments or additions)?*			

	Як ви вважаєте, чи допоможе запропонований перелік лабораторних і практичних робіт розвинути всі практичні компетенції, заявлені програмою дисципліни? (Якщо відповідь «ні» - вкажіть, які розділи курсу потребують змін чи доповнень)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів	12 (100%)		
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	12 (100%)		
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	12 (100%)		
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	12 (100%)		
	Electric machines and devices / Електричні машини та апарати	12 (100%)		
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	11 (91,67%)	1 (8,33%)	Compilation of electrical circuits and soldering, using the studied new electrical components, research.
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	11 (91,67%)	1 (8,33%)	
7	*Do you have any suggestions for changing the list of lectures laboratory and practical works? (If your answer is "yes" - specify which sections of the course need amendments or additions)?* Чи є у Вас пропозиції щодо зміни переліку лекційних лабораторних та практичних робіт? (Якщо відповідь «так» - вкажіть вимоги щодо змін чи доповнень)			
	Electric vehicle infrastructure / Інфраструктура електромобілів	4 (33,33%)	8 (66,67%)	Practice at auto repair shops. More practice in car maintenance and repair services.
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	2 (16,67%)	10 (83,33%	Add laboratory work on the topic "Fundamentals of reliability of electricity supply". Practice at industrial enterprises. For a subject like "Energy Supply and Energy Saving Systems," using MATLAB can be very effective due to its powerful numerical computation, visualization, and programming capabilities. In a comprehensive exploration of energy systems through MATLAB, students engage in a series of practical exercises that span the calculation of solar energy potential, simulation of building energy consumption, analysis of wind turbine performance, and optimization of battery

				storage operations. These exercises delve into the complexities of energy flow in electrical grids, assess the carbon footprint of various energy sources, and investigate energy efficiency improvements in industrial processes. Through this multifaceted approach, the exercises not only bolster MATLAB programming skills but also impart a nuanced understanding of energy supply dynamics, the integration of renewable sources, and strategies for energy conservation. This holistic curriculum aims to equip students with the analytical tools and knowledge necessary to address the challenges and opportunities in the field of energy systems, emphasizing sustainable and efficient energy solutions.
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	2 (16,67%)	10 (83,33%	Practical exercises in Electric Drive Theory should involve hands-on tasks that cover programming variable frequency drives for speed control of motors, simulating motor performance under various conditions, designing control algorithms for precise motor operation, and analyzing the efficiency of electric drives. These activities will enable students to understand the fundamentals of electric motors, including AC, DC, stepper, and servo motors, the role of control systems in optimizing motor performance, and the significance of energy efficiency and recovery in drive systems. By integrating theoretical knowledge with practical skills, these exercises prepare students for real-world applications in industries such as manufacturing and electric vehicles, emphasizing the importance of electric drives in modern engineering solutions.
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	2 (16,67%)	10 (83,33%	
	Electric machines and devices / Електричні машини та апарати	2 (16,67%)	10 (83,33%	More practice in car maintenance and repair services.
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	3	9	Internship at car service centers.

		(25%)	(75%)	
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	3 (25%)	9 (75%)	
8	*Do you have any recommendations for using specialized software for laboratory works? (If you answer is "yes" – give recommendations)* Чи є у Вас пропозиції щодо використання спеціалізованого програмного забезпечення для лабораторних робіт? (При відповіді «так» - вкажіть рекомендації)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів	5 (41,67%)	7 (58,33%)	Software for special diagnostic scanners, such as Thinktool, Launch. Matlab Simulink
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	1 (8,33%)	11 (91,67%)	Matlab Simulink
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	1 (8,33%)	11 (91,67%)	Matlab Simulink, PSIM
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	1 (8,33%)	11 (91,67%)	Matlab Simulink, PSIM
	Electric machines and devices / Електричні машини та апарати	1 (8,33%)	11 (91,67%)	Matlab Simulink
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	2 (16,67%)	10 (83,33%	Matlab Simulink, Multisim, PyCharm (free), Proteus
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	2 (16,67%)	10 (83,33%	Matlab Simulink, Multisim, PyCharm (free), Proteus
9	*What in your opinion, is the program of this discipline aimed at (multiple options could be selected):* На що, на вашу думку, спрямована програма даної дисципліни (можна обрати декілька):			
	☐ formal use of knowledge (формальне використання знань) – **3 (25%)** ☐ development of critical thinking skills (розвиток критичного мислення) – **5 (41,67%)** ☒ use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) – **10 (83,33%)** ☒ development of practical experience and skills (розвиток практичного досвіду та навичок) – **11 (91,67%)** ☒ development of new competencies (розвиток нових компетентностей) – **11 (91,67%)** ☒ development of independent thinking (розвиток самостійності мислення) – **10 (83,33%)**			

	☒ development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) **– 10 (83,33%)** ☐ other (інше) - **0**			
10	*What, in your opinion, is the importance of this discipline:* У чому, на вашу думку, полягає важливість цієї дисципліни:			
	Electric vehicle infrastructure / Інфраструктура електромобілів			According to the future, in the near future this direction will have a very high demand. Because electric cars are the essence of advanced technologies. At the moment, the most promising one is gaining demand and developing. Formation of students' knowledge, skills and ideas on the basics and principles of building the infrastructure of electric vehicles. It is important to know this topic well to be able to find new solutions to improve the industry. The modern trend is the transition to electric transport, studying this course is a step into the future. Nowadays, this direction is very relevant, the infrastructure of electric cars encourages global manufacturers to develop new technologies. Rapid development and widespread use. Common based infrastructure knowledge that helps engineer to be aligned with contemporary standards of the vehicle building. Infrastructure development will allow seamless use of electric vehicles around the world. Crucial for enabling the widespread adoption of electric vehicles, ensuring the necessary charging framework and grid integration to support sustainable transportation and reduce greenhouse gas emissions.
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			Almost nothing works now without electricity. Our country needs to switch to energy-saving technologies. Electricity is an integral part of life.

				General design and calculation bases of power supply systems of motor vehicle enterprises. Power systems are a key aspect of the EV and hybrid industry, so knowing this topic is critical. This is an important component of any enterprise. The development of energy-efficient technologies and systems helps reduce dependence on imported energy resources and increase the country's energy independence. This is one of the important problems of our time. The future of not only our country, but also the world depends on this direction of study. Energy saving and low consumption systems – it is modern and actual problems of the engineering community. Understanding the specifics of electricity production, transformation and transmission allows for more energy-efficient methods of work in the industry. Essential for developing sustainable energy solutions, optimizing resource use, and reducing environmental impact, thereby ensuring a secure, efficient, and eco-friendly energy future.
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			An electric drive is the main power unit that drives an electric car. Knowledge of its characteristics and capabilities is extremely necessary. The electric drive in an electric car has high performance indicators and is constantly being improved, so it must be studied. Knowledge of electric drive characteristics and capabilities is extremely necessary. Basic knowledge and practical skills regarding the electric drive and motion control of executive mechanisms of working machines. One of the main elements in an electric car is an electric motor, so a specialist needs a thorough knowledge of its design and principle of operation. These are the basics you need to know to be a specialist in the field of "Electric vehicles and automotive electronics".
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			

				The electric drive is indispensable in various types of automated systems, robotics and industrial processes. Knowing its main characteristics is very important. Many modern devices use electric drives and electric motors. Therefore, knowledge about them gives an opportunity to move the future forward. Base drive and control principles of electric motor control. A modern car has up to fifty different electric motors in its composition. Knowledge of the characteristics and principles of their management is necessary for the formation of a specialist in this field. Pivotal for advancing the efficiency, control, and performance of electric motors used in a wide range of applications, from industrial machinery to electric vehicles, thus playing a critical role in the transition towards electrification and sustainable energy utilization.
	Electric machines and devices / Електричні машини та апарати			Knowledge of electrical machines and devices is extremely necessary for electrical engineers working in the field of motor vehicles. Electric machines are a part of the electric drive. Knowledge of electric machines is extremely necessary for people working with motor vehicles. The general structure and principle of operation, specific features and functionality of modern electrical machines and devices. Knowledge of the technical components of electric cars and hybrids makes it possible to offer ideas for creating new, more modern devices or improving existing ones. These are the basics you need to know to be a specialist in the field of "Electric vehicles and automotive electronics". Well-designed electric machines can have a high level of efficiency and productivity, which is important to ensure the economy and reliability of production processes. Knowledge from this discipline is a component of many industries, such as car factories. All mechanisms need support for their operation and maintenance.

				Theoretical principals of electrical machines and devices. A modern car uses a large number of different electric machines and devices. Knowledge of their characteristics and calculation skills are necessary for the formation of a specialist in this field. Fundamental to powering the modern world, enabling the conversion of electrical energy into mechanical energy and vice versa, thus driving innovation across industries from renewable energy to automation and beyond.
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			These are the basics of diagnosing and repairing electrical and electronic systems of cars. Knowledge of such a discipline allows one to understand control systems. Electronics and microcircuit engineering are the basis for solving professional tasks in the field of technical operation of electric power equipment and energy. Peculiarities of the construction of automotive devices and of industrial electronics designed for the formation, rectification, amplification, generation, regulation, conversion and processing of analog and discrete signals, design and selection of automation tools, their development and operation. Most systems in modern cars have control units, so knowledge of electronics and microcircuit technology is necessary for correct diagnosis and problem solving. These are the basics you need to know to be a specialist in the field of "Electric vehicles and automotive electronics". The development of electronics and microcircuit technology makes it possible to create equipment that is smaller in size and weight, which contributes to the development of modern technologies. This discipline provides the basic knowledge for the study of special electrical engineering disciplines in which many types of microcontrollers and electronic components are studied. Theoretical and practical side of microcircuit engineering.
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			

				Electronics are used in all areas of modern life, including cars. Knowledge of electronics and microcircuit technology allows you to understand the principles of operation of electronic circuits during the development, use and diagnostics in the industry. Crucial for the miniaturization and advancement of electronic devices and systems, fostering innovation in computing, telecommunications, healthcare, and a myriad of technologies that underpin the digital age.
11	*Emphasize 3 main areas that you consider the most important for mastering this discipline:* Визначить 3 основні моменти, які ви вважаєте найважливішими для опанування цієї дисципліни:			
	Electric vehicle infrastructure / Інфраструктура електромобілів			Desire to learn. Knowledge of physics and mathematics. Knowledge of electromechanics. Desire for new knowledge. The desire for development. The possibility of using the acquired knowledge in work. Knowledge of electronics, electrical engineering. Development of critical thinking and formation of a scientific approach. Knowledge verification (testing, exam or credit). Basic definitions of electric cars and hybrids. The purpose of creating electric cars for the environment. Correct construction of the infrastructure for the development of electric vehicles and hybrids. In order to master each of the disciplines, the first thing you need is a desire. It is also necessary to explain to the student why this course is necessary for studying, explaining the purpose and subject (Encouraging students to study the course). In the future, providing the student with theoretical lecture information (only necessary information). And the main thing is to consolidate this information. practically, both in laboratory conditions and, if possible, in real ones. Interest and desire to acquire knowledge. Working out practical and laboratory tasks. Development of critical thinking.

				Propensity for technical sciences. Theoretical basic training. Laboratory practice. Motivation to study. Independent mastering of additional material. Charging network design and management. Grid integration and energy management. Policy and regulatory frameworks.
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			Desire to learn. Knowledge of physics. Knowledge of electromechanics. Desire for new knowledge. The desire for development. The possibility of using the acquired knowledge in work. Knowledge of electronics, electrical engineering. Development of critical thinking and formation of a scientific approach. Knowledge verification (testing, exam or credit). The principle of operation of alternative sources of energy supply. Construction of electric vehicle systems with maximum. energy efficiency. Design solutions to increase the efficiency of alternative energy sources. In order to master each of the disciplines, the first thing you need is a desire. It is also necessary to explain to the student why this course is necessary for studying, explaining the purpose and subject (Encouraging students to study the course). In the future, providing the student with theoretical lecture information (only necessary information). And the main thing is to consolidate this information practically, both in laboratory conditions and, if possible, in real ones. Knowledge of physics and electrical engineering. Propensity for technical sciences. Theoretical basic training. Laboratory practice.

				Custom design. Independent mastering of additional material. Renewable energy technologies. Energy efficiency technique. System analysis and optimization.
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			Desire to learn. Knowledge of physics. Knowledge of electromechanics. Desire for new knowledge. The desire for development. The possibility of using the acquired knowledge in work Propensity for technical sciences. A knack for electric cars. Development of critical thinking and formation of a scientific approach. Knowledge verification (testing, exam or credit). The principle of operation of the main nodes and aggregates. Electric motor design. Fundamentals of electromechanics. In order to master each of the disciplines, the first thing you need is a desire. It is also necessary to explain to the student why this course is necessary for studying, explaining the purpose and subject (Encouraging students to study the course). In the future, providing the student with theoretical lecture information (only necessary information). And the main thing is to consolidate this information practically, both in laboratory conditions and, if possible, in real ones. Interest and desire to acquire knowledge. Knowledge of physics, electrical engineering and the basics of electric machines. Theoretical basic training. Laboratory practice. Custom design. Independent mastering of additional material. Control systems and algorithms. Power electronics.
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			

				Motor design and dynamics.
	Electric machines and devices / Електричні машини та апарати			Desire to learn. Knowledge of physics. Knowledge of electromechanics. Desire for new knowledge. The desire for development. The possibility of using the acquired knowledge in work. Propensity for technical sciences. A knack for electric cars. Development of critical thinking and formation of a scientific approach. Knowledge verification (testing, exam or credit). The principle of operation of the hybrid system. The principle of operation of electric cars. Design features of electric cars and hybrids. In order to master each of the disciplines, the first thing you need is a desire. It is also necessary to explain to the student why this course is necessary for studying, explaining the purpose and subject (Encouraging students to study the course). In the future, providing the student with theoretical lecture information (only necessary information). And the main thing is to consolidate this information practically, both in laboratory conditions and, if possible, in real ones. Interest and desire to acquire knowledge Knowledge of physics, electromechanics, electrical engineering. Theoretical basic training. Laboratory practice. Motivation to study. Independent mastering of additional material. Principles and operation of electric machines. Materials and manufacturing processes. Electromagnetic theory and applications.
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			Desire to learn. Propensity for technical sciences. Knowledge of physics and electrical engineering.
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			

				Desire for new knowledge. The desire for development. The possibility of using the acquired knowledge in work. Development of critical thinking and formation of a scientific approach. Knowledge verification (testing, exam or credit). Fundamentals of electronics. Studying the purpose and principle of operation of individual electronic elements. Ability to read and understand electrical schematics. To master each of the disciplines, it is necessary first. desire. It is also necessary to explain to the student why this course is necessary for studying, explaining the purpose and subject (Encouraging students to study the course). In the future, providing the student with theoretical lecture information (only necessary information). And the main thing is to consolidate this information practically, both in laboratory conditions and, if possible, in real ones. Interest and desire to acquire knowledge. Knowledge of physics and the basics of electrical engineering. Theoretical basic training. Laboratory practice. Custom design. Independent mastering of additional material. Solid-state devices and semiconductor physics. Circuit design and analysis. Microfabrication and nanotechnology.
12	*Do you have any suggestions for further improvement of this discipline?* Чи є у вас пропозиції щодо подальшого вдосконалення цієї дисципліни?			
	Electric vehicle infrastructure / Інфраструктура електромобілів	4 (33,33%)	8 (66,67%)	More practice at auto repair shops. More practical classes not only in laboratory conditions, but also in real ones, practical classes at enterprises, etc. Studying

				and consolidating information will practically help the future specialist to adapt to real working conditions more quickly. Involvement of specialists in the field of development and maintenance of charging stations and ports of electric vehicles.
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження	7 (58,33%)	5 (41,67%)	More practical classes not only in laboratory conditions, but also in real ones, practical classes at enterprises, etc. Studying and consolidating information will practically help the future specialist to adapt to real working conditions more quickly. Adding more suggested practical exercises.
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)	8 (66,67%)	4 (33,33%)	More practical classes not only in laboratory conditions, but also in real ones, practical classes at enterprises, etc. Studying and consolidating information will practically help the future specialist to adapt to real working conditions more quickly. Create additional labs to get initial experience with frequency converters for motor driving. Practical use of the electric drive of modern cars. Adding more suggested practical exercises
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)	8 (66,67%)	4 (33,33%)	
	Electric machines and devices / Електричні машини та апарати	5 (41,67%)	7 (58,33%)	More practical classes not only in laboratory conditions, but also in real ones, practical classes at enterprises, etc. Studying and consolidating information will practically help the future specialist to adapt to real working conditions more quickly. Conducting practice at car service stations.
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)	5 (41,67%)	7 (58,33%)	More practice at auto repair shops. More practical classes not only in laboratory conditions, but also in real ones, practical classes at enterprises, etc. Studying and consolidating information will practically help the future specialist to adapt to real working conditions more quickly. Improve labs work with new dev-boards for motor drive controls.
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)	5 (41,67%)	7 (58,33%)	

Summary Table 3.1.5 of the composition of participants in the analysis of courses/laboratory study programs

Scientific and academic staff

	Question	Area of professional activity	Experience in training		Comments about work experience	Work experience in scientific projects	
N			Yes	No		Scientific direction	Applied direction
1	What is your area of professional activity: a. Science b. Education c. Production of High-Tech Products d. other	a - 3(25%) b - 12(100%) c - 0 d - 0			Head of the cycle commission for electrical engineering and electromechanics of the Kharkiv Polytechnic College		
2	Have you had previous or current experience training in electrical, energy, electronics, automotive, transportation technology, etc.?		11 (91,67%)	1 (8,33%)	I have experience in teaching disciplines in the field of electrical equipment of cars devices/diagnostics/design, mechatronic systems of cars devices/diagnostics, automatic control systems and power electronics I have experience in teaching disciplines in the field of electrical engineering, electrical machines, electronics, physics (electrical section) Teaching of academic disciplines: "Electronics and microcircuit engineering", "Electrical engineering in construction", "Fundamentals of electrical engineering" Teaching academic subjects in the specialty 141 Electric power, electrical engineering and electromechanics at KhNUPS and KhNADU I have experience in teaching the discipline of Physics, which includes the section Electricity and Magnetism I have experience in teaching disciplines in the field of electrical machines, electrical engineering, electronics and microprocessor technology He had previous experience in teaching electronics, microprocessor devices, automotive electronics A rich man I have experience in teaching disciplines in the field of electric power, electromechanics and electrical systems and complexes of vehicles I have experience in teaching electrical		

					engineering, electrical equipment and modeling I have experience in teaching disciplines in the field of automation, computer science, automatic control systems and power electronics		
3	Have you had previous or current work experience in scientific projects in electrical, energy, electronics, automotive, transportation technology, etc.?		7 (58,33%)	5 (41,67%)		I have experience in performing scientific works in the field of magnetic pulse processing of metals, creation of modern vehicles Took part in the implementation of research works in the specialty 141 Electric power, electrical engineering and electromechanics at KhNUPS and KhNADU. I have work experience in 10 research works in the field of physics of electromagnetic technologies in the automotive industry Had previous work experience in scientific projects: - Increasing the survivability of multi-axle military trucks by using an automatic transmission and increasing the reliability of brakes. Scientific and research work 03-53-19 - Kharkiv: Khnadu, 12.2020. – state registration number 0119U001297. - 202 p. - Development of a system that improves the energy efficiency and environmental friendliness of vehicles based on "mild hybrid" technology. GDR 03-53-22. Project implementation dates: from 01.01.2022 to 31.12.2023. The name of the priority area of development of science and technology: Energy and energy efficiency. Kharkiv: Khnadu, 2022 I have experience in performing research works	

Employers

	Question	Area of professional activity	Experience in training		Comments about work experience	Work experience in scientific projects	
N			Yes	No		Scientific direction	Applied direction

1	What is your area of professional activity: a. industrial enterprise b. production of high-tech (IT) products c. IT-services d. transport e. non-government organization f. other (denote)	a. - 0 b. - 3 (25%) c. -1 d. -8 (66,67%) e. - 0 f. - 1 (8,33%)			Developing high performance systems of digital signal processing (DSP) VW dealership. "Avtodom Kharkiv" LLC		
2	Have you had previous or current experience training in electrical, energy, electronics, automotive, transportation technology, etc.?		8 (66,67%)	4 (33,33%)	That's how he completed his internship at "Master Service" for the restoration of automobile generators, starting starters, and air conditioning compressors. Before entering the Khnadu. I had work experience at 3 automobile factories in the Czech Republic for 3 months at each factory; KOVOLIS HEDVIKOV a.s., IDEAL Automotiv Bor, s.r.o. , Czechia Yanfeng Automotive Interior System. In the Netherlands, he worked in the dealership of Aston Martin, Maclaren, Jaguar, Range Rover, Bmw, Mini Cooper for 6 months, learned how to activate electronic systems and diagnose errors. Now I work in a TOYOTA, Mazda, Hyndai dealership, I moved from an assistant to the position of the 1st after-sales service technician Performing of adaptation DSP courses for new employees I conduct classes for students. I act as a consultant for students, as a representative of the company when they complete coursework and diploma projects. Received a master's degree at the Kharkiv National Automobile and Road University in the 141 specialty "Electric Power Engineering, Electrical Engineering and Electromechanics" Training in electrical engineering, drones technologies, seminars in various topics connected to electrical engineering. I have practical experience of working with maintenance, repair and diagnostics of motor vehicles Obtaining a specialist diploma in specialty 141, work at several service stations, work at the international automobile holding "SOLLY PLUS"		

					I conduct laboratory and practical work for students at the ELCARS enterprise. I advise students as a representative of the company when they complete coursework and diploma projects.		
3	Have you had previous or current work experience in scientific projects in electrical, energy, electronics, automotive, transportation technology, etc.?		5 (41,67%)	7 (58,33%)	Automotive electronics. Automatic lighting systems and systems for remote heating of the wiper zone. Scientific research work , Development of a combined power plant based on a pneumatic engine using renewable energy sources for city vehicles. 2021-2022 Investigation of wireless communication systems for Next-Gen WIFI and BT standards. Developing and implementing new math algorithms based on specific Core architecture Projects on power systems, electrical engineering, electronics, cyber physical systems.		

Summary Table 3.1.6

of the composition of participant's status in the analysis of courses/laboratory study programs

Status	Period			
Teaching experience	3-7 years	7-15 years	15-20 years	>20 years
	2 (8,33%)	2 (8,33%)	-	7 (29,17%)
Work experience in science	3-7 years	7-15 years	15-20 years	>20 years
	4 (16,67%)	3 (12,5%)	-	6 (25%)
Work experience in production	3-7 years	7-15 years	15-20 years	>20 years
	3 (12,5%)	6 (25%)	1 (4,17%)	1 (4,17%)
Position in production	Assistant auto electrician TDM AUTO; AUTOVIT service station manager; Diagnostic electrician "ElCars"; Researcher, PhD Candidate.	1st auto technician, after-sales service "TOYOTA Nederland Europa"; Individual entrepreneur Sarajevo O.V.; Snr. DSP developer; Director, "MOTOR TRANS" PE; Employee of "СОЛЛІ ПЛЮС" car service; Owner "ELCARS" LLC.	Director of Suzuki Kharkiv Technical Center.	Standardization and quality engineer of "Avtodom Kharkiv" LLC.

Comments and suggestions

All surveyed respondents consider it necessary to study the declared courses in the bachelor's program "Electric Vehicles and Automotive Electronics". Also, the vast majority of the surveyed respondents agree with the purpose of these courses, their tasks, main competencies and the distribution of hours by types of training sessions.
Respondents suggested adding, in their opinion, relevant topics to the educational material by about 20%. Which is quite important, because it shows the direction of development and modernization of these courses, considering the opinion of the main stakeholders.
Also, the respondents formed what, in their opinion, is the importance of the proposed courses. This gives an understanding of what needs to be paid attention to in the learning process and what is important from the side of the labor market representatives. The implementation of such an approach will increase the quality of the educational process and help the university to train qualified specialists under the "Electric Vehicles and Automotive Electronics" program.
The main recommendation of the respondents regarding changing the list of lecture laboratory and practical work was to add more practice at employers and at car maintenance and repair services.
Also, the respondents provided suggestions regarding the use of specialized software for laboratory work. This is software for special diagnostic scanners, such as Thinktool, Launch, and application program packages: Matlab Simulink, Multisim, PyCharm (free), Proteus.
Analyzing the respondents' answers, the three main areas that are considered the most important for mastering the disciplines related to electric cars are:
1. Desire to learn:
The desire to learn is fundamental in any educational endeavor. Without a genuine interest and motivation to understand electric cars and related disciplines, students may struggle to grasp the concepts effectively. Cultivating a passion for learning encourages students to delve deeper into the subject matter, seek out additional resources, and actively engage in their studies.
2. Knowledge of physics, electrical engineering, and the basics of electric machines:
A solid foundation in physics and electrical engineering is essential for understanding the principles behind electric cars and their components. Concepts such as electromagnetism, circuits, and energy conversion form the basis of electromechanics and power electronics, which are integral to electric vehicle technology. Understanding the basics of electric machines provides insight into the operation of electric motors and generators, which are central to electric propulsion systems.
3. Practical experience through laboratory practice and real-world applications:
Hands-on experience is invaluable for reinforcing theoretical knowledge and developing practical skills. Laboratory practice allows students to apply theoretical concepts in controlled environments, gaining firsthand experience with equipment and experimental setups. Additionally, exposure to real-world applications, such as internship opportunities or industry collaborations, provides context and relevance to classroom learning. By engaging in practical exercises and projects, students can deepen their understanding of electric vehicle technology and its practical implications.
By emphasizing these three main areas – desire to learn, knowledge of foundational principles, and practical experience – students can effectively master the disciplines related to electric cars and contribute to advancements in the field of electric mobility.

After processing the questionnaires of stakeholders on improving training courses, the next steps can be:

1. Analysis of the results: Evaluation and analysis of the data obtained from the questionnaires, identification of the main problems and needs for improvement of training courses.

2. Formulation of proposals: Based on the analysis of the results, the development of specific proposals for the improvement of educational courses, including content, teaching methods, organization of classes and other aspects.

3. Implementation of changes: Implementation of planned measures to improve educational courses, including updating course content, changing teaching methods, training teachers and students for new approaches, etc.

4. Evaluation of effectiveness: Monitoring and evaluation of the results of implementation of changes, identification of positive and negative aspects, adjustment of the strategy of improvement of training courses in accordance with the needs of stakeholders and the achieved results.

This cycle can be repeated, allowing to constantly adapt the training courses to the changing needs and requirements of the participants in the educational process.

3.3 Lutsk National Technical University

Time of the survey

The survey of the representatives of academic and scientific staff, as well as the representatives of potential employers, was conducted in March 2024.

Participants in the survey

In total, 10 academic staff representatives, and 9 employers participated in the survey. The number of respondents from employers included representatives of associated partners, namely Limited Liability Company «Avtokoncept», PJSC «Volyn-Avto» (see Tab. 3.3.1.).

The reason of selection of particular respondents:

Respondents who are specialists in the field of automobile transport, in particular in the field of sales, maintenance, repair and operation of vehicles, took part in the survey. This applies to both employers and scientific and teaching staff. The professions and specializations of the respondents involved in the survey will allow us to collect constructive feedback that will help in the development and modernization of the identified courses according to the needs of the market for which the students are being prepared. Such an approach will contribute to the improvement of the quality of training courses, the educational process, and the mutual increase of the interests of representatives of the labor market and students of higher education.

Table 3.3.1. List of Scientific, academic staff and employers who participated in the survey on the bachelor program *«Motor Vehicle Transport»*.

Nr	Academic staff	Position
1	Pavlo Popovych	Head of the Department of Transport and Logistics of the West Ukrainian National University, doctor of technical sciences, professor
2	Yurii Monastyrskyi	Head of the Automobile Transport Department Kryvyi Rih National University, doctor of technical sciences, professor
3	Serhiy Andrusenko	Head of the department of technical operation of cars and service of the National Transport University, candidate of technical sciences, professor
4	Roman Kachmar	Deputy director for scientific and pedagogical work of the Institute of Engineering Mechanics and Transport of the National University of Lviv Polytechnic, candidate of technical sciences, associate professor
5	Eduard Klimov	Head of the department of cars and tractors Kremenchug National University named after Mykhailo Ostrogradskyi, candidate of technical sciences, associate professor

6	Serhii Melnychuk	Head of the Automobile Transport Department of the Zhytomyr Agricultural Technical College, candidate of technical sciences, associate professor
7	Mykhailo Grubel	Head of the Department of Automobiles and Automotive Industry of the National Academy of Land Forces named after Hetman Petro Sahaidachny, doctor of technical sciences, professor
8	Oleg Sitovsky	Associate Professor of the Department of Automobiles and Transport Technologies of the Lutsk National Technical University, Candidate of Technical Sciences
9	Victor Samostian	Associate Professor of the Department of Automobiles and Transport Technologies of the Lutsk National Technical University, Candidate of Technical Sciences
10	Oleg Zakharchuk	Associate Professor of the Department of Automobiles and Transport Technologies of the Lutsk National Technical University, Candidate of Technical Sciences
	Employers	**Position**
1	Andriy Paliychuk	Deputy General Director of PJSC «Volyn-Auto»
2	Oleg Mogiletskyi	Director of Limited Liability Company «Avtokoncept»
3	Maxim Dorosh	Specialist in certification of the Testing Laboratory of Limited Liability Company «AWG STANDARD»
4	Dmytro Titarenko	Director of production of Limited Liability Company «BAS MOTOR»
5	Oleg Mogiletskyi	Director of Limited Liability Company «Promtechmervis»
6	Nazar Galiy	Engineer Private Enterprise «SVITAHO»
7	Oleg Kukhta	Director of Limited Liability Company «AUTODROM LUTSK»
8	Serhii Petryk	Master receiver of Limited Liability Company «Avtotsentr-Zakhid»
9	Andriy Kotsyuba	Head of the motor vehicle shop of Limited Liability Company «Avtotsentr-Zakhid»

Study programs, courses etc. that were evaluated by representatives of employers.

Table 3.3.2: Study courses of the bachelor program "Motor Vehicle Transport" that were evaluated by representatives of Academic staff and employers

Course/ Lab title	**Updated or newly developed**	**Level (Bachelor, Master 5-year course)**	**ECTS credit points**	**The teaching/training methodologies developed/adopted e.g. e-learning/ training modalities,**	**The link to the university's website**	**Date of accreditation**	**The status / document of accreditation**

				practical placements in enterprises, etc.			
Theory of operational properties of the car	Updated	Bachelor	7	Lecture, e-learning, practical, lab practical	https://docs.google.com/document/d/1uwpRRHIPKy3FJyUSxjYXggzSAMPOOriP/edit?usp=sharing&ouid=101377625706635695753&rtpof=true&sd=true	spring 2028	Completed
Road transport enterprises. Part 1. Design	Updated	Bachelor	7	Lecture, e-learning, practical	https://docs.google.com/document/d/1O_cAmgX1LojDY-4JyUgsHSNBJhzljEas/edit?usp=drive_link&ouid=101377625706635695753&rtpof=true&sd=true	spring 2028	Completed
Road transport enterprises. Part 2. Organization and management	Updated	Bachelor	5	Lecture, e-learning, practical	https://docs.google.com/document/d/11rngUhR2GYmtafQN1_-52piuo1z2uq5u/edit?usp=drive_link&ouid=101377625706635695753&rtpof=true&sd=true	spring 2028	Completed
Road transport enterprises. Part 3. Quality of production processes	Updated	Bachelor	5	Lecture, e-learning, practical	https://docs.google.com/document/d/122xXKmHSWLgpabvmG8CKyWTAAy63CmbY/edit?usp=drive_lin	spring 2028	Completed

					k&ouid=101377625706635695753&rtpof=true&sd=true		
Technical operation of cars	Updated	Bachelor	9	Lecture, e-learning, practical, lab practical, practical placements in enterprises	https://docs.google.com/document/d/1O_cAmgX1LojDY-4JyUgsHSNBJhzIjEas/edit?usp=drive_link&ouid=101377625706635695753&rtpof=true&sd=true	spring 2028	Completed

Description of the means and channels used in the survey

Before the start of the survey, appropriate questionnaires were developed for academic staff and for representatives of industrial enterprises. The specified questionnaires were sent to stakeholders by e-mails. The selection of stakeholders was carried out on the basis of the experience of LNTU cooperation with partners. In particular, questionnaires were sent to scientists and teaching staff of leading universities that train specialists in the field of road transport. Industrial enterprises were selected on the basis of data available at the Department of Automobiles and Transport Technologies of the National Technical University. Questionnaires were sent to enterprises where graduates of the "Automotive Transport" educational program work.

Responses from stakeholders were sent to the e-mail of Valerii Dembitskyi, associate professor of the Department of Automobiles and Transport Technologies of LNTU.

Results of the survey

19 questionnaires were analysed, 10 of them are of scientific, academic staff and 9 of industrial employers. The results of the analysis are collected in Table 3.3.3 - 3.3.6.

Among the respondents, the largest percentage, i.e. 31,6%, have work experience in science >20 years, and work experience in production >20 years - 75,0 %, teaching experience has the largest percentage among respondents with >20 years of work experience – 31,6%.

Summary Table 3.3.3 of the "yes" and "no" answers included in the questionnaires for courses/ laboratory study programs by **academic and scientific** stakeholders.

PART 2 / ЧАСТИНА 2 ***Questions by courses/laboratory work study programs* / Питання за програмами курсів/лабораторних робіт**				
N	***Question* /Запитання**	**Yes**	**No**	***Justification and notes* /Примітки, пояснення**
1	*Do you consider it necessary for the learning of students in the bachelor's program "**Motor Vehicle Transport**": (If you answer is "no," please justify your answer)?* Чи вважаєте Ви необхідним вивчення наступної дисципліни в бакалаврській програмі «**Автомобільний транспорт»:** (Якщо відповідь «ні» – обґрунтуйте відповідь)			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	10 (100%)	0 (0%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	10 (100%)	0 (0%)	
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	10 (100%)	0 (0%)	It is possible to combine the disciplines "Road transport enterprises. Part 2. Organization and management" and "Road transport enterprises. Part 3. Quality of production processes", since "quality of production processes" is a feedback link to organization and management
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	10 (100%)	0 (0%)	It is possible to combine the disciplines "Road transport enterprises. Part 2. Organization and management" and "Road transport enterprises. Part 3. Quality of production processes", since "quality of production processes" is a feedback link to organization and management

	Technical operation of cars / Технічна експлуатація автомобілів	10 (100%)	0 (0%)	
	Do you agree with the wording of the purpose of this academic discipline (If your answer is "no" - justify your answer)? Чи згодні ви з формулюванням мети даної навчальної дисципліни (Якщо ви відповіли «ні» - обґрунтуйте свою відповідь)?			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	10 (100%)	0 (0%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	10 (100%)	0 (0%)	
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	10 (100%)	0 (0%)	
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	10 (100%)	0 (0%)	
	Technical operation of cars / Технічна експлуатація автомобілів	10 (100%)	0 (0%)	
	Do you agree with the wording of the tasks of this academic discipline (If your answer is "no" - justify your answer)? Чи згодні ви з формулюванням завдань даної навчальної дисципліни (Якщо відповідь «ні» – відповідь обґрунтуйте)?			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	10 (100%)	0 (0%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	10 (100%)	0 (0%)	
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	10 (100%)	0 (0%)	If you combine the disciplines "Road transport enterprises. Part 2. Organization and management" and "Road transport enterprises.

				Part 3. Quality of production processes", then the goal and task must be adjusted
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	10 (100%)	0 (0%)	If you combine the disciplines "Road transport enterprises. Part 2. Organization and management" and "Road transport enterprises. Part 3. Quality of production processes", then the goal and task must be adjusted
	Technical operation of cars / Технічна експлуатація автомобілів	10 (100%)	0 (0%)	
	Do you agree with the formulation of the core competencies to which the discipline is intended to be mastered? (In your answer is "no," please specify which of the competencies need further clarification and/or modification): Чи згодні ви з формулюванням основних компетенцій, якими передбачається опанувати дисципліну? (У відповіді «ні» - вкажіть, які з компетенцій потребують уточнення чи зміни):			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	10 (100%)	0 (0%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	10 (100%)	0 (0%)	
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	10 (100%)	0 (0%)	
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	10 (100%)	0 (0%)	
	Technical operation of cars / Технічна експлуатація автомобілів	10 (100%)	0 (0%)	

	Do you think that the lecture material will allow students to reveal the essence of the discipline, will allow them to achieve the main goal and educational results of the discipline? (If your answer is "no," please give an explanation): Як ви вважаєте, лекційний матеріал дозволить студентам розкрити сутність дисципліни, дозволить досягти основної мети та навчальних результатів дисципліни? (При відповіді «ні» - дайте пояснення):			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	10 (100%)	0 (0%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	9 (90%)	1 (10%)	It is necessary to add production practice and an individual design task to the lecture material
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	10 (100%)	0 (0%)	
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	10 (100%)	0 (0%)	
	Technical operation of cars / Технічна експлуатація автомобілів	9 (90%)	1 (10%)	A combination with production practice is necessary
	Do you think that the proposed list of laboratory and practical works will help to develop all practical competence, declared by the discipline program? (If your answer is "no" - specify which sections of the course need amendments or additions)? Як ви вважаєте, чи допоможе запропонований перелік лабораторних і практичних робіт розвинути всі практичні компетенції, заявлені програмою дисципліни? (Якщо відповідь «ні» - вкажіть, які розділи курсу потребують змін чи доповнень)?			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	10 (100%)	0 (0%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	10 (100%)	0 (0%)	Add the issue of discipline to production practice

	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	10 (100%)	0 (0%)	
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	10 (100%)	0 (0%)	
	Technical operation of cars / Технічна експлуатація автомобілів	10 (100%)	0 (0%)	Add the issue of discipline to production practice
	Do you have any suggestions for changing the list of lectures laboratory and practical works? (If your answer is "yes" - specify which sections of the course need amendments or additions)? Чи є у Вас пропозиції щодо зміни переліку лекційних лабораторних та практичних робіт? (Якщо відповідь «так» - вкажіть вимоги щодо змін чи доповнень)			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	0 (0%)	10 (100%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	0 (0%)	10 (100%)	
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	0 (0%)	10 (100%)	
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	0 (0%)	10 (100%)	
	Technical operation of cars / Технічна експлуатація автомобілів	0 (0%)	10 (100%)	
	Do you have any recommendations for using specialized software for laboratory works? (If you answer is "yes" – give recommendations)			

	Чи є у Вас пропозиції щодо використання спеціалізованого програмного забезпечення для лабораторних робіт? (При відповіді «так» - вкажіть рекомендації)?			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	0 (0%)	10 (100%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	0 (0%)	10 (100%)	
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	0 (0%)	10 (100%)	
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	0 (0%)	10 (100%)	
	Technical operation of cars / Технічна експлуатація автомобілів	1 (10%)	9 (90%)	Study of specialized software of technological equipment of enterprises for diagnostics and maintenance of cars
	What in your opinion, is the program of this discipline aimed at (multiple options could be selected): На що, на вашу думку, спрямована програма даної дисципліни (можна обрати декілька):			
	☐ formal use of knowledge (формальне використання знань) **– 2 (20%)** ☐ development of critical thinking skills (розвиток критичного мислення) **– 10 (100%)** ☐ use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) **– 10 (100%)** ☐ development of practical experience and skills (розвиток практичного досвіду та навичок) **– 10 (100%)**			

	☐ development of new competencies (розвиток нових компетентностей) **– 9 (90%)** ☐ development of independent thinking (розвиток самостійності мислення) **– 7 (70%)** ☐ development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) **– 9 (90%)** ☐ other (інше) **– 1 (10%)**			
	What, in your opinion, is the importance of this discipline: У чому, на вашу думку, полягає важливість цієї дисципліни:			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля			1. Development of new competencies 2. Not very important One of the many professional disciplines that must be mastered during the preparation of a bachelor's degree 3. Acquisition of knowledge, abilities, skills in the specialty, ability to communicate, responsibility and autonomy. 4. Understanding the processes of car movement and braking, evaluation of the operational efficiency of cars 5. Formal use of knowledge, development of critical thinking, use of causal analysis methods 6. Knowledge of the operation of the road transport system
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування			1. Critical thinking. Development of new competencies

				2. Not very important One of the many professional disciplines that must be mastered during the preparation of a bachelor's degree 3. Acquisition of knowledge, abilities, skills in the specialty, ability to communicate, responsibility and autonomy. 4. Designing the production and technical base of road transport enterprises 5. Formal use of knowledge, development of critical thinking, development of new competencies, development of independent thinking 6. Knowledge of the structure and functioning of divisions and the enterprise as a whole
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління			1. Development of new competencies. 2. Not very important One of the many professional disciplines that must be mastered during the preparation of a bachelor's degree 3. Acquisition of knowledge, abilities, skills in the specialty, ability to communicate, responsibility and autonomy. 4. Understanding the adjustment of the functioning of the elements of road transport enterprises, their structure, organization and management 5. The development of critical thinking, the development of the ability to non-standard approaches in solving problems and making decisions

				6. Knowledge of methods and organizational actions aimed at ensuring quality work and development of road transport enterprises
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів			1. Development of new competencies 2. Not very important One of the many professional disciplines that must be mastered during the preparation of a bachelor's degree 3. Acquisition of knowledge, abilities, skills in the specialty, ability to communicate, responsibility and autonomy. 4. Control over compliance with the quality of production processes at road transport enterprises 5. Formal use of knowledge, development of critical thinking, use of causal analysis methods 6. Knowledge of methods and organizational actions aimed at ensuring quality work and development of road transport enterprises
	Technical operation of cars / Технічна експлуатація автомобілів			1. Development of new competencies 2. It is very important. One of the main professional disciplines that must be mastered when preparing a bachelor's degree 3. Acquisition of knowledge, abilities, skills in the specialty, ability to communicate, responsibility and autonomy. 4. Ensuring a given level of technical condition of cars, understanding the processes of carrying out maintenance and repair of cars

				5. Formal use of knowledge, use of methods of cause and effect analysis, development of practical experience and skills, development of independent thinking, development of the ability to non-standard approaches in solving problems and making decisions 6. Knowledge of the organization of technological processes of maintenance and repair of cars
	Emphasize 3 main areas that you consider the most important for mastering this discipline: Визначить 3 основні моменти, які ви вважаєте найважливішими для опанування цієї дисципліни:			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля			1. Methods of causal analysis 2. Systematicity, complexity and consistency 3. Availability of basic knowledge, desire and ability to study among students, high-quality teaching staff, educational and methodological, information and material and technical support 4. Autonomy, critical thinking, analytical thinking Formal use of knowledge, development of critical thinking, use of causal analysis methods 5. Lectures, practical work, laboratory work
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування			1. Methods of causal analysis 2. Systematicity, complexity and consistency 3. Availability of basic knowledge, desire and ability to study among students, high-quality teaching staff, educational and methodological, information and material and technical support

				4. Analytical thinking, modern teaching methods, independence 5. Formal use of knowledge, development of new competencies, development of independent thinking 6. Theory, production, calculation
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління			1. Development of critical thinking. Analytical abilities. 2. Systematicity, complexity and consistency 3. Availability of basic knowledge, desire and ability to study among students, high-quality teaching staff, educational and methodological, information and material and technical support 4. Modern methods of learning, modern trends in the development of the industry, teamwork 5. The development of critical thinking, the development of the ability to non-standard approaches in solving problems and making decisions Lectures, practical work
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів			1. Development of critical thinking. Analytical abilities. 2. Systematicity, complexity and consistency 3. Availability of basic knowledge, desire and ability to study among students, high-quality teaching staff, educational and methodological, information and material and technical support

				4. Modern methods of quality assessment, autonomy, teamwork 5. Formal use of knowledge, development of critical thinking use of causal analysis methods 6. Lectures, practical work
	Technical operation of cars / Технічна експлуатація автомобілів			1. Development of critical thinking. Analytical abilities. 2. Systematicity, complexity and consistency 3. Availability of basic knowledge, desire and ability to study among students, high-quality teaching staff, educational and methodological, information and material and technical support 4. Modern trends in the development of the industry, independence, practical skills 5. Formal use of knowledge, development of critical thinking, development of practical experience and skills 6. Lectures, practical work, laboratory work
	Do you have any suggestions for further improvement of this discipline? Чи є у вас пропозиції щодо подальшого вдосконалення цієї дисципліни?			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	2 (20%)	8 (80%)	1. Of course, there are always proposals, but it is necessary to realistically evaluate the possibilities of their implementation 2. Trends in increasing the fleet of electric vehicles and hybrids, taking into account their features 3. In terms of the development of the design of cars

	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	2 (20%)	8 (80%)	1. Use of modern design methods without outdated calculation methods of large motor transport enterprises. 2. In terms of maintenance and repair of the latest car systems
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	1 (10%)	9 (90%)	1. Using the experience of foreign enterprises in the field of transport
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	1 (10%)	9 (90%)	1. Acquaintance of students of higher education with the standards of the ISO series
	Technical operation of cars / Технічна експлуатація автомобілів	3 (30%)	7 (70%)	1. Study of the peculiarities of maintenance and repair of electric cars and hybrids 2. In terms of maintenance and repair of the latest car systems

If you have any further comments or suggestions about the problem and/or the content of the questions, please write down your thoughts in this section:

1. The questionnaire is sufficiently complete and allows to analyse the positive and negative qualities of the educational program and to determine directions for its improvement.

Summary Table 3.3.4 of the "yes" and "no" answers included in the questionnaires for courses/ laboratory study programs by **industrial** stakeholders.

PART 2 / ЧАСТИНА 2

***Questions by courses/laboratory work study programs* / Питання за програмами курсів/лабораторних робіт**

N	*Question* /Запитання	Yes	No	*Justification and notes* /Примітки, пояснення
1	*Do you consider it necessary for the learning of students in the bachelor's program "**Motor Vehicle Transport**": (If you answer is "no," please justify your answer)* Чи вважаєте Ви необхідним вивчення наступної дисципліни в бакалаврській програмі «**Автомобільний транспорт»:** (Якщо відповідь «ні» – обґрунтуйте відповідь)			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	9 (100%)	0 (0%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	9 (100%)	0 (0%)	
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	9 (100%)	0 (0%)	
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	9 (100%)	0 (0%)	
	Technical operation of cars / Технічна експлуатація автомобілів	9 (100%)	0 (0%)	
	Do you agree with the wording of the purpose of this academic discipline (If your answer is "no" - justify your answer)? Чи згодні ви з формулюванням мети даної навчальної дисципліни (Якщо ви відповіли «ні» - обґрунтуйте свою відповідь)?			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	9 (100%)	0 (0%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	9 (100%)	0 (0%)	

	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	9 (100%)	0 (0%)	
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	9 (100%)	0 (0%)	
	Technical operation of cars / Технічна експлуатація автомобілів	9 (100%)	0 (0%)	
	Do you agree with the wording of the tasks of this academic discipline (If your answer is "no" - justify your answer)? Чи згодні ви з формулюванням завдань даної навчальної дисципліни (Якщо відповідь «ні» – відповідь обґрунтуйте)?			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	9 (100%)	0 (0%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	9 (100%)	0 (0%)	
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	9 (100%)	0 (0%)	
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	9 (100%)	0 (0%)	
	Technical operation of cars / Технічна експлуатація автомобілів	9 (100%)	0 (0%)	
	Do you agree with the formulation of the core competencies to which the discipline is intended to be mastered? (In your answer is "no," please specify which of the competencies need further clarification and/or modification):			

	Чи згодні ви з формулюванням основних компетенцій, якими передбачається опанувати дисципліну? (У відповіді «ні» - вкажіть, які з компетенцій потребують уточнення чи зміни):			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	9 (100%)	0 (0%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	9 (100%)	0 (0%)	
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	9 (100%)	0 (0%)	
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	9 (100%)	0 (0%)	
	Technical operation of cars / Технічна експлуатація автомобілів	9 (100%)	0 (0%)	
	Do you think that the lecture material will allow students to reveal the essence of the discipline, will allow them to achieve the main goal and educational results of the discipline? (If your answer is "no," please give an explanation): Як ви вважаєте, лекційний матеріал дозволить студентам розкрити сутність дисципліни, дозволить досягти основної мети та навчальних результатів дисципліни? (При відповіді «ні» - дайте пояснення):			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	8 (87,5%)	1 (12,5%)	More practice
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	9 (100%)	0 (0%)	
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	8 (87,5%)	1 (12,5%)	Needs more practical aspects using modern design programs

	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	9 (100%)	0 (0%)	
	Technical operation of cars / Технічна експлуатація автомобілів	8 (87,5%)	1 (12,5%)	More practice
	Do you think that the proposed list of laboratory and practical works will help to develop all practical competence, declared by the discipline program? (If your answer is "no" - specify which sections of the course need amendments or additions)? Як ви вважаєте, чи допоможе запропонований перелік лабораторних і практичних робіт розвинути всі практичні компетенції, заявлені програмою дисципліни? (Якщо відповідь «ні» - вкажіть, які розділи курсу потребують змін чи доповнень)?			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	9 (100%)	0 (0%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	8 (87,5%)	1 (12,5%)	Requires an introduction to modern design programs with the latest updates
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	9 (100%)	0 (0%)	
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	9 (100%)	0 (0%)	
	Technical operation of cars / Технічна експлуатація автомобілів	9 (100%)	0 (0%)	
	Do you have any suggestions for changing the list of lectures laboratory and practical works? (If your answer is "yes" - specify which sections of the course need amendments or additions)? Чи є у Вас пропозиції щодо зміни переліку лекційних лабораторних та практичних робіт? (Якщо відповідь «так» - вкажіть вимоги щодо змін чи доповнень)			

	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	0 (0%)	9 (100%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	8 (87,5%)	1 (12,5%)	Since it is difficult to master the entire discipline, there should be a division into areas to choose from: 3D design + mechanics, hydraulics + pneumatics, electricity + electronics
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	0 (0%)	9 (100%)	
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	0 (0%)	9 (100%)	
	Technical operation of cars / Технічна експлуатація автомобілів	0 (0%)	9 (100%)	
	Do you have any recommendations for using specialized software for laboratory works? (If you answer is "yes" – give recommendations) Чи є у Вас пропозиції щодо використання спеціалізованого програмного забезпечення для лабораторних робіт? (При відповіді «так» - вкажіть рекомендації)?			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	0 (0%)	9 (100%)	
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	1 (12,5%)	8 (87,5%)	Solidworks 2021, Solidworks electrical
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	2 (25%)	7 (70%)	1. I consider it expedient to use SRM systems and software used by modern enterprises 2. Studying the "1C Enterprise" program

	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	0 (0%)	9 (100%)	
	Technical operation of cars / Технічна експлуатація автомобілів	1 (12,5%)	8 (87,5%)	Using diagnostic software
	What in your opinion, is the program of this discipline aimed at (multiple options could be selected): На що, на вашу думку, спрямована програма даної дисципліни (можна обрати декілька):			
	☒ formal use of knowledge (формальне використання знань) – 2 (22,2 %) ☒ development of critical thinking skills (розвиток критичного мислення) – 5 (55,6 %) ☒ use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) – 5 (55,6 %) ☒ development of practical experience and skills (розвиток практичного досвіду та навичок) – 5 (55,6 %) ☒ development of new competencies (розвиток нових компетентностей) – 5 (55,6 %) ☒ development of independent thinking (розвиток самостійності мислення) – 5 (77,8 %) ☒ development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) – 6 (66,7 %) ☐ other (інше) – 0 (0,0 %)			
	What, in your opinion, is the importance of this discipline: У чому, на вашу думку, полягає важливість цієї дисципліни:			

	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля			1. Understanding the prospects for the development of the automotive industry 2. Knowledge of this discipline will allow applicants to familiarize themselves with the basics and norms of the properties of cars, as well as this knowledge is necessary for further employment in the automotive field 3. It is important to learn the operational properties of cars 4. To provide basic general knowledge about the development and improvement of the car through the prism of operational properties 5. Provides a deep understanding of the working mechanisms of cars; helps in increasing safety, efficiency and economy of operation; promotes innovation and improvement of automotive technologies; prepares specialists for the development and maintenance of modern and future cars. 6. A deep understanding of the principles of operation and behavior of a car
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування			1. Optimization of production processes in the field of car operation 2. In the future, a person will be competent in the design and development of a company or organization. He will also be able to start new projects with their further implementation

				3. Understand the structure of enterprises from the inside of the organization 4. Familiarize with approaches to design, learn to use basic design programs 5. Analysis of transport service and logistics needs; planning of placement, structure and scale of the enterprise; consideration of environmental norms and traffic safety; integration of modern technologies and process automation; ensuring effective communication between different parts of the enterprise. 6. Understanding the functioning and organization of motor transport enterprises
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління			1. Knowledge of this discipline is necessary for understanding processes in the company 2. Ability to perform management in the organization 3. To provide basic knowledge about the organization of the work of enterprises in the automotive industry and their management system 4. Development strategy development and optimization of work processes; establishment of an effective system of logistics and distribution of tasks; implementation of quality and safety management systems; monitoring of transport operations and customer service; personnel training and development of corporate culture;

				application of innovation and digital technologies to improve efficiency. 5. Acquisition of knowledge and skills necessary for work in the field of motor transport
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів			1. Quality control in production 2. To be able to achieve the highest result in the future 3. It directly affects the quality of work performed by young personnel 4. Familiarize with the conditions of quality organization of production processes, as a mandatory requirement of modern production 5. Standardization of work procedures and compliance with regulations; implementation of quality management systems (for example, ISO); regular monitoring and analysis of processes to identify and eliminate deviations; continuous training of personnel and improvement of their qualifications; application of modern technologies and equipment to optimize production; focus on customer service and satisfaction of consumer needs. 6. Development of logical and analytical thinking, increasing competitiveness in the labor market.
	Technical operation of cars / Технічна експлуатація автомобілів			1. Forecasting the costs of the enterprise for maintaining the car in a technically sound condition

				2. The importance lies in the fact that the use of this knowledge is important both for personal purposes and for general development, as well as during operation, proper maintenance of car fleets or maintenance of client cars 3. Understanding the importance of timely car maintenance 4. Basic knowledge of a car maintenance engineer 5. Regular maintenance to ensure the safe and efficient operation of the vehicle; diagnosis and repair of malfunctions to keep the vehicle in good condition; execution of planned inspections and replacement of consumables (oil, filters, brake pads, etc.); adaptation of the car to specific operating conditions; ensuring compliance of the car with safety requirements and environmental standards. 6. Providing the knowledge and skills to keep the car in a safe condition
	Emphasize 3 main areas that you consider the most important for mastering this discipline: Визначить 3 основні моменти, які ви вважаєте найважливішими для опанування цієї дисципліни:			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля			1. Willingness to learn, availability of material, material that meets current trends and demand on the labor market 2. Attention, logical thinking 3. Read, listen, memorize

				4. Understanding the principles of operation of automotive systems and units: Knowledge of the mechanisms of action of the main components of the car (engine, transmission, chassis) and their influence on operational characteristics; analysis of the influence of external and internal factors on operation: Assessment of how operating conditions (climate, road surface) and technical condition of the car affect its safety, reliability and economy; use of methods to improve operational efficiency: Application of modern technologies and approaches (for example, diagnostics, maintenance planning) to optimize the use of the car and reduce the costs of its maintenance. 5. Understanding the principles of operation of the main systems of the car, the ability to analyze operational indicators
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування			1. Willingness to learn, availability of material, material that meets current trends and demand on the labor market 2. Creativity, perseverance 3. Formulation of the task for designing, knowledge of the design of the car, ownership of a software product for designing 4. Infrastructure planning: Mastering the skills of developing effective planning of the territory of the enterprise, which includes maintenance and repair areas, warehouses and administrative buildings; analysis of market needs and

				legislative requirements: Ability to conduct an analysis of the road transport market, determine the needs of the target audience and ensure compliance of the design with regulatory and legal acts and safety standards; integration of technologies and environmental requirements: Knowledge of modern technological solutions for road transport and their implementation in the project, as well as taking into account environmental norms and requirements in the design of enterprises. 5. Understanding the principles of logistics and supply chain management, possessing analytical and managerial skills
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління			1. Willingness to learn, availability of material, material that meets current trends and demand on the labor market 2. Self-control, critical thinking, attentiveness 3. Understanding of the main organizational structures and their differences, planning to achieve results, analytical thinking regarding activity management 4. Strategic planning and change management: Mastering the methods of developing long-term enterprise development strategies, the ability to adapt to changes in market conditions and implement innovations; effective distribution of resources and logistics: Understanding the principles of optimizing the use of material,

				financial and human resources, as well as the organization of logistics processes to ensure the uninterrupted operation of the enterprise; quality and safety control: Skills to establish and maintain high standards of service quality and occupational safety, including the development of policies, procedures and standards, and the regular monitoring and evaluation of their compliance. 5. Knowledge of the regulatory framework, ability to use software, understanding of the market
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів			1. Willingness to learn, availability of material, material that meets current trends and demand on the labor market 2. Attention to detail, analytical mindset 3. Understanding the process approach, formulation and control of achieving goals, risk-oriented thinking 4. Implementation and management of quality systems: Mastering the methods of implementation of quality management systems, such as ISO 9001, to increase the efficiency of production processes and meet customer requirements; continuous improvement of processes: Understanding of the principles and tools of continuous improvement, including Lean, Six Sigma techniques, to reduce costs, minimize waste and increase productivity; monitoring and analysis of production processes: Skills of regular

				monitoring, collection and analysis of data on production processes to identify problem areas, analyze the causes of defects and develop measures to eliminate them. 5. Understanding the principles of quality management, ensuring compliance with regulatory requirements, increasing staff engagement and motivation
	Technical operation of cars / Технічна експлуатація автомобілів			1. Willingness to learn, availability of material, material that meets current trends and demand on the labor market 2. Practical experience, logical thinking 3. Understanding of operational processes, critical thinking, forecasting consequences 4. Regular maintenance: Mastering schedules and procedures for regular maintenance of cars to ensure their reliable and safe operation; fault diagnosis: Skills of quick and accurate detection and diagnosis of typical and potential faults in car systems using modern diagnostic equipment; performing repair work: Mastering the methods and techniques of performing repair work, replacing consumables and components that ensure the restoration and maintenance of the optimal condition of the car. 5. Understanding the principles of the structure and operation of the car, the ability to perform maintenance, knowledge of the rules and norms of maintenance

	Do you have any suggestions for further improvement of this discipline? Чи є у вас пропозиції щодо подальшого вдосконалення цієї дисципліни?			
	Theory of operational properties of the car / Теорія експлуатаційних властивостей автомобіля	3 (37,5)	6 (62,5%)	1. A detailed study of the principles of electronic component cars 2. Add material on the operation of electric cars and hybrid cars to the curriculum
	Road transport enterprises. Part 1. Design / Підприємства автомобільного транспорту. Частина 1. Проектування	1 (12,5%)	8 (87,5%)	1. Modern approaches to the design of mini car service enterprises
	Road transport enterprises. Part 2. Organization and management / Підприємства автомобільного транспорту. Частина 2. Організація та управління	1 (12,5%)	8 (87,5%)	1. In-depth study of the regulatory framework in the field of consumer rights protection, workplace certification system, implementation of the latest motivation systems
	Road transport enterprises. Part 3. Quality of production processes / Підприємства автомобільного транспорту. Частина 3. Якість виробничих процесів	1 (12,5%)	8 (87,5%)	1. Implementation of ISO series quality system standards into production
	Technical operation of cars / Технічна експлуатація автомобілів	2 (25,0%)	7 (75,0%)	1. Add material on the operation of electric cars and hybrid cars to the curriculum

Summary Table 3.3.5 of the composition of participants in the analysis of courses/laboratory study programs

Scientific and academic staff

N	Question	Area of professional activity	Experience in training		Comments about work experience	Work experience in scientific projects	
			Yes	No		Scientific direction	Applied direction
1	What is your area of professional activity: • Science • Education • Production of High-Tech Products • other	a – 9 (90 %) b – 10 (100 %) c – 0 (0 %) d – 0 (0 %)					
2	Have you had previous or current experience training in electrical, energy, electronics, automotive, transportation technology, etc.?		10 (100 %)	0 (0 %)	Head of the Department of Transport and Logistics of the West Ukrainian National University, doctor of technical sciences, professor Training of students of specialists, bachelors and masters in the educational programs and specialties of Motor transport and Transport technologies (on road transport) for more than 25 years Engineer "Automotive transport" Candidate of Technical Sciences, "Heat Engines" Professor at the department "Production systems and		

					service in transport" Regular professional development with the help of Coursera, associate professor at the department of operation and repair of automotive equipment, professional development at the technical service station of PrJSC "Galichyna" Higher education in the specialty of automobile and tractor construction		
3	Have you had previous or current work experience in scientific projects in electrical, energy, electronics, automotive, transportation technology, etc.?		9 (90 %)	1 (10 %)		Head of scientific research on the functioning of the transport system of the city of Ternopil by order of Gmbh Dornier (2021 - 2022); Head of the economic contract topic related to the study of the optimizatio n of passenger transportati	

						on in Ternopil Carrying out scientific and research works on the operation of quarry dump trucks and the improvement of passenger transportation in the longest city of Ukraine - Kryvyi Rih Automatic adjustment of engines Optimization of means of transport and transport infrastructure Scientific research with funding from the state budget and economic contracts Head of the departmental economic contract topic "Determination of individual linear norms of fuel consumptio	

						n for passenger cars of FLC "Electron Leasing" in Lviv" Head of research work related to improving the efficiency of passenger car service stations	

Employers

N	Question	Area of professional activity	Experience in training		Comments about work experience	Work experience in scientific projects	
			Yes	No		Scientific direction	Applied direction
1	What is your area of professional activity: a. industrial enterprise b. production of high-tech (IT) products c. IT-services d. transport e. non-government organization f. other (denote)	a. – 1 (12,5 %) b. – 0 (0 %) c. – 0 0 (0 %) d. – 8 0 (87,5 %) e. – 0 0 (0 %) f. – 0 (0 %)			Sale of new cars, service and sale of spare parts for cars Design and production of wheeled vehicles		

2	Have you had previous or current experience training in electrical, energy, electronics, automotive, transportation technology, etc.?		9		The distributor of Mercedes-Benz cars in Ukraine, PJSC "Volynavto" regularly conducts face-to-face and remote training on the construction and repair of cars, both in general and individual units and aggregates At the enterprise, the staff undergoes training, testing and certification on an ongoing basis, taking into account the updating of models and technologies Bachelor's degree, master's degree		
3	Have you had previous or current work experience in scientific projects in electrical, energy, electronics, automotive, transportation technology, etc.?		1	8		Scientific work on the topic "Optimization of the operation of internal combustion engines on gas"	

Summary Table 3.3.6

of the composition of participant's status in the analysis of courses/laboratory study programs

Status	Period			
Teaching experience	3-7 years	7-15 years	15-20 years	>20 years
	0 (0%)	2 (10,5 %)	0 (0%)	8 (42,1 %)
Work experience in science	3-7 years	7-15 years	15-20 years	>20 years

	0 (0%)	2 (10,5 %)	1 (5,3 %)	6 (31,6)
Work experience in production	3-7 years	7-15 years	15-20 years	>20 years
	1 (12,5 %)	0 (0 %)	1 (12,5 %)	7 (75 %)
Position in production	Specialist in certification of the Testing Laboratory of Limited Liability Company «AWG STANDARD»	–	Director of Limited Liability Company «AUTODROM LUTSK»	Deputy General Director of PJSC «Volyn-Auto» Director of Limited Liability Company «Avtokoncept» Director of production of Limited Liability Company «BAS MOTOR» Director of Limited Liability Company «Promtechmervis» Engineer Private Enterprise «SVITAHO» Master receiver of Limited Liability Company «Avtotsentr-Zakhid» Head of the motor vehicle shop of Limited Liability Company «Avtotsentr-Zakhid»

Comments and suggestions

Practically, all respondents consider the offered courses of the "Automotive Transport" educational program to be relevant and necessary for future specialists who will work in the field of automobile transport. The majority of surveyed respondents agree with the content of the courses, their purpose, tasks, competencies, program learning outcomes and the number of ECTS credits.

The main suggestions proposed by the respondents concern the expansion of the list of software, the expansion of topics related to electric and hybrid cars and the increase of the share of practical training, both within the discipline and within all types of practices.

Stakeholders from among employers noted the main points that they considered as the most important for mastering the disciplines. This makes it possible to improve not only the quality of

the educational process, but also the meaningful content of the disciplines, which in turn will lead to the maximum approximation of the content of the courses to the needs of employers.

Based on the results of the analysis of the respondents' proposals, the main directions for further improvement of not only the courses, but also the educational program as a whole were highlighted:

1) Electric and hybrid cars.

Today, cars with an electric drive, namely electric and hybrid cars, are gaining more and more development. The car market of Ukraine is also gradually switching to these types of engines. These factors lead to the need to train specialists who are able to carry out their repair, maintenance and operation.

2) Practical training.

Practical training, both during the implementation of practical work from courses of disciplines, and in all types of practice is one of the most important elements of training specialists in the field of road transport. Practical training gives students of higher education the opportunity to acquire the necessary skills in the operation, maintenance and repair of vehicles in conditions as close as possible to real ones.

3) Constant monitoring and modernization of training courses.

Given the rapid development of the field of road transport, it is important to constantly monitor training courses and their modernization in order to ensure that these training courses include all advanced trends, methods, techniques and technologies. This approach will make it possible to train road transport specialists who meet the needs of the labor market as much as possible.

The following steps to improve the training courses will be carried out according to the principles of ISO 9001:

Plan - analysis and monitoring of the resources needed to meet the requirements of the respondents, identifying opportunities and risks will be carried out.

Execute - at this stage, the implementation of the planned measures will be carried out.

Check - monitoring will be carried out in order to check the effectiveness of implemented actions, analysis of the results of implementation.

Action - at this stage, measures are implemented with the aim of further continuous improvement of the quality and content of training courses.

3.4 Technical University of Moldova

Time of the survey

The survey involving academic and scientific staff representatives, as well as potential employers, took place in March 2024.

Participants in the survey

A total of 13 academic staff representatives and employers took part in the survey. Among the employers, respondents included representatives from the industrial partners Draxlmaier (see Tab. 3.4.1.). The survey was conducted for the three study courses within the existing Bachelor's program in "Electromecanics Engineering."
The associated project partner, INFORMBUSINESS SRL, was not engaged in this survey as they operate in a different area of activity. This company will be included in a separate survey designed for the new master program. The new survey will be conducted separately in accordance with the qualification standards set by the Ministry and must be approved by the TUM Quality Management Committee.

The reason of selection of particular respondents:

In the survey participated specialists in the fields of electric power, electrical engineering, and electromechanics, including employers, scientific, and academic staff. The diverse professions and specializations of the respondents involved will provide valuable feedback for developing and modernizing courses to align with market needs. This effort aims to better prepare students for the industry, fostering alignment and relevance.

Table 3.4.1. List of Scientific, academic staff and employers who participated in the survey on the bachelor program "*ELECTROMECANICS ENGINERING*".

Number	Academic staff	Position
1	Ojegov Alexandr	Associate Professor, USARB
2	Verbițchii Mihail	Head of department - Agricultural Technical College from Soroca
3	Voinesco Dinu	University lector of the Electrical Enginering Department, TUM
4	Ceclul Liliana	Dean of the Faculty, Cahul State University B.P. Hasdeu - USC
5	Beşliu Vitalie	Associate Professor, USARB
	Employers	**Position**
1	Chifa Sergiu	EFES VITANTA MOLDOVA BREWERY SA
2	Cazac Dumitru	EFES VITANTA MOLDOVA BREWERY SA
3	Guțu Grigoe	Floreni SA
4	Bubulici Vadim	Country Head of Professional Education, DRÄXLMAIER Group
5	Moldovan Artiom	ENEERS SRL
6	Alexandru Jalbă	TGW Logistics Group
7	Țurcan Serghei	Regia Transport Electric Chișinău ÎM
8	Dontu Victor	NBU Proiect SRL

Study programs, courses etc. that were evaluated by representatives of employers.

Table 3.4.2: Study courses of the bachelor program "*ELECTROMECANICS ENGINERING*" that were evaluated by representatives of Academic staff and Employers.

Course/Lab title	Updated or newly developed	Level (Bachelor, Master 5-year course)	ECTS credit points	The teaching/training methodologies developed/adopted e.g. e-learning/ training modalities, practical placements in enterprises, etc.	The link to the university's website	Date of accreditation	The status / document of accreditation
Static power converters	Updated	Bachelor	5	Lecture, e-learning, practical, lab practical	https://utm.md/wp-content/uploads/2021/05/ISE.pdf	2018	expired
Digital control systems	Updated	Bachelor	5	Lecture, e-learning, practical, lab practical	https://utm.md/wp-content/uploads/2021/05/ISE.pdf	2018	expired
Electrical and electronic equipment	Updated	Bachelor	4	Lecture, e-learning, practical, lab practical	https://utm.md/wp-content/uploads/2021/05/ISE.pdf	2018	expired

Description of the means and channels used in the survey

Online survey is used for a wide spectrum of energy professionals and institutions. The data derived from these surveys can be collected and analyzed, facilitating a rapid understanding of trends in audience responses. This enables the formulation of strategies to implement changes or improvements based on the feedback received.

Online surveys offer high convenience, as respondents can answer questions at their own pace and even have flexibility in completion time if the option to save progress and resume later is provided.

The survey was conducted using pre-prepared questionnaire templates designed for academic and scientific staff, as well as for employers. Respondents provided answers to the questions within the questionnaire.

Results of the survey

13 questionnaires were analyzed, 5 of them - scientific, academic staff and 8 employers. The results of the analysis are collected in Table 3.2.3 - 3.2.6.
Among the respondents, the largest percentage, i.e. 40 % have Work experience in teaching- >20 years, and Work experience in production 62.5% - 7-15 years.

Summary Table 3.2.3 of the "yes" and "no" answers included in the questionnaires for courses/ laboratory study programs by academic and scientific stakeholders.

PART 2 / Partea 2 *Questions by courses/laboratory work study programs* / Întrebări pe cursuri/programe de studii de lucru de laborator				
N	***Question* /Întrebări**	**Yes**	**No**	***Justification and notes* / Justificari și notițe**
1	***Do you consider it necessary for the learning of students in the bachelor's program "*ELECTROMECHANICS ENGINEERING*": (If you answer is "no," please justify your answer)?*** **Considerați disciplinele enumerate necesare instruirii studenților la specialitatea „INGINERIA SISTEMELOR ELECTROMECANICE"** ***(Dacă răspundeți „nu", vă rugăm să justificați răspunsul)***			
	Static power converters/Convertoare statice de putere	13 (100%)		
	Electrical and electronic equipment/Echipamente electrice și electronice	13 (100%)		
	Digital control systems/Sisteme numerice de control	12 (92,3%)	1 7,7%	In my field it is not really necessary
•	***Do you agree with the wording of the purpose of this academic discipline* / Sunteți de acord cu formularea scopului la disciplinele următoare**			
	Static power converters/Convertoare statice de putere	13 (100%)		
	Electrical and electronic equipment/Echipamente electrice și electronice	12 (92,3%)	1 7,7	Matlab /simulink, simulation of electrical circuits. Complex interconections (Control technology, Electropneumatics)
	Digital control systems/Sisteme numerice de control	11 **(84,6%)**	2 **15,4 %**	It does not have a practicality in the process of maintaining electric drives in the production company PLC
•	**Do you agree with the formulation of tasks in the listed academic disciplines? /Sunteți de acord cu formularea sarcinilor la disciplinele academice enumerate?**			
	Static power converters/Convertoare statice de putere	13 (100%)		
	Electrical and electronic equipment/Echipamente electrice și electronice	13 (100%)		
	Digital control systems/Sisteme numerice de control	13		

		(100%)		
•	**Do you agree with the formulation of the requirements for the qualification of students after training in the listed subjects (what they should know, be able to, then possess)? /Sunteți de acord cu formularea cerințelor pentru calificarea studenților după pregătirea la disciplinile enumerate (ce ar trebui să știe, să poată, apoi să posede)?**			
	Static power converters/Convertoare statice de putere	13 (100%)		
	Electrical and electronic equipment/Echipamente electrice și electronice	13 (100%)		
	Digital control systems/Sisteme numerice de control	13 **(100%)**		
•	**Do you think that the lecture material will allow students to reveal the essence of the discipline, will allow them to achieve the main goal and educational results of the discipline? /Credeți că materialul de curs va permite studenților să dezvăluie esența disciplinei, le va permite să atingă scopul principal și rezultatele educaționale ale disciplinei?**			
	Static power converters/Convertoare statice de putere	12 (92,3%)	**1 7,7%**	To develop a new course support
	Electrical and electronic equipment/Echipamente electrice și electronice	13 (100%)		
	Digital control systems/Sisteme numerice de control	13 **(100%)**		
•	**Do you think that the proposed list of laboratory and practical works will help to develop all practical competence, declared by the discipline curricula? /Credeți că lista propusă de lucrări de laborator și practice va contribui la dezvoltarea întregii competențe practice, declarate de curicula disciplinelor enumerate?**			
	Static power converters/Convertoare statice de putere	12 (92,3%)	1 7,7%	It is necessary to review the list of laboratory works
	Electrical and electronic equipment/Echipamente electrice și electronice	11 (84,6%)	**2 15.4%**	It is necessary to review the list of laboratory works The experimental and dynamic simulation study of the transient process due to the symmetrical three-phase sudden short circuit at the terminals of the synchronous generator with electromagnetic excitation. The experimental determination of the subtransient and reverse sequence reactances of the synchronous machine with apparent poles (the Dalton – Cameron method). The experimental and dynamic simulation

				study of the processes transients due to asynchronous starting and self-synchronization of three-phase synchronous motor Knowledge assessment.
	Digital control systems/Sisteme numerice de control	12 (92,3%)	1 7,7%	It is necessary to review the list of laboratory works
•	**Do you agree with the content of the training material in the curricula listed and the laboratory work? /Sunteți de acord cu conținutul materialului de instruire din curricula disciplinilor enumerate și lucrările de laborator?**			
	Static power converters/Convertoare statice de putere	12 (92,3%)	**1 7,7%**	Review the material for laboratory work
	Electrical and electronic equipment/Echipamente electrice și electronice	11 (84,6%)	**2 15,4%**	Review the material for laboratory work Matlab /simulink, simulation of electrical circuits. Complex interconections (Control technology, Electropneumatics)
	Digital control systems/Sisteme numerice de control	12 (92,3%)	**1 7,7%**	Review the material for laboratory work
•	**Do you agree with the list of recommended basic literature in the Information and Methodical part of the discipline or laboratory program? /Sunteți de acord cu lista de literatură de bază recomandată la partea Informativă și Metodică a disciplinelor sau a lucrărilor de laborator enumerate?**			
	Static power converters/Convertoare statice de putere	12 (92,3%)	1 7,7%	Petre Teodosescu UTCN
	Electrical and electronic equipment/Echipamente electrice și electronice	12 (92,3%)	1 7,7%	1. R. Munteanu – Măsurări Electrice și Electronice, Note de curs. 2. R. Munteanu, col., Electrotehnică şi convertoare energetice, Ed. Mediamira, Cluj-Napoca, 1997. 3. I. Târnovan, - Metrologie şi instrumentaţie electrică, Ed. Mediamira, 2003. 4. R Munteanu jr., col. – Traductoare pentru sisteme de măsurare, Ed. Mediamira, 2003. 5. Dan Iudean, Radu Munteanu jr., Mircea Buzdugan, Eudor Flueraș, Alex Crețu - „Măsurări electrice și electronice – Îndrumător de laborator”- 2016, Editura Mediamira. 6. Bird, J. – “Electrical Circuit Theory and Technology”, Elsevier, Oxford, 2004.

				7. Webster, J., Eren, H. – “Measurement, Instrumentation and Sensors Handbook” CRC Press 2014.
	Digital control systems/Sisteme numerice de control	13 (100%)		
•	**What measures to control the quality of mastering knowledge in this discipline, given in the Information and Methodical part of the course program, do you consider necessary and sufficient? / Ce măsuri de control al calității a cunoștințelor la disciplinele enumerate, prezentate la partea de Informare și Metodică a curriculei cursului, considerați necesare și suficiente?**			
	Static power converters/Convertoare statice de putere	13 (100%)		• Testing-8(61,5%) • Test works-10(76,9%) • Writing essays-1(7.7%) • Workshops-3(23,1%) • Individual or group projects • Simulations, project
	Electrical and electronic equipment/Echipamente electrice și electronice	13 (100%)		• Testing-7(53,8%) • Test works-8(61,5) • Writing essays-3(23.1%) • Workshops-4(30,8%) • Practical testing • Individual or group projects • Simulations, project
	Digital control systems/Sisteme numerice de control	13 (100%)		• Testing-7(53,8%) • Test works-9(69,25) • Writing essays-2(15.4%) • Workshops-4(30,8%)
•	**Do you agree with the recommendations on quality control of knowledge assimilation and certification? /Sunteți de acord cu recomandările privind controlul calității, asimilării și certificării cunoștințelor la disciplinile enumerate?**			
	Static power converters/Convertoare statice de putere	13 (100%)		
•	*Electrical and electronic equipment*/Echipamente electrice și electronice	13 (100%)		
•	*Digital control systems*/Sisteme numerice de control	13		

		(100%)		
•	**What, in your opinion, is the curricula of this discipline aimed at? / Care este, în opinia dumneavoastră, curricula acestei discipline care vizează?**			
	***Static power converters*/Convertoare statice de putere**			
	• formal use of knowledge/utilizarea formală a cunoștințelor	3 (23,1%)		
	• development of critical thinking/dezvoltarea gîndirii critice	6 (46.2%)		
	• use of methods of cause-and-effect analysis/utilizarea metodelor de analiză cauză-efect	7 (53.8%)		
	• development of practical experience and skills/dezvoltarea experienței și abilităților practice	11 (84,6%)		
	• development of new competencies/dezvoltarea de noi competențe	7 (53.8%)		
	• development of independent thinking/dezvoltarea gîndirii independente	4 (30.8%)		
	• development of the ability for non-standard approaches in solving problems and making decisions/dezvoltarea capacităților pentru abordări non-standard în rezolvarea problemelor și luarea deciziilor	5 (38.5%)		
	• other/altele	1 (7.7%)		
	***Electrical and electronic equipment*/Echipamente electrice și electronice**			
	• formal use of knowledge/utilizarea formală a cunoștințelor	4 (30,8%)		

	• development of critical thinking/dezvoltarea gîndirii critice	5 (38.5%)		
	• use of methods of cause-and-effect analysis/utilizarea metodelor de analiză cauză-efect	6 (46.2%)		
	• development of practical experience and skills/dezvoltarea experienței și abilităților practice	9 (69,2%)		
	• development of new competencies/dezvoltarea de noi competențe	10 (76.9%)		
	• development of independent thinking/dezvoltarea gîndirii independente	5 (38.5%)		
	• development of the ability for non-standard approaches in solving problems and making decisions/dezvoltarea capacităților pentru abordări non-standard în rezolvarea problemelor și luarea deciziilor	6 (46.2%)		
	• other/altele	1 (7.7%)		
	***Digital control systems*/Sisteme numerice de control**			
	• formal use of knowledge/utilizarea formală a cunoștințelor	5 (15,4%)		
	• development of critical thinking/dezvoltarea gîndirii critice	4 (30.8%)		
	• use of methods of cause-and-effect analysis/utilizarea metodelor de analiză cauză-efect	8 (61.5%)		

•	• development of practical experience and skills/dezvoltarea experienței și abilităților practice	10 (76,9%)		
•	• development of new competencies/dezvoltarea de noi competențe	7 (53.8%)		
•	• development of independent thinking/dezvoltarea gîndirii independente	3 (23.1%)		
•	• development of the ability for non-standard approaches in solving problems and making decisions/dezvoltarea capacităților pentru abordări non-standard în rezolvarea problemelor și luarea deciziilor	3 (23.1%)		
•	• other/altele	1 (7.7%)		
•	**What is, in your opinion, the importance of the disciplines listed below? /Care este, după părerea dumneavoastră, importanța disciplinelor enumerate mai jos?**			
•	***Digital control systems/ Sisteme numerice de control***			
•	• Very important/Foarte importantă	8 61.5%		
•	• Important/Importantă	5 38.5%		
•	• It is not important/Nu este importantă			
•	***Electrical and electronic equipment*/Echipamente electrice și electronice**			
•	• Very important/Foarte importantă	13 100%		
•	• Important/Importantă			
•	• It is not important/Nu este importantă			
•	***Static power converters /Convertoare statice de putere***			
•	• Very important/Foarte importantă	11 84.6%		

•	• Important/Importantă	2 15.4%		
•	• It is not important/Nu este importantă			
•	**Emphasize 3 main points that you consider to be the most important for mastering this discipline / Enumerați 3 puncte principale pe care le considerați cele mai importante pentru însușirea disciplinilor enumerate.**			
•	*Static power converters*/Convertoare statice de putere			• Extending the performance of static converters during laboratory work • Understanding the basic concept, practice and application, collaboration • Laboratory work • Logical thinking, Motivation, Attention to details • laboratory, practice, works • Unordered single-phase rectifiers • Knowledge of modern technologies is an advantage • The material base (manuals, course notes, methodical instructions for laboratory work) • Simulating processes with the use of software • Using modern machines high-performance material base, the use of innovative, interactive teaching-learning - assessment methods, didactic materials updated with the latest advances in technology • practical works, exemplification, real cases • Focus on High voltage
•	*Electrical and electronic equipment*/Echipamente electrice și electronice			• Diversification of laboratory work for different fields • Understanding the basic concept, practice and application, collaboration • Laboratory work • Motivation, Practical works, General knowledge in Electrical Engineering laboratory, practice, works

				• Controllers and programmable controllers • Knowledge of electrical and electronic equipment a priority for future specialists • Material base (manuals, course notes, methodical instructions for laboratory work) • Simulation of processes with the use of software • Use of modern machinery • High-performance material base, the use of innovative, interactive teaching-learning - assessment methods, updated didactic materials with the latest advances in technology • Practical works, examples, real cases • Hardware in the loop, simulation in the loop
•	*Digital control systems*/Sisteme numerice de control			• Fields of use of numerical control systems • Understanding the basic concept, practice and application, collaboration • Laboratory work • Logical thinking, Motivation, English knowledge • Laboratory, practice, works • Low-power single-phase motors • A proper numerical control reduces expenses • Material basis (manuals, course notes, methodical instructions for laboratory works) Simulation of processes with the use of software • Use of modern machines • High-performance material base, the use of innovative, interactive teaching-learning - assessment methods, updated didactic materials with the latest advances in technology • Practical works • Automation of production processes, joining functional parts through software (mechanical,

				electrical, electronic, pneumatic, hydraulic, programming)
•	**Do you have any suggestions for further improvement of these disciplines? / Aveți sugestii pentru îmbunătățirea ulterioară a disciplinilor enumerate?**			
•	*Static power converters*/Convertoare statice de putere			• Not • Expanding the curriculum for several fields • Continuous exploration • The course is good as it is. • Practical works in the industrial field • Not • Renewing the course support, the technical-material base • Continuous modernization of the material base, publication of new didactic and scientific materials, continuous revision of the curriculum, continuous revision of the curriculum • Adaptation to European curricula
•	*Electrical and electronic equipment*/Echipamente electrice și electronice			• No • Upgrading laboratory works • Continuous research • More practice needed • The course is good as it is. • Practical work in industry • No • Updating of course material, technical and material base • Continuous update of the material base, publication of new teaching and scientific materials, ongoing review of the curriculum • Adaptation with European curricula
•	*Digital control systems*/Sisteme numerice de control			• No • Increase the number of contact hours

				• Continuous exploring • Not • The course is good as it is. • Practical works in the industrial field • Not • Updating the course support, the technical-materials • Continuous upgrading of the material base, publication of new didactic and scientific materials, continuous revision of the curriculum • Adaptation at the European curricula
•	**If you have any comments or suggestions about the problem or the content of the questions, please write down your thoughts in this section. / Dacă aveți comentarii sau sugestii la conținutul întrebărilor, vă rugăm să scrieți părerile dvs. în această secțiune.**			
		100%		• I do not have • I do not have • To add the analytical programs so that they can be analyzed • No suggestions • No comments • I have no suggestions • They are formulated correctly • I do not have • To be able to answer at such questions, the respondent must know quite well what an education plan means and know the curricula. Perhaps it would be more recommended to analyze the real skills obtained by graduates and what are the probelems when are hiring. • A synthesis of the other disciplines will be presented.

Summary Table 3.2.5 of the composition of participants in the analysis of courses/laboratory study programs

	Question	Area of professional activity	Experience in training		Comments about work experience	Work experience in scientific projects	
N			Yes	No		Scientific direction	Applied direction
1	**The position that you hold/Funcția pe care o dețineți în organizație** • Execution function with technical responsibilities, specific to the position you hold/Funcție de execuție cu responsabilități tehnice, specifică funcției pe care o ocupați	8 66.7%					
	• Management position with decision-making responsibilities / Funcție de conducere cu responsabilități în adoptarea de decizii/	4 33.3%					
2	**What is your field of professional activity? / Care este domeniul dumneavoastră de activitate profesională?**						
	a. Science	1 (7,7%)					
	b. Education	4 (30,8%)					
	c. Production of High-Tech Products	0%					

	d. Industrial enterprise/ întreprindere	6 (46,2%)					
	e. Transport/ transport	0%					
	f. Non-government organization/organizație non-guvernamentală	0%					
	g. IT-services/ servicii IT	1 (7,7%)					
	h. Other/ Altele	1 (7,7%)					
3	**Status/Statutul**						
	• employee of the research institution/angajat al instituției de cercetare	0%					
	• professor/professor	5 (38.5%)					
	• an employee of a company/angajat al unei întreprinderi	8 (61%)					
4	**Experience in teaching activity / Experiență de predare:**						
	• 3 - 7 years/ani	0%					
	• 7 - 15 years/ani	1 (20%)					
	• 15 - 20 years/ani	2 (40%)					
	• > 20 years/ani	2 (40%)					

	it is not/nu este						
5	**Manufacturing experience/Experiență în producție**						
	• 3 - 7 years/ani	2 (25%)					
	• 7 - 15 years/ani	5 (62.5%)					
	• 15 - 20 years/ani	1 (12.5%)					
	• > 20 years/ani	0					
	• it is not/nu este	0%					
6	**Experience in your field /Experiență în domeniul dumneavoastră** • 3 - 7 years/ani • 7 - 15 years/ani • 15 - 20 years/ani • > 20 years/ani • it is not/nu este	0%					

Summary Table 3.2.6 of the composition of participant's status in the analysis of courses/laboratory study programs

Status	Period			
Teaching experience	3-7 years	7-15 years	15-20 years	>20 years
	0	1 (20%)	2(49%)	2 (40%)

Work experience in science	3-7 years	7-15 years	15-20 years	>20 years
	0	0	0	0
Work experience in production	3-7 years	7-15 years	15-20 years	>20 years
	2(25%)	5(62.5%)	1(12.5%)	0

Comments and suggestions

The all surveyed respondents unanimously emphasize the essentiality of including the specified courses within the bachelor's program: *ELECTROMECANICS ENGINERING*. They underscore the significance of these courses in providing foundational knowledge and practical skills essential for their academic and professional development. Moreover, respondents express a collective belief in the relevance and applicability of the proposed courses to their future career paths, highlighting the need for comprehensive education in these areas.

Furthermore, the diverse background of the respondents adds depth to their endorsement of the courses, with 46.2% representing professionals from various enterprises and 30.8% originating from the education sector. This diversity underscores the breadth of experience and expertise that collectively affirm the value and relevance of the proposed cources.

Additionally, the survey respondents articulated their perspectives on the necessity of the proposed courses, providing valuable insights into the focal points of the learning process and the priorities from the standpoint of labor market representatives. This comprehensive understanding not only guides curriculum development but also ensures alignment with industry demands and fosters graduates' readiness for the professional landscape.

In response to the inquiry about the effectiveness of laboratory and practical works in developing the practical competencies outlined in the discipline curricula, the predominant recommendation was to reassess the current list of laboratory works. This suggestion stems from the belief that a thorough review of the existing list could potentially enhance the alignment between the practical activities and the desired learning outcomes. By revisiting and potentially revising the selection of laboratory works, it is anticipated that a more targeted and impactful approach can be adopted to better support the development of essential practical competencies as mandated by the curriculum.

In addressing the examination on effective measures to regulate the quality of mastering knowledge within these disciplines, as outlined in the Information and Methodical section of the course program, the following responses are provided:

Test works: Achieving a substantial endorsement with 9 out of 13 respondents (69.2%) deems test works as an indispensable measure. These assessments not only gauge comprehension but also facilitate the retention of crucial concepts.

Testing: A notable 7 respondents (53.8%) are for the implementation of regular testing. Such evaluations serve as benchmarks for individual progress and aid in identifying areas requiring further attention.

Workshops: A considerable portion of 4 respondents (30.8%) underscore the significance of workshops. These interactive sessions foster collaborative learning environments and enable hands-on engagement with subject matter, enhancing overall understanding.

Additional Group Projects: Furthermore, the inclusion of supplementary group projects is suggested as an enriching measure by an unspecified number of respondents. These projects foster teamwork, critical thinking, and practical application of theoretical knowledge, thereby augmenting the depth of learning experiences.

In conclusion, the combination of test works, testing, workshops, and additional group projects is advocated by respondents as a comprehensive approach to ensuring the quality attainment of knowledge within the specified disciplines.

The feedback from the respondents provided valuable insights and actionable suggestions for enhancing the educational experience. An expanded version of the suggestions is presented below:

1. **Increasing the number of hours in laboratory work:** Respondents emphasized the importance of practical experience in reinforcing theoretical concepts learned in lectures. Increasing the number of hours allocated to laboratory work would provide students with more opportunities to engage with experiments, develop practical skills, and deepen their understanding of complex topics.

2. **Improvement of laboratories with equipment**: Modernizing laboratory facilities and upgrading equipment emerged as a key recommendation. By investing in the most recent stage technology, institutions can create an environment conducive to the latest research and experimentation. Upgraded equipment not only enhances the quality of student learning but also prepares them for real-world applications in their respective fields.

3. **Improving and renewing bibliographic resources**: Access to modern reference materials is essential for fostering academic growth and research excellence. Respondents highlighted the need to enhance the library's collection with recent publications, journals, and digital resources relevant to the curriculum. By ensuring comprehensive access to scholarly content, students can conduct thorough research and stay on a level of the latest developments in their discipline.

4. **Implementation of innovative teaching methods:** Incorporating innovative pedagogical approaches can invigorate the learning experience and cater to diverse learning styles. Suggestions included active learning strategies, collaborative projects, flipped classrooms, and inquiry-based learning methodologies. By fostering student engagement and critical thinking, these methods promote deeper comprehension and retention of subject matter.

5. **Integration of software for modeling systems**: Use educational software for system modeling presents an effective way to enhance conceptual understanding and analytical skills. By simulating real-world scenarios and phenomena, students can explore complex systems, conduct virtual experiments, and visualize abstract concepts. Incorporating software tools into the curriculum not only enriches the learning experience but also equips students with valuable computational skills relevant to their future careers.

In summary, implementing the recommendations provided by the respondents can raise the quality of education in laboratory settings, fostering a dynamic learning environment that empowers students to be the best academically and grow in their chosen fields.

After processing the surveys from stakeholders regarding the improvement of proposed courses, the following steps can be taken:

- *Results Analysis:* The evaluation and analysis of data obtained from surveys involve identifying the main issues and needs for improvement in the evaluated courses.
- *Proposal Formulation:* Based on the analysis of results, specific proposals for enhancing educational courses are developed, including content revision, adoption of innovative teaching methods, restructuring course organization, and other relevant aspects.

- *Implementation of Changes:* Planned measures for improving educational courses, including updating course content, changing teaching methods, and providing training for teachers and students on new approaches, are implemented.
- *Effectiveness Evaluation:* Monitoring and evaluating the results of implementing changes involve identifying positive and negative aspects. Based on this evaluation, the strategy for improving courses is adjusted according to the needs of stakeholders and the outcomes obtained.

  This cycle can be repeated, allowing for constant adaptation of training courses to the changing needs and requirements of participants in the educational process.

3.5 Alecu Russo Balti State University

Time of the survey

The survey involving academic and scientific staff representatives, as well as potential employers, took place in March 2024.

Participants in the survey

A total of 19 academic staff representatives and employers took part in the survey. Among the employers, respondents included representatives from associated partners Draxlmaier. (see Tab. 3.5.1.).

The reason of selection of particular respondents:

In the survey participated specialists in the fields of automotive transport and logistics, including employers, scientific, and academic staff. The diverse professions and specializations of the respondents involved will provide valuable feedback for developing and modernizing courses to align with market needs. This effort aims to better prepare students for the industry, fostering alignment and relevance.

Table 3.5.1. List of Scientific, academic staff and employers who participated in the survey on the bachelor program "*ENGINEERING AND MANAGEMENT IN AUTOMOTIVE TRANSPORT*".

Number	Academic staff	Position
1	Ojegov Alexandr	Associate Professor, USARB
2	Beşliu Vitalie	Associate Professor, Head of Department of Physical and Engineering sciences, USARB
3	Pînzaru Natalia	University Lecturer, USARB
4	Pereteatcu Pavel	Associate Professor, USARB
5	Rusnac Vladislav	Associate Professor, USARB
6	Prițcan Valentina	Vice-rector for research and international relations, USARB
7	Ceclul Liliana	Dean of the Faculty, Cahul State University B.P. Hasdeu - USC
8	Corina Guțu-Chertușca	University Lecturer, TUM
9	Cazac Vadim	Associate Professor, Head of Department of Electrical Engineering, TUM
	Employers	**Position**
1	Bubulici Vadim	Country Head of Professional Education, DRÄXLMAIER Group
2	Iankovski Roman	JSC Floresti Butter Factory
3	Kolesnicenko Vitalii	SE „Moldova Railways”
4	Citac Rodion	EFC „Magnetec Components” SRL
5	Golovenko Anatolii	CC „Aquatrade” SRL
6	Botnari Dumitru	EFC „Cables & Wires” SRL
7	Procopciuc Vadim	EFC „Cables & Wires” SRL
8	Catan Nicolai	EFC „Cables & Wires” SRL

9	Gangu Vasile	SRL „IFOSTRANS”
10	Gangu Dumitru	SRL „Energia”

Study programs, courses etc. that were evaluated by representatives of employers.

Table 3.5.2: Study courses of the bachelor program "*ENGINEERING AND MANAGEMENT IN AUTOMOTIVE TRANSPORT*" that were evaluated by representatives of Academic staff and Employers.

Course/Lab title	**Updated or newly developed**	**Level (Bachelor, Master 5-year course)**	**ECTS credit points**	**The teaching/training methodologies developed/adopted e.g. e-learning/ training modalities, practical placements in enterprises, etc.**	**The link to the university's website**	**Date of accreditation**	**The status / document of accreditation**
Automotive electrical and electronic equipment	updated	Bachelor	4	Lecture, e-learning, practical, lab practical	usarb.md/wp-content/uploads/2019/02/Echipament-electric-%C8%99i-electronic-cu-freventa.pdf	2019	accredited
Automatic control engineering	updated	Bachelor	4	Lecture, e-learning, practical, lab practical	usarb.md/wp-content/uploads/2019/02/Ingineria-regl%C4%83rii-automate-cu-frecventa.pdf	2019	accredited
Electro-mobiles	updated	Bachelor	4	Lecture, e-learning, practical, lab practical	usarb.md/wp-content/uploads/2019/02/Electromobile-cu-frecventa.pdf	2019	accredited

Description of the means and channels used in the survey

Online survey is used for a wide spectrum of energy professionals and institutions. The data derived from these surveys can be collected and analyzed, facilitating a rapid understanding of trends in audience responses. This enables the formulation of strategies to implement changes or improvements based on the feedback received.

Online surveys offer high convenience, as respondents can answer questions at their own pace and even have flexibility in completion time if the option to save progress and resume later is provided.

The survey was conducted using pre-prepared questionnaire templates designed for academic and scientific staff, as well as for employers. Respondents provided answers to the questions within the questionnaire.

Results of the survey

19 questionnaires were analyzed, 9 of them - Scientific, academic staff and 10 employers. The results of the analysis are collected in Table 3.5.3 - 3.5.6.
Among the respondents, the largest percentage, i.e. 50 % have Work experience in teaching->20 years, and Work experience in production 44.4% - 7-15 years.

Summary Table 3.3.3 of the "yes" and "no" answers included in the questionnaires for courses/ laboratory study programs by academic and scientific stakeholders.

PART 2 / Partea 2 *Questions by courses/laboratory work study programs* / Întrebări pe cursuri/programe de studii de lucru de laborator				
N	***Question* /Întrebări**	**Yes**	**No**	***Justification and notes* / Justificari și notițe**
1	***Do you consider it necessary for the learning of students in the bachelor's program "*ENGINEERING AND MANAGEMENT IN AUTOMOTIVE TRANSPORT*": (If you answer is "no," please justify your answer)*** **Considerați disciplinele enumerate necesare instruirii studenților la specialitatea „INGINERIA ȘI MANAGEMENT ÎN TRANSPORTUL AUTO" *(Dacă răspundeți „nu", vă rugăm să justificați răspunsul)***			
	Automatic control engineering/Ingineria reglării automate	19 (100%)		
	Automotive electrical and electronic equipment/Echipament electric și electronic auto	18 (94.7%)	1 (5.3%)	
	Electromobiles/Electromobile	19 (100%)		
•	***Do you agree with the wording of the purpose of this academic discipline* / Sunteți de acord cu formularea scopului la disciplinele următoare**			
	Automatic control engineering/Ingineria reglării automate	18 (94.7%)	1 (5.3%)	Automation means control systems from electromechanic, electronic, programming and combining into mechatronics. Otherwise - automotive systems are nearly the same but means different things regarding final supposes.
	Automotive electrical and electronic equipment/Echipament electric și electronic auto	19 (100%)		
	Electromobiles/Electromobile	19 (100%)		
•	**Do you agree with the formulation of tasks in the listed academic disciplines? /Sunteți de acord cu formularea sarcinilor la disciplinele academice enumerate?**			

	Automatic control engineering/Ingineria reglării automate	18 (94.7%)	1 (5.3%)	Automatic control refers to automation. Electromobiles and electronic systems refers to controlling functions, but not automating the drivers' scope.
	Automotive electrical and electronic equipment/Echipament electric și electronic auto	19 (100%)		
	Electromobiles/Electromobile	19 (100%)		
•	**Do you agree with the formulation of the requirements for the qualification of students after training in the listed subjects (what they should know, be able to, then possess)? /Sunteți de acord cu formularea cerințelor pentru calificarea studenților după pregătirea la disciplinile enumerate (ce ar trebui să știe, să poată, apoi să posede)?**			
	Automatic control engineering/Ingineria reglării automate	18 (94.7%)	1 (5.3%)	Because the closest is the study of design and functioning of cars, engines, control systems but is not involve automation study.
	Automotive electrical and electronic equipment/Echipament electric și electronic auto	19 (100%)		
	Electromobiles/Electromobile	18 (94.7%)	1 (5.3%)	We suggest to rename and extend the name of the course as follows: Electrical cars/ Electrical Vehicle. At the moment the curriculum is focused on Electrical machines.
•	**Do you think that the lecture material will allow students to reveal the essence of the discipline, will allow them to achieve the main goal and educational results of the discipline? /Credeți că materialul de curs va permite studenților să dezvăluie esența disciplinei, le va permite să atingă scopul principal și rezultatele educaționale ale disciplinei?**			
	Automatic control engineering/Ingineria reglării automate	17 (89.5%)	2 (10.5%)	To develop a new course support we propose to use the following material: for example, Petre Teodosescu Technical University Cluj-Napoca
	Automotive electrical and electronic equipment/Echipament electric și electronic auto	17 (89.5%)	2 (10.5%)	To develop a new course support to use the following list of bibliography: 1. R. Munteanu – Măsurări Electrice și Electronice, Note de curs

				2. R. Munteanu, col., Electrotehnică şi convertoare energetice, Ed. Mediamira, Cluj-Napoca, 1997. 3. I. Târnovan, - Metrologie şi instrumentaţie electrică, Ed. Mediamira, 2003. 4. R Munteanu jr., col. – Traductoare pentru sisteme de măsurare, Ed. Mediamira, 2003. 5. Dan Iudean, Radu Munteanu jr., Mircea Buzdugan, Eudor Fluerași, Alex Crețu - „Măsurări electrice și electronice –Îndrumător de laborator”- 2016, Editura Mediamira. 6. Bird, J. – “Electrical Circuit Theory and Technology”, Elsevier, Oxford, 2004. 7. Webster, J., Eren, H. – “Measurement, Instrumentation and Sensors Handbook” CRC Press 2014.
	Electromobiles/Electromobile	17 (89.5%)	2 (10.5%)	To develop a new course support to use the following list of bibliography: [1] Electric and PlugIn Hybrid Vehicles Advanced Simulation Methodologies, ISBN: 978-3-319-18638-2, Autor principal Bogdan Ovidiu VARGA © Springer International Publishing Switzerland 2015, 524 pagini; DOI)10.1007/978-3-319-18639-9. [2] Electric and Hybrid Vehicles Author(s): Gianfranco Pistoia ISBN: 978-0-444-53565-8; [3] Energy Management Strategies for Electric and Plug-in Hybrid Electric Vehicles; Sheldon S. Williamson, 2013 Publisher Springer-Verlag New York Copyright Holder Springer Science+Business Media New York eBook ISBN 978-1-4614-7711-2 DOI 10.1007/978-1-4614-7711-2 Hardcover ISBN

				978-1-4614-7710-5 Edition Number 1;
•	**Do you think that the proposed list of laboratory and practical works will help to develop all practical competence, declared by the discipline curricula?/ Credeți că lista propusă de lucrări de laborator și practice va contribui la dezvoltarea întregii competențe practice, declarate de curicula disciplinelor enumerate?**			
	Automatic control engineering/Ingineria reglării automate	11 (57.9 %)	8 (42.1%)	PLC, Dispace - real time measurement of motor. Simulation in the loop. AC/DC -> DC/DC. Energy conversion New lab work and simulation software are required It is necessary to renew the technical and material bases and the lists of laboratory works It is necessary to develop new laboratory works with modern equipment It is necessary to renew the technical-material meringue and lists of laboratory works renewing the technical-material base and the list of laboratory works To increase the list of the number of laboratories works with the renewal of laboratory equipment Revising the objectives of laboratory work and changing the aims of practical work
	Automotive electrical and electronic equipment/Echipament electric și electronic auto	11 (57.9 %)	8 (42.1%)	Matlab/simulink, simulation of electrical circuits. Complex interconnections (Control technology, Electropneumatics) New lab work and simulation software are required It is necessary to renew the technical and material bases and the lists of laboratory works It is necessary to develop new laboratory works with modern equipment

				It is necessary to renew the technical-material meringue and lists of laboratory works renewing the technical-material base and the list of laboratory works To increase the list of the number of laboratories works with the renewal of laboratory equipment Revising the objectives of laboratory work and changing the aims of practical work
	Electromobiles/Electromobile	10 (52.6%)	9 (47.4%)	High voltage, increased efficiency. Timisoara S/ VILLAGE. Charging part. Use without aluminium. New lab work and simulation software are required Laboratory work would need to be adapted to the most real and modern conditions of contemporary industry It is necessary to renew the technical and material bases and the lists of laboratory works It is necessary to develop new laboratory works with modern equipment It is necessary to renew the technical-material meringue and lists of laboratory works renewing the technical-material base and the list of laboratory works To increase the list of the number of laboratories works with the renewal of laboratory equipment Revising the objectives of laboratory work and changing the aims of practical work
•	**Do you agree with the content of the training material in the curricula listed and the laboratory work? / Sunteți de acord cu conținutul materialului de instruire din curricula disciplinilor enumerate și lucrările de laborator?**			
	Automatic control engineering/Ingineria reglării automate	17 (89.5%)	2 (10.5%)	The structure of a high-performance electrical actuation system; The character multidisciplinary of energy-efficient adjustable actuation systems, with

				electric machines, electronic power converters, transducers, systems of regulation and calculation systems. The physical principles of machine operation, etc. Bibliography: 1. Kelemen, A.: Acţionări electrice. Ed. Didactică şi Pedagogică, Bucureşti, 1979. 2. Iulian Birou - Metode performante de control in actionari electrice de curent alternativ. Editura Casa cartii de stiinta, 1999. 3. Kelemen, A., Imecs, M.: Sisteme de reglare cu orientare după câmp ale maşinilor de curent alternativ. Lito I.P.C.N. 1987 sau Editura Academiei Române, Bucureşti, 1989. 4. Iulian Birou – Actionari electrice; Sisteme de reglare si control. Editura Mediamira, 2003 5. Kelemen, A., Imecs, M.: Electronică de putere. Ed. Didactică şi Pedagogică, Bucureşti, 1983. Because is necessary to improve the list of themes for laboratories and needs additional equipment, also the revision of curricula.
	Automotive electrical and electronic equipment/Echipament electric şi electronic auto	18 (94.7%)	1 (5.3%)	Bibliography: 1. R. Munteanu – Măsurări Electrice și Electronice, Note de curs. 2. R. Munteanu, col., Electrotehnică şi convertoare energetice, Ed. Mediamira, Cluj-Napoca, 1997.

				3. I. Târnovan, - Metrologie şi instrumentaţie electrică, Ed. Mediamira, 2003. 4. R Munteanu jr., col. – Traductoare pentru sisteme de măsurare, Ed. Mediamira, 2003. 5. Dan Iudean, Radu Munteanu jr., Mircea Buzdugan, Eudor Flueraș, Alex Crețu - „Măsurări electrice și electronice –Îndrumător de laborator”- 2016, Editura Mediamira. 6. Bird, J. – “Electrical Circuit Theory and Technology”, Elsevier, Oxford, 2004. 7. Webster, J., Eren, H. – “Measurement, Instrumentation and Sensors Handbook” CRC Press 2014.
	Electromobiles/Electromobile	18 (94.7%)	1 (5.3%)	It would be necessary to update the theme depending on the development of the industry, as well as the renewal of the material base
•	**Do you agree with the list of recommended basic literature in the Information and Methodical part of the discipline or laboratory program? /Sunteți de acord cu lista de literatură de bază recomandată la partea Informativă și Metodică a disciplinelor sau a lucrărilor de laborator enumerate?**			
	Automatic control engineering/Ingineria reglării automate	15 (78.9%)	4 (21.1%)	Refresh list of bibliography
	Automotive electrical and electronic equipment/Echipament electric și electronic auto	18 (94.7%)	1 (5.3%)	Refresh list of bibliography
	Electromobiles/Electromobile	17 (89.5%)	2 (10.5%)	It needs to be adopted to changes in the market Refresh list of bibliography
•	**What measures to control the quality of mastering knowledge in this discipline, given in the Information and Methodical part of the course program, do you consider necessary and sufficient? / Ce măsuri de control al calității a cunoștințelor la disciplinele enumerate, prezentate la partea de Informare și Metodică a curriculei cursului, considerați necesare și suficiente?**			
	Automatic control engineering/Ingineria reglării automate	19 (100%)		• Testing-14(73.7%) • Test works-15(78.9%)

				• Writing essays-5(26.3%) • Workshops-7(36.8%) • Practice at the enterprise • Projects
	Automotive electrical and electronic equipment/Echipament electric și electronic auto	19 (100%)		• Testing-14(73.7%) • Test works-15(78.9%) • Writing essays-7(36.8%) • Workshops-6(31.6%) • Practice at the enterprise • Projects
	Electromobiles/Electromobile	19 (100%)		• Testing-14(73.7%) • Test works-16(84.2%) • Writing essays-6(31.6%) • Workshops-5(26.3%) • Practice at the enterprise • Projects
•	**Do you agree with the recommendations on quality control of knowledge assimilation and certification? /Sunteți de acord cu recomandările privind controlul calității, asimilării și certificării cunoștințelor la disciplinile enumerate?**			
	Automatic control engineering/Ingineria reglării automate	19 (100%)		
•	*Automotive electrical and electronic equipment/Echipament electric și electronic auto*	19 (100%)		
•	*Electromobiles/Electromobile*	19 (100%)		
•	**What, in your opinion, is the curricula of this discipline aimed at? / Care este, în opinia dumneavoastră, curricula acestei discipline care vizează?**			
	Automatic control engineering/Ingineria reglării automate			
	• formal use of knowledge/utilizarea formală a cunoștințelor	4 (21.1%)		

	• development of critical thinking/dezvoltarea gîndirii critice	11 (57.9%)		
	• use of methods of cause-and-effect analysis/utilizarea metodelor de analiză cauză-efect	15 (78.9%)		
	• development of practical experience and skills/dezvoltarea experienței și abilităților practice	15 (78.9%)		
	• development of new competencies/dezvoltarea de noi competențe	16 (84.2%)		
	• development of independent thinking/dezvoltarea gîndirii independente	9 (47.4%)		
	• development of the ability for non-standard approaches in solving problems and making decisions/dezvoltarea capacităților pentru abordări non-standard în rezolvarea problemelor și luarea deciziilor	11 (57.9%)		
	• other/altele	0 (0%)		
	Automotive electrical and electronic equipment/Echipament electric și electronic auto			
	• formal use of knowledge/utilizarea formală a cunoștințelor	2 (10.5%)		
	• development of critical thinking/dezvoltarea gîndirii critice	13 (68.4%)		
	• use of methods of cause-and-effect analysis/utilizarea metodelor de analiză cauză-efect	12 (63.2%)		
	• development of practical experience and skills/dezvoltarea experienței și abilităților practice	17 (89.5%)		
	• development of new competencies/dezvoltarea de noi competențe	15 (78.9%)		
	• development of independent thinking/dezvoltarea gîndirii independente	9 (47.4%)		

	• development of the ability for non-standard approaches in solving problems and making decisions/dezvoltarea capacităților pentru abordări non-standard în rezolvarea problemelor și luarea deciziilor	9 (47.4%)		
	• other/altele	0 (0%)		
	Electromobiles/Electromobile			
	• formal use of knowledge/utilizarea formală a cunoștințelor	5 (26.3%)		
	• development of critical thinking/dezvoltarea gîndirii critice	10 (52.6%)		
	• use of methods of cause-and-effect analysis/utilizarea metodelor de analiză cauză-efect	12 (63.2%)		
•	• development of practical experience and skills/dezvoltarea experienței și abilităților practice	15 (78.9%)		
•	• development of new competencies/dezvoltarea de noi competențe	16 (84.2%)		
•	• development of independent thinking/dezvoltarea gîndirii independente	8 (42.1%)		
•	• development of the ability for non-standard approaches in solving problems and making decisions/dezvoltarea capacităților pentru abordări non-standard în rezolvarea problemelor și luarea deciziilor	10 (52.6%)		
•	• other/altele	0 (0%)		
•	**What is, in your opinion, the importance of the disciplines listed below? /Care este, după părerea dumneavoastră, importanța disciplinelor enumerate mai jos?**			
•	*Automatic control engineering/Ingineria reglării automate*			
•	• Very important/Foarte importantă	18 (94.7%)		
•	• Important/Importantă	1 (5.3%)		

•	• It is not important/Nu este importantă			
•	***Automotive electrical and electronic equipment/Echipament electric și electronic auto***			
•	• Very important/Foarte importantă	18 (94.7%)		
•	• Important/Importantă	1 (5.3%)		
•	• It is not important/Nu este importantă			
•	***Electromobiles/Electromobile***			
•	• Very important/Foarte importantă	16 (84.2%)		
•	• Important/Importantă	3 (15.8%)		
•	• It is not important/Nu este importantă			
•	**Emphasize 3 main points that you consider to be the most important for mastering this discipline / Enumerați 3 puncte principale pe care le considerați cele mai importante pentru însușirea disciplinilor enumerate.**			
•	*Automatic control engineering/Ingineria reglării automate*			• Due to the multiple automatic systems of motor vehicles • PLC, Dispace - real time measurement of motor. Simulation in the loop. AC/DC -> DC/DC. Energy conversion • the applied part, the practical works • Didactic materials, process simulation, laboratory work • Adequate technique-material base, modern textbooks, innovative teaching learning assessment technologies

				• Knowledge base, practical skills, creative thinking • Updated information, developed laboratories, repeated knowledge verification • Modern equipment in laboratories, new didactic material • Efficient laboratories, updated course support • Updated course support • Modernized laboratories • Modern and precise equipment • 1.Understanding the basic concepts • 2.Practice and application • 3. Consistency and perseverance • 1. Theoretical training according to modern technologies; 2. Practical laboratory works; 3. Qualitative specialty practice. • renewing the technical-material base and the list of laboratory works • Modern technical-material base, curricular support, adequate knowledge assessment • Technical-material base and curricular support
•	*Automotive electrical and electronic equipment/Echipament electric și electronic auto*			• Widespread use of electronic equipment in automobile construction • Matlab/simulink, simulation of electrical circuits. Complex interconnections (Control technology, Electropneumatics) • the applied part, the practical works • Didactic materials, process simulation, laboratory work

				• Adequate material technical base, modern textbooks, innovative teaching, learning and evaluation technologies • Knowledge base, practical skills, application • Updated information, developed laboratories, repeated knowledge verification • Modern equipment in laboratories, new didactic material • Efficient laboratories, updated course support • Updated course support • Modernized laboratories • Modern and precise equipment • 1.Knowledge of automotive electrical and electronic systems • 2. Diagnosis and troubleshooting • 3. Health and safety in working with electrical equipment • 1. Theoretical training according to modern technologies; 2. Practical laboratory works; 3. Qualitative specialty practice. • renewing the technical-material base and the list of laboratory works • Modern technical-material base, curricular support, adequate knowledge assessment • Technical-material base and curricular support
•	*Electromobiles/Electromobile*			• Due to the trend of increasing the number of electric vehicles • High voltage, increased efficiency. Timisoara S/ VILLAGE. Charging part. Use aluminum rails.

				• the applied part, the practical works • Didactic materials, process simulation, laboratory work • Adequate technical-material base, modern textbooks, innovative teaching, learning and evaluation technologies • Knowledge base, analytical skills, creative thinking • Updated information, developed laboratories, repeated knowledge verification • Modern equipment in laboratories, new didactic material • Efficient laboratories, updated course support • Updated course support • Modernized laboratories • Modern and precise equipment • 1. Knowledge of electric propulsion technologies • 2. Familiarization with energy storage technologies • 3. Aspects related to sustainability and environmental impact • 1. Theoretical training according to modern technologies; 2. Practical laboratory works; 3. Qualitative specialty practice. • renewing the technical-material base and the list of laboratory works • Modern technical-material base, curricular support, adequate knowledge assessment

				• Technical-material base and curricular support
•	**Do you have any suggestions for further improvement of these disciplines? / Aveți sugestii pentru îmbunătățirea ulterioară a disciplinilor enumerate?**			
•	*Automatic control engineering/Ingineria reglării automate*			• More contact hours • Alignment with standards from other European curricula • Revision of didactic materials and the technical-material base • It would be necessary to equip the laboratories • Development of laboratories and curricula • Simulation of some processes • Update laboratory equipment • Efficient laboratories • Practical works regarding the level of use in industry • Extensive practical experience, laboratory equipment with: • 1. Control systems • 2. Measuring equipment and sensors • 3. Simulation software • 4. Work platforms and test equipment • The University's equipment with modern laboratories • renewing the technical-material base and the list of laboratory works • List of laboratory works • Procurement of modern machinery
•	*Automotive electrical and electronic equipment/Echipament electric și electronic auto*			• More lab work

				• Alignment with standards from other European curricula • Revision of didactic materials and the technical-material base • CAN Bus system • Updated information, developed laboratories, repeated knowledge verification • Update laboratory equipment • Efficient laboratories • Practical works regarding the level of use in industry • Equipment: • 1. Advanced diagnostic equipment, • 2. Work platforms • 3. Components and spare parts • The University's equipment with modern laboratories • renewing the technical-material base and the list of laboratory works • List of laboratory works • Procurement of modern machinery
•	*Electromobiles/Electromobile*			• More practical work • Alignment with standards from other European curricula • Revision of didactic materials and the technical-material base • It would be necessary to equip the laboratories • HEV, BEV, PHEV, Hydrogen generators, etc. • Update laboratory equipment • Efficient laboratories

				• Practical works regarding the level of use in industry • An EV lab should be equipped with everything necessary to enable students and professionals to learn and work effectively with EV technologies, providing opportunities for hands-on training and experimentation in a safe and controlled environment . • The University's equipment with modern laboratories • renewing the technical-material base and the list of laboratory works • List of laboratory works • Procurement of modern equipment
•	**If you have any comments or suggestions about the problem or the content of the questions, please write down your thoughts in this section. / Dacă aveți comentarii sau sugestii la conținutul întrebărilor, vă rugăm să scrieți părerile dvs. în această secțiune.**			
		100%		• I do not have • I do not have • I do not have • I do not have • We will present a synthesis for other disciplines as well • to have access to plans and curricula • It would be interesting to study in this program such subjects as hybrid and autonomous vehicles. An important place in the design of automobiles is also played by their shape, which would influence certain parameters in

				this sense, and the discipline of engineering bionics could be analyzed. • Perfect didactic team • To improve and facilitate the learning process in the courses, I offer the following suggestions: • 1. Interactive laboratories • 2.Case studies and practical applications • 3.Discussion and question and answer sessions • The involvement of professional economic agents in the study process would bring advantage to the University, the students, but also to the economic agents.

Summary Table 3.1.5 of the composition of participants in the analysis of courses/laboratory study programs

Scientific, academic staff and employers

	Question	Area of professional activity	Experience in training	Comments about work experience	Work experience in scientific projects

N			Yes	No		Scientific direction	Applied direction
1	**The position that you hold / Funcția pe care o deținești în organizație** • Execution function with technical responsibilities, specific to the position you hold/Funcție de execuție cu responsabilități tehnice, specifică funcției pe care o ocupați	13 68.4%					
	• Management position with decision-making responsibilities / Funcție de conducere cu responsabilități în adoptarea de decizii/	6 31.6%					
2	**What is your field of professional activity? / Care este domeniul dumneavoastră de activitate profesională?**						
	i. Science	0 (0%)					
	j. Education	10 (52.6%)					
	k. Production of High-Tech Products	0%					
	l. Industrial enterprise/ întreprindere	7 (36.8%)					

	m. Transport/ transport	1 (5.3%)					
	n. Non-government organization/organizație non-guvernamentală	0 (0%)					
	o. IT-services/ servicii IT	0 (0%)					
	p. Other/ Altele	1 (5.3%)					
3	**Status/Statutul**						
	• employee of the research institution/angajat al instituției de cercetare	1 (5.3%)					
	• professor/professor	9 (47.4%)					
	• an employee of a company/angajat al unei întreprinderi	9 (47.4%)					
4	**Experience in teaching activity / Experiență de predare:**						
	• 3 - 7 years/ani		1 (10%)				
	• 7 - 15 years/ani		3 30%)				
	• 15 - 20 years/ani		1 (10%)				

	• > 20 years/ani		5 (50%)				
	it is not/nu este						
5	**Manufacturing experience / Experiență în producție**						
	• 3 - 7 years/ani		1 (11.1%)				
	• 7 - 15 years/ani		4 (44.4%)				
	• 15 - 20 years/ani		1 (11.1%)				
	• > 20 years/ani		0 (0%)				
	• it is not/nu este		3 (33.3%)				
6	**Experience in your field /Experiență în domeniul dumneavoastră** • 3 - 7 years/ani • 7 - 15 years/ani • 15 - 20 years/ani • > 20 years/ani • it is not/nu este		0%				

Comments and suggestions

The all surveyed respondents unanimously emphasize the essentiality of including the specified courses within the bachelor's program: *ENGINEERING AND MANAGEMENT IN AUTOMOTIVE TRANSPORT*. They underscore the significance of these courses in providing foundational knowledge and practical skills essential for their academic and professional development. Moreover, respondents express a collective belief in the relevance and applicability of the proposed courses to their future career paths, highlighting the need for comprehensive education in these areas.

Furthermore, the diverse background of the respondents adds depth to their endorsement of the courses, with 47.4% representing professionals from various enterprises and 52.6% originating from the education sector. This diversity underscores the breadth of experience and expertise that collectively affirm the value and relevance of the proposed cources.

Additionally, the survey respondents articulated their perspectives on the necessity of the proposed courses, providing valuable insights into the focal points of the learning process and the priorities from the standpoint of labor market representatives. This comprehensive understanding not only guides curriculum development but also ensures alignment with industry demands and fosters graduates' readiness for the professional landscape.

In response to the inquiry about the effectiveness of laboratory and practical works in developing the practical competencies outlined in the discipline curricula, the predominant recommendation was to reassess the current list of laboratory works. This suggestion stems from the belief that a thorough review of the existing list could potentially enhance the alignment between the practical activities and the desired learning outcomes. By revisiting the selection of laboratory works, it is anticipated that a more targeted and impactful approach can be adopted to better support the development of essential practical competencies as mandated by the curriculum.

In addressing the query on effective measures to regulate the quality of mastering knowledge within these disciplines, as outlined in the Information and Methodical section of the course program, the following responses are provided:

Test works: Achieving a substantial endorsement with 14 out of 19 respondents (73.7%) deems test works as an indispensable measure. These assessments not only gauge comprehension but also facilitate the retention of crucial concepts.

Testing: A notable 15 respondents (78.9%) are for the implementation of regular testing. Such evaluations serve as benchmarks for individual progress and aid in identifying areas requiring further attention.

Workshops and writing essays: A considerable portion of 6 respondents (31.6%) underscore the significance of workshops and writing essays. These interactive sessions foster collaborative learning environments and enable hands-on engagement with subject matter, enhancing overall understanding and face-to face response with teacher.

Additional Group Projects: Furthermore, the inclusion of supplementary group projects is suggested as an enriching measure by an unspecified number of respondents. These projects foster teamwork, critical thinking, and practical application of theoretical knowledge, thereby augmenting the depth of learning experiences.

In conclusion, the combination of test works, testing, workshops, and additional group projects is advocated by respondents as a comprehensive approach to ensuring the quality attainment of knowledge within the specified disciplines.

The feedback from the respondents provided valuable insights and actionable suggestions for enhancing the educational experience. An expanded version of the suggestions is presented below:

1. **Increasing the number of hours in laboratory work:** Respondents emphasized the importance of practical experience in reinforcing theoretical concepts learned in lectures. Increasing the number of hours allocated to laboratory work would provide students with more opportunities to engage with experiments, develop practical skills, and deepen their understanding of complex topics.

2. **Improvement of laboratories with equipment**: Modernizing laboratory facilities and upgrading equipment emerged as a key recommendation. By investing in the most recent stage technology, institutions can create an environment conducive to the latest research and experimentation. Upgraded equipment not only enhances the quality of student learning but also prepares them for real-world applications in their respective fields.

3. **Improving and renewing bibliographic resources**: Access to modern reference materials is essential for fostering academic growth and research excellence. Respondents highlighted the need to enhance the library's collection with recent publications, journals, and digital resources relevant to the curriculum. By ensuring comprehensive access to scholarly content, students can conduct thorough research and stay on a level of the latest developments in their discipline.

4. **Implementation of innovative teaching methods:** Incorporating innovative pedagogical approaches can invigorate the learning experience and cater to diverse learning styles. Suggestions included active learning strategies, collaborative projects, flipped classrooms, and inquiry-based learning methodologies. By fostering student engagement and critical thinking, these methods promote deeper comprehension and retention of subject matter.

5. **Integration of software for modeling systems**: Use educational software for system modeling presents an effective way to enhance conceptual understanding and analytical skills. By simulating real-world scenarios and phenomena, students can explore complex systems, conduct virtual experiments, and visualize abstract concepts. Incorporating software tools into the curriculum not only enriches the learning experience but also equips students with valuable computational skills relevant to their future careers.

In summary, implementing the recommendations provided by the respondents can raise the quality of education in laboratory settings, fostering a dynamic learning environment that empowers students to be the best academically and thrive in their chosen fields.

After processing the surveys from stakeholders regarding the improvement of proposed courses, the following steps can be taken:

- *Results Analysis:* The evaluation and analysis of data obtained from surveys involve identifying the main issues and needs for improvement in the evaluated courses.
- *Proposal Formulation:* Based on the analysis of results, specific proposals for enhancing educational courses are developed, including content revision, adoption of innovative teaching methods, restructuring course organization, and other relevant aspects.

- *Implementation of Changes:* Planned measures for improving educational courses, including updating course content, changing teaching methods, and providing training for teachers and students on new approaches, are implemented.
- *Effectiveness Evaluation:* Monitoring and evaluating the results of implementing changes involve identifying positive and negative aspects. Based on this evaluation, the strategy for improving courses is adjusted according to the needs of stakeholders and the outcomes obtained.

  This cycle can be repeated, allowing for constant adaptation of training courses to the changing needs and requirements of participants in the educational process.

3.6 Cahul State University Bogdan Petriceicu Hasdeu - USC

Time of the survey

The survey of the representatives of academic and scientific staff, as well as the representatives of potential employers, was conducted in March 2024

Participants in the survey

In total, 5 academic staff representatives and 9 employers (including project partner - ICS DRA Draexlmaier Automotive SRL) participated in the survey (see Tab. 3.6.1.). The number of respondents from employers included representatives of our industrial partner - ICS DRA Draexlmaier Automotive SRL (see Tab. 3.6.1.).

The reason of selection of particular respondents

The survey involved respondents who are specialists with experience in the fields of science related to digitization processes, namely: mechanical engineering, industrial automation, electronics, electrotechnics and electromechanics, robotics. Also, specialists in the field of economy, management and environmental protection were questioned. From the economic and industrial environment, representatives of the car manufacturing industry, car repair and maintenance, marketing, logistics, recruiting were questioned. From the academic environment, heads of field departments from universities in the Republic of Moldova and academic staff involved in the training of specialists in the given field were interviewed. The general principles of the selection of experts for this survey were their high competence and broad representation both in terms of coverage of different regions of the Republic of Moldova, especially the Southern Development Region, and professional activity.

Table 3.6.1. List of Scientific, academic staff and employers who participated in the survey on the developed courses for bachelor program "*Engineering and Management in Machine Construction (Automotive)*"

Nr. crt.	Academic staff	Position
1	Rumeus Iurie	Associated professor, Head of the Department of Engineering and Applied Sciences, Faculty of Economics, Engineering and Applied Sciences, Cahul State University “B.P.Hasdeu”
2	Bunea Marina	Associated professor, Department of Engineering and Applied Sciences, Faculty of Economics, Engineering and Applied Sciences, Cahul State University “B.P.Hasdeu”
3	Popa Andrei	Professor, Department of Economic Sciences, Faculty of Economics, Engineering and Applied Sciences, Cahul State University “B.P.Hasdeu”
4	Rosca-Sadurschi Liudmila	Associated professor Department of Economic Sciences, Faculty of Economics, Engineering and Applied Sciences, Cahul State University “B.P.Hasdeu”
5	Besliu Vitalie	Associated professor, Head of the Department of Physical Sciences and Engineering, “Alecu Russo” Balti State University

Nr. crt.	Academic staff	Position
6	Ojegov Alexandr	Associated professor, Department of Physical Sciences and Engineering, “Alecu Russo” Balti State University
7	Cazac Vadim	Associated professor, Head of the Department of Electrical Engineering, Technical University of Moldova
	Employers	**Position**
1	Bubulici Vadim	Head of Professional Education, ICS DRA Draexlmaier Automotive SRL
2	Mocanu Eduard	Human Resources Manager, ICS DRA Draexlmaier Group, Cahul
3	Saghin Lilia	ISC DRAEXLMAIER SRL, Cahul
4	Guglea Dionis	Engineer, „Top Construct BNN” S.R.L
5	Manoli Ion	Engineer, SA „Apa-Canal Cahul"
6	Acriș Cristina	Engineer, ÎCS Danube Logistics SRL, Giurgiulesti
7	Zamfir Nicolae	SRL Motor-Grup, Cahul
8	Cirlan Vasile	SRL GARAGE-EXPERT, Cahul
9	Cocev Oleg	General Director, SA Integral Auto

Study programs, courses etc. that were evaluated by representatives of employers

Table 3.6.2: The courses of the four study programs that were evaluated by representatives of Academic staff and employers

Course/Lab title	Updated or newly developed	Level (Bachelor, Master 5-year course)	ECTS credit points	The teaching/training methodologies developed/adopted e.g. e-learning/ training modalities, practical placements in enterprises, etc.	The link to the university's website	Date of accreditation	The status / document of accreditation
Design of electric machines	Updated	Bachelor	4	Lecture, practicals, lab practicals, tests	https://feisa.usch.md/wp-content/uploads/2021/05/Plan-IMCM-2018.pdf	27.07.2018	Authorised
Computer-aided design of products in the machine building industry	Updated	Bachelor	4	Lecture, practicals, lab practicals, tests	https://feisa.usch.md/wp-content/uploads/2021/05/Plan-IMCM-2018.pdf	27.07.2018	Authorised
Computer-aided design of technological processes and CALS technologies	Updated	Bachelor	4	Lecture, practicals, lab practicals, tests	https://feisa.usch.md/wp-content/uploads/2021/05/Plan-IMCM-2018.pdf	27.07.2018	Authorised
Tools of ecological production	Updated	Bachelor	4	Lecture, e-learning, practical, lab practical	https://feisa.usch.md/wp-content/uploads/2021/05/Plan-IMCM-2018.pdf	27.07.2018	Authorised
Planning and management of industrial enterprise (Production Management)	Updated	Bachelor	6	Lecture, e-learning, practical	https://feisa.usch.md/wp-content/uploads/2021/05/Plan-IMCM-2018.pdf	27.07.2018	Authorised
Human resources management	Updated	Bachelor	4	Lecture, e-learning, practical	https://feisa.usch.md/wp-content/uploads/2021/05/Plan-IMCM-2018.pdf	27.07.2018	Authorised

Description of the means and channels used in the survey

The survey was carried out according to a questionnaire prepared together with the representatives of the economic and industrial environment, but also with the members of the project implementation team. The questionnaire was distributed by e-mail, the same for both academics and employers. The questionnaire was built in *Google forms* and completed entirely online. A list of potential respondents was made in the South Development Region, for which the "B.P. Hasdeu" State University of Cahul is preparing specialists.
Respondents answered online and responses were automatically recorded. Later, the results obtained were analysed by Liliana Ceclu.

Results of the survey

In total, 16 questionnaires were analysed, of which, 7 questionnaires from representatives of the academic environment and 9 questionnaires from employers. The results of the analysis are presented below in Table 3.6.3.

Summary Table 3.6.3 of the answers included in the questionnaires for courses/ laboratory study programs by academic and employers

PART 2. Questions about the curriculum, courses and their contents			
Question	**Yes**	**No**	***Justification and notes***
1. Do you consider the disciplines below necessary for training students in the bachelor's program "Engineering and Management in Machine Construction (Automotive)"?			
Design of electric machines	16 (100%)	-	
Computer-aided design of products in the machine building industry	16 (100%)	-	
Computer-aided design of technological processes and CALS technologies	16 (100%)	-	
Tools of ecological production	16 (100%)	-	
Human resources management	16 (100%)	-	
Production Management	16 (100%)	-	
2. Do you agree with the wording of purpose of the academic disciplines below?			
Design of electric machines	16 (100%)	-	
Computer-aided design of products in the machine building industry	16 (100%)	-	

Computer-aided design of technological processes and CALS technologies	16 (100%)	-	
Tools of ecological production	16 (100%)	-	
Human resources management	15 (93,75%)	1 (6,25%)	Staff retention, talent management, salary policy
Production Management	16 (100%)	-	
3. Do you agree that the ratio between the number of direct contact hours and the number of hours for individual study contributes to the full assimilation of the knowledge and the formation of the necessary skills in the disciplines listed below by students?			
Design of electric machines	14 (87,5%)	2 (12,5%)	- To be added 15 hours of problem-solving seminars - The number of hours in the laboratory (practices) must be greater.
Computer-aided design of products in the machine building industry	16 (100%)		-
Computer-aided design of technological processes and CALS technologies	15 (93,75%)	1 (6,25%)	- More practical hours
Tools of ecological production	14 (87,5%)	2 (12,5%)	- Part of the hours can be directed to other fundamental disciplines - 30 hours of direct contact would be better for laboratory work
Human resources management	15 (93,75%)	1 (6,25%)	- Human resource management is the field that should be studied in more depth only in the case of a manager or an entrepreneur who needs to deepen his knowledge of the staff.
Production Management	15 (93,75%)	1 (6,25%)	Part of the hours can be directed to other basic disciplines
4. Do you agree with the course contents in the disciplines listed below?			

Design of electric machines	11 (68,75%)	5 (31,25%)	1) Introductory notions. Why electrical engineering? Role and place of the electric cars. How to approach electric cars? Operating regimes of electric machines. How to deal with problems associated with electric cars? Elements of field theory necessary in the approach and treatment of problems associated with electric machines. Constructive elements of electric machines. Fluxes and inductivities in electrical machines. Losses in electric cars. Representation of sinusoidal quantities. The electrical transformer. General considerations on the operation of the transformer. Constructive elements. Equations and equivalent schemes. Three-phase electrical transformer. General aspects of alternating current machines. Magnetic fields and windings. Electromotive voltages. The asynchronous machine. Generalities, construction and operation. Equivalent circuit diagram. Electromagnetic torque. Operating characteristics. The synchronous machine. Generalities, construction and operation. Power and torque of a synchronous machine. Characteristics and applications. Direct current machine. Generalities, construction and operation. Regimes and characteristics of operation. Synthesis of the principles of construction and operation of classic electric machines. Used methods in the study of dynamic regimes of electric machines. Dynamic regimes of practical interest of direct current machines with a collector (starting, braking, reversal, sudden change of load, sudden variations of the electric voltage at the armature terminals etc.). Dynamic regimes of practical interest of three-phase electrical transformers (connection to the network, sudden short circuit, overvoltages at the terminals etc.). Operation in non-symmetrical sinusoidal mode. Dynamic regimes of practical interest of induction machines (direct coupling to the network, sudden variation of the load on the shaft, sudden disconnection, fast and frequent reconnections etc.). Dynamic regimes of practical interest of synchronous machines with electromagnetic excitation (asynchronous start-up, self-synchronisation, electromechanical oscillations, sudden short-circuit at the terminals etc.). Dynamics of thermal regime in electric cars. The main defects of electric cars. Symptoms and detection possibilities.

			Teaching methods: PowerPoint presentations for courses with the use of media (videos, animations), software packages for modeling-simulation of electric machines, online exposure and TEAMs platform. 2) Among the first points analyzed and studied should be included: - The impact on the environment; - Possibility of starting (charging methods or battery supply; - Battery component; - The lifespan of an electric car compared to one on existing fuels; - The others are good that you included. 3)To add the themes: - Stepper motors, servomotors, selsins, inductosyn, rotary transformers and tachogenerators. Electromagnetic brake. 4) In the topics nothing is indicated about the design of the cars, it is not clear from the content that design is being done. Closer would be the name of the course Electric Machines, or to adopt the content by name. 5) It would be good to add topics related to the particularities of designing electric machines.
Computer-aided design of products in the machine building industry	11 (68,75%)	5 (31,25%)	Matlab /simulink, simulation of electrical circuits. Complex interconections (Control technology, Electropneumatics), Fluidsim
Computer-aided design of technological processes and CALS technologies	16 (100%)	-	
Tools of ecological production	13 (81,25%)	3 (18,25%)	- ISO 14001, Management of hazardous substances, documentation of substance evidence, assessment of risk factors, management of resources, disposal of different types of waste - In addition to those listed, I think methods and measures should be included in combating pollution and the ecological footprint that apply or can be applied in industries. - It would be good to add studying the concept of the circular economy
Human resources management	15 (93,75%)	1 (6,25%)	- Salary strategies, talent management, staff retention, investment in human resources
Production Management	14 (87,5%)	2 (12,5%)	- Time and Motion Study Ergonomics and Workspace Organization Programming of Informational Systems

			- The points are well established, it is necessary to study them just to have an idea of the terms and processes. The process will be better learned during the activity and depending on the requirements of the organization where it will work.
5. Do you agree with the formulation of the tasks for laboratory hours in the disciplines listed below?			
Design of electric machines	13 (81,25%)	3 (18,25%)	1) Knowledge of components and electromagnetic phenomena in classic electric machines. Creation of an experimental stand. Induction machine. Synchronous machine. Direct current machine – operating characteristics. Introductory session (safety of work in the laboratory, overview of the laboratory and applications). (2 hours) Hybrid teaching. Combined study: experimental on laboratory stands and dynamic simulation in the MATLAB/Simulink environment. Study using stands, power supplies, data acquisition systems, measuring devices, MATLAB/Simulink programming environment. Experimental and dynamic simulation study of the transient process due to sudden short-circuit at the terminals of the DC generator with collector and with derivation excitation. (2 hours) Experimental and dynamic simulation study of the transient process in the d.c. motor. with collector and separate excitation, due to: (4 hours) - the sudden variation of the mechanical load on the rotor shaft; - sudden variations in the electrical voltage at the indus terminals. Determining the parameters of the dynamic model of the DC motor with collector and separate excitation based on the transient response to the step signal (Pasek method). (2 hours) Determination of the parameters of the dynamic model of the induction motor with the rotor short-circuited based on the transient response to the step signal. (2 hours) The experimental and dynamic simulation study of the transient processes in the induction motor with the short-circuited rotor, due to: - the sudden disconnection and quick reconnection of the supply from the three-phase electrical network (when idling); - the sudden start and coupling of the mechanical load to the rotor shaft.

			Experimental and dynamic simulation study of the transient process in the induction generator with short-circuited rotor due to self-excitation and sudden connection of the electrical load at the terminals. Experimental and dynamic simulation study of the transient process due to the symmetrical three-phase sudden short circuit at the terminals of the synchronous generator with electromagnetic excitation. (2 hours) Experimental determination of subtransient reactances and of the inverse sequence of the synchronous machine with apparent poles (the Dalton – Cameron method). (2 hours) Experimental and dynamic simulation study of the transient processes due to asynchronous starting and self-synchronization of the three-phase synchronous motor. (4 hours) 2) Personally, I would add one more thing: - Adjustment of the components for commissioning; - Sectioning of the electrical components (the engine and the other elements used); - Analysis of the assembly method. 3) The topics to be included in the list of laboratory work: 1. Transformer; 2. The command of electric motors; 3. Electric generators. 4) Modeling and simulations in Matlab/Simulink are recommended in addition to the topics indicated in the curriculum.
Computer-aided design of products in the machine building industry	15 (93,75%)	1 (6,25%)	Matlab /simulink, simulation of electrical circuits. Complex interconections (Control technology, Electropneumatics); Fluidsim
Computer-aided design of technological processes and CALS technologies	16 (100%)	-	
Tools of ecological production	14 (87,5%)	2 (12,5%)	- Resource management, waste disposal, risk assessment, means of intervention - Studying the influence of manufacturing processes on the ecological state of the environment
Human resources management	16 (100%)	-	-
Production Management	15 (93,75%)	1 (6,25%)	Time and Motion Study Ergonomics and Workspace Organization Programming of Informational Systems

6. Do you agree with the formulation of the specific and professional competencies (what they should know, be able, then possess) formulated in the curriculum (per discipline), for the qualification of students from the Engineering and Management in Machine Construction (Automotive) study program?									
	Modelling and solving engineering, managerial and economic problems;	Professional computer use	Knowing and understanding the concept of the industrial product	Knowing and understanding the concept of production systems	Knowledge and understanding of the technological manufacturing process concept and process management;	Experimental skills	Socio-humanistic, communication and linguistic skills	Economic-managerial skills	Skills in ecology and the security of vital activity
Design of electric machines	12 (75,00%)	13 (81,25%)	11 (68,75%)	9 (56,25%)	7 (43,75%)	5 (31,25%)	3 (18,75%)	2 (12,5%)	3 (18,75%)
Computer-aided design of products in the machine building industry	10 (62,5%)	12 (75,00%)	11 (68,75%)	8 (50,00%)	6 (37,5%)	5 (31,25%)	2 (12,5%)	2 (12,5%)	3 (18,75%)
Computer-aided design of technological processes and CALS technologies	11 (68,75%)	11 (68,75%)	9 (56,25%)	9 (56,25%)	11 (68,75%)	6 (37,5%)	2 (12,5%)	2 (12,5%)	4 (25,00%)
Tools of ecological production	11 (68,75%)	8 (50,00%)	8 (50,00%)	8 (50,00%)	8 (50,00%)	4 (25,00%)	2 (12,5%)	3 (18,75%)	5 (31,25%)
Human resources management	11 (68,75%)	7 (43,75%)	5 (31,25%)	4 (25,00%)	9 (56,25%)	2 (12,5%)	5 (31,25%)	7 (43,75%)	3 (18,75%)

Production Management	13 (81,25%)	10 (62,5%)	9 (56,25%)	9 (56,25%)	11 (68,75%)	3 (18,75%)	5 (31,25%)	6 (37,5%)	4 (25,00%)	
7. Do you agree with the formulation of the general competencies formulated in the education plan (per discipline), for the qualification of students from the Engineering and Management in Machine Construction (Automotive) study program?										
	Personal and professional development	Social interaction	Responsibility	The ability to learn and work independently	The study of specialized literature in the field	Knowing, understanding and using the specific language	Logical thinking	Explanation and interpretation	Creative-innovative behavior	Critical and constructive thinking
Design of electric machines	16 (100%)	8 (50,00%)	12 (75,0%)	11 (68,75%)	11 (68,75%)	8 (50,00%)	9 (56,25%)	7 (43,75%)	7 (43,75%)	8 (50,00%)
Computer-aided design of products in the machine building industry	14 (87,5%)	6 (37,5%)	11 (68,75%)	10 (62,5%)	11 (68,75%)	9 (56,25%)	8 (50,00%)	4 (25,0%)	7 (43,75%)	6 (37,5%)
Computer-aided design of technological processes and CALS technologies	14 (87,5%)	6 (37,5%)	10 (62,5%)	9 (56,25%)	12 (75,0%)	8 (50,00%)	7 (43,75%)	5 (31,25%)	7 (43,75%)	4 (25,0%)
Tools of ecological production	13 (81,25%)	9 (56,25%)	11 (68,75%)	10 (62,5%)	11 (68,75%)	6 (37,5%)	7 (43,75%)	8 (50,00%)	5 (31,25%)	7 (43,75%)
Human resources management	14 (87,5%)	10 (62,5%)	13 (81,25%)	9 (56,25%)	10 (62,5%)	5 (31,25%)	8 (50,00%)	7 (43,75%)	6 (37,5%)	6 (37,5%)
Production Management	13 (81,25%)	8 (50,00%)	11 (68,75%)	8 (50,00%)	12 (75,0%)	5 (31,25%)	8 (50,00%)	5 (31,25%)	7 (43,75%)	8 (50,00%)

8. Which of the presented assessment methods do you consider necessary and effective for the following subjects listed below?							
	Tests	Laboratory work	Essays	Individual or group projects	Interdisciplinary projects	Neither	Other
Design of electric machines	10 (62,5%)	12 (75,0%)	1 (6,25%)	11 (68,75%)	9 (56,25%)	1 (6,25%)	1 (6,25%)
Computer-aided design of products in the machine building industry	11 (68,75%)	13 (81,25%)	1 (6,25%)	13 (81,25%)	9 (56,25%)	-	2 (12,5%)
Computer-aided design of technological processes and CALS technologies	12 (75,0%)	13 (81,25%)	1 (6,25%)	11 (68,75%)	11 (68,75%)	-	1 (6,25%)
Tools of ecological production	12 (75,0%)	12 (75,0%)	5 (31,25%)	7 (43,75%)	8 (50,00%)	-	2 (12,5%)
Human resources management	14 (87,5%)	8 (50,00%)	6 (37,5%)	8 (50,00%)	7 (43,75%)	1 (6,25%)	2 (12,5%)
Production Management	14 (87,5%)	9 (56,25%)	5 (31,25%)	10 (62,5%)	8 (50,00%)	-	1 (6,25%)

9. Please specify what other assessment methods you consider necessary, useful or relevant for the subjects listed below	
Design of electric machines	- Work visit to similar companies that produce equipment or other similar elements (in the country or outside the country). - Inviting other specialists with some ppt presentations for how to work on designing or simulating machine components. - The use of high-performance equipment by equipping a laboratory with all the necessary equipment. This will help to transpose the theoretical with the practical. - The urgent need to be able to get miniatures and put them into motion with the designed elements (here I am talking about making a mini electric car that will help you). - Carrying out tests (in the field) regarding the level of air pollution in congested areas. Checking the level of pollution with the necessary equipment on internal combustion cars and those with electric propulsion.
Computer-aided design of products in the machine building industry	
Computer-aided design of technological processes and CALS technologies	
Tools of ecological production	

Human resources management	- The most successful projects to be implemented in companies that have a partnership with the University. - Leadership and project management. - Quality management system in automotive. - Group project based on problem research (Problem Based Learning). - Laboratories are the most efficient method of assimilating information. - I don't think other methods are needed. - Simulations in specialized programs. - Design of electric machines. - Computer-aided evaluation. - Simulation tests, projects. - Case study, experiment. - Conceptual map method. - Course project.
Production Management	

10. The curriculum for the study program Engineering and Management in Machine Construction (Automotive) contains four categories of modules

	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
a) The module that provides a theoretical training in mathematics, engineering graphics, car construction technology, economic theory by teaching the fundamental subjects Higher mathematics, Descriptive geometry and technical drawing, Study of materials, Materials technology, Theoretical mechanics, Basics of automobile construction, Strength of materials, Theory of Machines and Mechanisms, Tolerance and Dimensional Control, Applied Mechanics, Economic Theory, Fundamentals of Organizational Management, etc.	10 (62,5%)	6 (37,5%)	-	-	-
b) The module that ensures the professional training of the future specialist in Engineering and Management in Machine Construction (Automotive) by teaching the subjects Machinery and mechanical processing systems, Machine ergonomics and aesthetics, Machine construction technology, Production systems engineering, Computer-aided design of the products of the machine building industry, Automation of technological processes, Reliability of production systems, Human resource management, Enterprise management, Quality management and quality standards, Planning and management of the industrial enterprise, etc.;	14 (87,5%)	1 (6,25%)	1 (6,25%)	-	-

c) The set of optional subjects provides a consistent set of knowledge in the specific field of specialization, containing a series of subjects corresponding to the specialization;	8 (50,0%)	6 (37,5%)	-	2 (12,5%)	-
d) The module that provides training in the socio-human field by teaching the subjects of Philosophy and concepts of technical-scientific progress, Intellectual property law, European economic integration, Oratory, Ethics and professional culture	6 (37,5%)	6 (37,5%)	4 (25,0%)	-	-

11. Rate, in your opinion, the importance of the courses listed below

	Very important	**Important**	**Don't know**	**Not important**
Design of electric machines	8 (50,00%)	8 (50,00%)	-	-
Computer-aided design of products in the machine building industry	13 (81,25%)	2 (12,5%)	1 (6,25%)	-
Computer-aided design of technological processes and CALS technologies	11 (68,75%)	5 (31,25%)	-	-
Tools of ecological production	8 (50,00%)	8 (50,00%)	-	-
Human resources management	5 (31,25%)	10 (62,5%)	1 (6,25%)	-
Production Management	10 (62,5%)	6 (37,5%)	-	-

12. Please list 3 main points that you consider the most important in the teaching-assessment and/or individual work and/or laboratory activities for learning the disciplines analyzed in this questionnaire.

Design of electric machines	- Definitions, classifications, parameters of electric machines. Low-voltage electrical devices for control, protection and automation of low-voltage electrical machines and electrical receivers. Defects specific to machines and electrical installations. - The design activity should be carried out by people with experience or who know design very well. The use of high-performance equipment. Availability of a well-defined model.

	- Analysis and practical case study related to current trends, practical laboratory works oriented towards the development of new viable and current concepts. - The relevance and applicability of the theoretical aspects. Maximum possible number of practical simulations. Learning and evaluation based on concrete problems. - Solving problems. Modeling and simulation. Group project to solve problems encountered by companies. - Knowledge of components and electromagnetic phenomena in classic electric machines. Creation of an experimental stand. - The interaction with the economic agents that can ensure the practical training of the course. - Training based on the formation of skills relevant to the specialty. - Didactic support, technical-material base and simulation of the processes. - Interactive teaching methods, material basis, projects. - Lectures, individual work and laboratory activities. - Theoretical, Practical, Integration of innovations. - Using software in teaching and evaluation. - Course project.
Computer-aided design of products in the machine building industry	- High-performance computer with licensed programs. Exchange of experience with other universities. Collaborating with a company that designs cars to be able to check if what is being done is useful. - Introduction to the issue of parameterized computer-aided design. Creating 3D models. The steps of a finite element simulation. - The relevance and applicability of theoretical aspects. Maximum possible number of practical simulations. Learning and evaluation based on concrete problems. - Solving problems. Modeling and simulation. Group project to solve problems encountered by companies. - Minimizing the theoretical report and multiplying case studies on real situations. - Training based on the formation of skills relevant to the specialty. - Didactic support, technical-material base and simulation of the processes. - Interactive teaching methods, material basis, projects. - Individual projects carried out within the practice. - Experimental stands, the same as in the electrical field. - Lectures, individual work and laboratory activities. - Theoretical, Practical, Integration of innovations.

	- Software engineer and software developer. - Individual design tasks.
Computer-aided design of technological processes and CALS technologies	- The essence of technological preparation of manufacturing and the parameters of the technological system in the design of integrated computer-aided design systems. Creation of prototypes and complex models. Modeling the design process of technological operations. - The relevance and applicability of theoretical aspects. Maximum possible number of practical simulations. Learning and evaluation based on concrete problems. - Solving problems. Modeling and simulation. Group project to solve problems encountered by companies. - Minimizing the theoretical report and multiplying case studies on real situations. - Training based on the formation of skills relevant to the specialty. - Didactic support, technical-material base and simulation of the processes. - Interactive teaching methods, material basis, projects. - Lectures, individual work and laboratory activities. - Theoretical, Practical, Integration of innovations. - Individual design tasks. - Latest version programs. - Individual projects.
Tools of ecological production	- In-depth study on the evolution of pollution levels in the country and what are the methods to predict the increase in the degree of pollution. In-depth analysis of the most dangerous elements (chemical or physical) that are used to achieve the desired results. The search and identification of alternative substances (products) that would allow reducing the level of pollution but would have the same result. The use of equipment to present true results by measuring the level of pollution, both on the ground and in the air. - The relevance and applicability of theoretical aspects. Maximum possible number of practical simulations. Learning and evaluation based on concrete problems. - Environmental pollution risks in the area of an enterprise. Waste management from enterprises. Waste recycling. - The role of environmental protection. Environmental monitoring. Waste management. - Minimizing the theoretical report and multiplying case studies on real situations. - Training based on the formation of skills relevant to the specialty. - Didactic support, technical-material base and simulation of the processes.

	- Interactive teaching methods, projects. - Not only pollution, but also management, evacuation, and risks. - Practices with the theme of ecology and sustainability. - Theoretical, Practical, Integration of innovations. - More practical and laboratory hours. - Lecture, evaluation, laboratory.
Human resources management	- The relevance and applicability of theoretical aspects. Maximum possible number of practical simulations. Learning and evaluation based on concrete problems. - Strategic planning of human resources. Professional training and career development. Motivating and rewarding staff. - The importance of each specialist to be successful. Motivating young employed specialists. Developing ideas at the level of our country. - The involvement of students in the real recruitment processes, e.g. AOFM and economic agents. - Minimizing the theoretical report and multiplying case studies on real situations. - Interactive methods of teaching and evaluation, updated bibliography. - Training based on the formation of skills relevant to the specialty. - Didactic support, working with national/international databases. - Talent management, salary policies, investments in HR. - The use of human resource management programs. - Lecture, evaluation, laboratory. - Theoretical, Integration of innovations.
Production Management	- The relevance and applicability of theoretical aspects. Maximum possible number of practical simulations. Learning and evaluation based on concrete problems. - The structure of the enterprise and the organization of production in the basic sections. Quality management. Financial planning. - Minimizing the theoretical report and multiplying case studies, study projects within companies. - The use of local products. Achieving the finished result at the best level. Market analysis. - Time and Motion Study Ergonomics and Workspace Organization Programming of Informational Systems. - Ensuring the interaction of the educational institution with the economic agents in the area. - Interactive methods of teaching and evaluation, updated bibliography.

	- Training based on the formation of skills relevant to the specialty. - Didactic support, technical-material base and simulation of the processes. - Practical hours and visits to enterprises. - Teaching, evaluation, and individual work. - Theoretical, Integration of innovations.
13. What suggestions do you have for further improvement of the listed disciplines?	
Design of electric machines	- Improving the curriculum by adjusting it to modern trends and technologies and to the needs of economic agents. - Knowledge of the concept of electric car formation and prototype design. - The lecture lessons should also contain design aspects of electric machines. - Orientation in trends and new technologies in the field of electric cars. - More practical lessons in laboratories equipped with modern equipment. - Elaboration/renewal of didactic support and the technical-material basis. - Correlation of course content with employers' requirements. - To focus the course on the control of electric machines. - To be connected with the problems in the real activity. - Setting up a high-performance work laboratory. - Let the practical side prevail. - Curriculum improvement. - Study projects.
Computer-aided design of products in the machine building industry	- Improving the curriculum by adjusting it to modern trends and technologies and to the needs of economic agents. - Possessing the necessary materials to be able to present at the highest level. - More practical lessons in laboratories equipped with modern equipment. - Application of simulations and projections in existing software. - Correlation of course content with employers' requirements. - Software in the electrical field, not only mechanical. - To connect with the problems in the real activity. - Adequate advanced endowment. - Curriculum improvement. - Theory and practice.

	- Study projects.
Computer-aided design of technological processes and CALS technologies	- Improving the curriculum by adjusting it to modern trends and technologies and to the needs of economic agents. - Diversification of methods for technological processes and their implementation in existing softwares. - Individual and group work, visualization and presentation of results through design. - More practical lessons in laboratories equipped with modern equipment. - Elaboration/renewal of didactic support and the technical-material basis. - Use of licensed programs and high-performance computers. - Correlation of course content with employers' requirements. - To connect with the problems in the real activity. - Curriculum improvement. - Study projects.
Tools of ecological production	- Orientation in the automotive field, legislation and ecological requirements, methods of minimizing pollution, case studies through examples of automotive production companies. - Improving the curriculum by adjusting it to modern trends and technologies and to the needs of economic agents. - Identifying solutions to make measurements in water and in air (on the ground is simpler). - More practical lessons in laboratories equipped with modern equipment. - Applicable pollution control methods and preventive measures. - Correlation of course content with employers' requirements. - To connect with the problems in the real activity. - Curriculum improvement. - Current adjusted information. - Study projects. - ISO standards.
Human resources management	- There are no suggestions, the study program was well developed. - Correlation of course content with employers' requirements. - To connect with the problems in the real activity. - Market analysis and recruitment methods. - Curriculum improvement.

	- Study projects.
Production Management	- Overall use of all possible means used in Production Management. - Improving the curriculum by adjusting it to the needs of economic agents. - There are no suggestions, the study program was well developed. - Correlation of course content with employers' requirements. - To connect with the problems in the real activity. - Market requirements and expectations. - Curriculum improvement. - Study projects.
14. In order to improve this questionnaire, please provide comments or suggestions on the content of the questions.	
- All these ideas must necessarily be done by comparing internal combustion cars with all types of fuel (pollution, maintenance, costs, reliability etc.) with electric cars. To identify the weak points and strong points of an electric car. Identifying students who are really interested in this field and necessarily for these people to be as good as possible or with better training to be able to get good results. I think admission to this specialty should be with an entrance exam to identify the level of knowledge. - The questionnaire must be simplified and formulated in such a way as to obtain more detailed answers. There were questions that could be given more answers. - The preparation, development and retention of human resources in the Republic of Moldova must be a primary objective for higher education institutions. - Less explicit questionnaire for people who are not employed in the didactic field.	

Summary Table 3.1.4 of the composition of participants in the analysis of courses/laboratory study programs

	Execution function with technical responsibilities, specific to the position you hold		Management position with decision-making responsibilities		Teachers
1. The position that you hold	4 (25,0%)		9 (56,25%)		3 (18,75%)
	Science	Education	Industrial enterprise	Transport	IT-services
2. What is your field of professional activity?	1 (6,25%)	7 (43,75%)	3 (18,75%)	4 (25,0%)	1 (6,25%)
	< 3 years	3 -7 years	8 -14 years	15-20 years	> 20 years
3. Work experience in the field in which you activate	2 (12,5%)	4 (25,0%)	5 (31,25%)	2 (12,5%)	3 (18,75%)

Comments and suggestions

From the results obtained, it can be mentioned that all surveyed respondents consider it necessary to study the declared courses in the bachelor's program *"Engineering and Management in Machine Construction (Automotive)"*, and that these courses are important or very important for the training of engineering specialists. Also, the vast majority of the surveyed respondents agree with the purpose of these courses, their tasks, main competencies and the distribution of hours by types of training sessions.

Their opinion and proposals are quite important, because they show the direction of development and modernization of these courses and will allow the improvement of the program, in relation to the requests of the stakeholders. The implementation of such an approach will increase the quality of the educational process and help the university to train qualified specialists under the *"Engineering and Management in Machine Construction (Automotive)"* program.

The main recommendation of the respondents regarding the subject of the courses, was to add more practical activities, with demonstrative aspect, the use of various software to develop the students' hard skills, soft skills being less important.

Also, the respondents provided suggestions regarding the use of specialized software for laboratory work, such as: Matlab, Simulink, Fluidsim.

Analyzing the respondents' answers, the three 3 main points that you consider the most important in the teaching-assessment and/or individual work and/or laboratory activities for learning the disciplines are:

1. Technical and material equipment:

Laboratory equipment, curriculum support with course notes, didactic support for laboratory work are important for the smooth running of the courses. Therefore, their advice and suggestions will allow you to determine the directions of work on the creation of the developed courses and will undoubtedly ensure their high quality.

2. Improving the curriculum/syllabus:

Adjusting the number of hours for practical work, diversifying teaching methods by introducing innovative elements in the automotive field and special software for this field. The deeper connection with industrial units to carry out practical activities directly in companies, to work on projects with concrete problems in companies.

3. Practical experience through laboratory practice and real-world applications:

Hands-on experience is invaluable for reinforcing theoretical knowledge and developing practical skills. Laboratory practice allows students to apply theoretical concepts in controlled environments, gaining firsthand experience with equipment and experimental setups. Additionally, exposure to real-world applications, such as internship opportunities or industry collaborations, provides context and relevance to classroom learning.

After processing the questionnaires of stakeholders on improving training courses, the next steps can be:

1. Analysis of the results: Evaluation and analysis of the data obtained from the questionnaires, identification of the main problems and needs for improvement of training courses.

2. Formulation of proposals: Based on the analysis of the results, the development of specific proposals for the improvement of educational courses, including content, teaching methods, organization of classes and other aspects.

3. Implementation of changes: Implementation of planned measures to improve educational courses, including updating course content, changing teaching methods, training teachers and students for new approaches, etc.

4. Evaluation of effectiveness: Monitoring and evaluation of the results of implementation of changes, identification of positive and negative aspects, adjustment of the strategy of improvement of training courses in accordance with the needs of stakeholders and the achieved results.

This cycle can be repeated, allowing to constantly adapt the training courses to the changing needs and requirements of the participants in the educational process.

3.7 Contribution of industrial partners to the survey on the curricula, needed to the labour market

3.7.1 The role of the Subsidiary SNT Ukraine

SNT Ukraine has been taking active part in the preparation stage of the survey. A meeting has been held between the company and the partner Universities from Ukraine to maintain common approach to the survey questionnaire preparation. SNT Ukraine's employees, including CEO, CTO and CMO have studied the training plans and curricula provided by the above-mentioned universities to offer consistent advice and recommendation. SNT Ukraine's CTO has been able to provide additional comments from the top technical personnel of the selected customers of SNT, to provide additional views and expertise, benefiting the process. As a result, SNT Ukraine provided a series of recommendations on adjustment of the training courses in question together with detailed commentaries explaining the suggested changes.

3.7.2 The role of the ICS DRA Draexlmaier Automotive

ICS DRA Draexlmaier Automotive has been involved in preparation of the rollout of the survey. Two meetings have been held between the enterprise and the three partner Universities from Moldova, in order to keep the same approach and standard within the formulation of the survey questionnaire. At the same time the company requested the training plans and curriculum per each discipline from the partner Universities. Based on this information the team from the company which consists of Director, Head of Industrial Engineering Department, Head of Production Department and Head of Professional Education, came up with comments and suggestions during the workshop. Additionally, in order to have feedback and opinion on international level, the ICS DRA Draexlmaier Automotive requested support and advice from the Headquarters location Fritz Draxlmaier GmbH & Co. KG from Vilsbiburg, Germany, which also contributed to the completion of the survey.

As result, ICS DRA Draexlmaier Automotive provided the advises about the content of the courses directly in the survey and additionally provided a separate list of comments on all the courses which represent high priority and interest for the enterprise.

4. Summary of the survey, conclusions and recommendations

The feedback received from academic staff and employers is a very important and necessary element in the quality assurance of the educational process, which would ensure the sustainability of newly developed programs and courses in the DIGITRANS project.

1. CPNU

A survey was conducted to gather feedback on planned non-relic courses developed for a project. Nearly 100% of respondents supported the courses. Suggestions were made regarding course names and classification as mandatory or optional. Experts recommended a balance between theoretical and practical training, with slight variations depending on the course. Practical experience and skills development were emphasized. Suggestions were also provided for types of control, information resources, and software and hardware to be studied.

The importance of new courses was highlighted, particularly in microcontroller systems programming and optimization of software code. The acquisition of competencies in various areas of computer engineering was deemed essential. Recommendations included focusing on real projects, ensuring access to modern laboratory equipment, and aligning courses with basic disciplines. Most experts had extensive experience in science, education, and production, providing valuable insights for course development. Their input is expected to ensure the high quality of the courses.

2. KhNAHU

The survey respondents unanimously support the inclusion of courses in the bachelor's program "Electric Vehicles and Automotive Electronics," with agreement on course objectives, tasks, competencies, and hour distribution. Suggestions from respondents for additional topics demonstrate a direction for course development and modernization, reflecting stakeholder opinions. Understanding the importance of these courses aids in focusing on essential aspects for both learning and meeting industry demands, enhancing educational quality and producing qualified graduates.

Key recommendations from respondents include increasing practical experience in employer settings and car maintenance services and utilizing specialized software for laboratory work, such as diagnostic scanners and application packages. Analysis of respondent feedback highlights three crucial areas for mastering electric car disciplines: a desire to learn, knowledge of foundational principles in physics and electrical engineering, and practical experience through laboratory practice and real-world applications.

The next steps involve analyzing survey results, formulating proposals for course improvement, implementing changes, and evaluating effectiveness. This iterative process ensures courses continuously align with stakeholders' evolving needs, maintaining relevance and quality in the educational program.

3. LNTU

Respondents overwhelmingly support the relevance and necessity of courses offered in the "Automotive Transport" educational program. There is broad agreement on course content, objectives, competencies, and credit allocation. Key suggestions include expanding software

resources, incorporating more topics on electric and hybrid cars, and increasing practical training opportunities.

Employer stakeholders identified crucial points for mastering disciplines, aiming to improve educational quality and align content with industry needs. Identified areas for further improvement include electric and hybrid cars, emphasizing practical training, and continuous monitoring and modernization of courses to reflect evolving trends and technologies in road transport.

Future steps for course improvement will follow ISO 9001 principles, involving analysis, implementation, monitoring, and continuous improvement. This approach ensures courses remain up-to-date and effectively meet the demands of the road transport industry.

4. TUM

Respondents unanimously support the inclusion of courses in the "Electromechanics Engineering" bachelor's program, emphasizing their significance in providing foundational knowledge and practical skills essential for academic and professional development. Their diverse backgrounds, spanning both industry and education sectors, underscore the broad consensus on the courses' value and relevance.

Suggestions from respondents focus on expanding software resources, incorporating more topics on electric and hybrid cars, and increasing practical training opportunities. These recommendations aim to align curriculum content with industry demands and enhance graduates' readiness for the workforce.

Respondents also provide insights into effective measures for regulating knowledge mastery, advocating for a comprehensive approach that includes test works, testing, workshops, and additional group projects. These methods foster understanding, gauge comprehension, and promote collaborative learning environments.

Further recommendations include increasing laboratory hours, improving equipment, updating bibliographic resources, implementing innovative teaching methods, and integrating software for system modeling. These measures aim to enhance the quality of education and provide students with dynamic learning experiences.

Future steps involve analyzing survey results, formulating proposals for course enhancement, implementing changes, and evaluating effectiveness. This iterative process ensures continuous improvement and adaptation of courses to meet evolving educational and industry needs.

5. USARB

Respondents unanimously support the inclusion of specified courses in the "Engineering and Management in Automotive Transport" bachelor's program, citing their importance in providing foundational knowledge and practical skills crucial for academic and professional development. With diverse backgrounds, including professionals from various enterprises and the education sector, respondents collectively affirm the relevance and applicability of the proposed courses.

Suggestions from respondents focus on reassessing the current list of laboratory works to better align practical activities with desired learning outcomes. Additionally, respondents advocate for a comprehensive approach to regulating knowledge mastery, including test works, testing, workshops, and additional group projects, to ensure quality attainment within the specified disciplines.

Furthermore, respondents provide actionable suggestions for enhancing the educational experience, such as increasing laboratory hours, improving equipment, renewing bibliographic resources, implementing innovative teaching methods, and integrating software for system modeling. Implementing these recommendations can elevate the quality of education and foster a dynamic learning environment conducive to student success.

Future steps involve analyzing survey results, formulating proposals for course enhancement, implementing changes, and evaluating effectiveness. This iterative process ensures continuous improvement and adaptation of courses to meet evolving educational and industry needs.

6. USC

All respondents agree on the necessity and importance of the declared courses in the bachelor's program "Engineering and Management in Machine Construction (Automotive)" for training engineering specialists. Their consensus extends to the courses' objectives, tasks, competencies, and hour distribution. Their opinions and proposals are vital for the development and modernization of these courses, ensuring alignment with stakeholder requests and enhancing the program's quality.

Respondents recommend adding more practical activities, emphasizing the use of various software to develop students' hard skills, while soft skills are deemed less critical. Specialized software suggestions for laboratory work include Matlab, Simulink, and Fluidsim.

Key points identified by respondents for teaching, assessment, and laboratory activities include ensuring technical and material equipment availability, enhancing the curriculum with practical work and innovative teaching methods, and providing practical experience through laboratory practice and real-world applications.

Future steps involve analyzing survey results, formulating proposals for course improvement, implementing changes, and evaluating effectiveness. This iterative process ensures continuous adaptation of training courses to meet evolving needs and requirements of educational stakeholders.

7. Industrial partners SNT Ukraine and ICS DRA Draexlmaier Automotive

In the process of preparing for a survey, both the Subsidiary SNT Ukraine and ICS DRA Draexlmaier Automotive played crucial roles in ensuring alignment and providing valuable input.

SNT Ukraine actively engaged in the survey preparation by holding meetings with partner universities from Ukraine. Their employees, including key executives like the CEO, CTO, and CMO, reviewed training plans and curricula, offering advice and recommendations. The CTO also provided insights from top technical personnel of SNT's customers, enriching the process with additional expertise. Ultimately, SNT Ukraine provided detailed recommendations for adjusting training courses.

Similarly, ICS DRA Draexlmaier Automotive contributed significantly to the survey rollout. They organized meetings with partner universities from Moldova and requested detailed training plans and curricula for each discipline. Their team, including directors and department heads, provided comments and suggestions during workshops. Additionally, they sought advice from their headquarters in Germany, further enriching the survey process. ICS DRA Draexlmaier Automotive provided direct advice on course content in the survey and offered a separate list of high-priority comments on specific courses important to the enterprise.

Attachments 1:

Questionnaire of the peer review of experts by courses/ laboratory works study programs from professional NGOs, research scientific institutes (RSI), enterprises and universities in the framework of ERASMUS+ Project DIGITRANS /**for academic staff/**

Questionnaire of the peer review of experts by courses/ laboratory works study programs from professional NGOs, research scientific institutes (RSI), enterprises and universities in the framework of ERASMUS+ Project DIGITRANS	**Анкета опитування експертів за навчальними програмами курсів/лабораторних робіт від професійних неурядових організацій, науково-дослідних інститутів (НДІ), підприємств та університетів у рамках проекту ERASMUS+ DIGITRANS**
The purpose of the survey In order to clarify the demand to future specialists, the business analysis was prepared at the pre-project's stage of DIGITRANS. Therefore, Moldavian and Ukrainian universities will finalize the survey of representatives of industry, research institutions, HEIs and professional association. This questionnaire has been developed in order during the project running to get additional feedback from the stakeholders: professional NGOs, research scientific institutes (RSI), enterprises and universities of Moldova and Ukraine in order to get more comprehensive analysis of the labor market. Based on these inputs the matrix of competences and profile of the required specialists will be created in each Moldavian and Ukrainian university. A Report that analyses the survey results will be submitted to MC. Workshop 2 to be held in Athens for discussion and elaboration the finding of the Report, which will be used for curriculum, syllabuses, didactic materials. <u>The objectives of this survey are:</u>	**Мета опитування** Для того, щоб уточнити попит майбутніх спеціалістів, на передпроектній стадії DIGITRANS був підготовлений бізнес-аналіз. Таким чином, молдавські та українські університети здійснюють опитування представників промисловості, наукових установ, вищих навчальних закладів та професійних асоціацій. Ця анкета була розроблена для того, щоб під час роботи проекту отримати додатковий зворотний зв'язок від зацікавлених сторін: професійних неурядових організацій, науково-дослідних інститутів (НДІ), підприємств та університетів Молдови та України з метою отримання більш повного аналізу ринку праці. На основі цих вхідних даних у кожному молдавському та українському університетах буде створено матрицю компетенцій та профіль необхідних спеціалістів. Звіт з аналізом результатів опитування буде подано до МС. Семінар 2 буде проведено в Афінах для обговорення та розробки висновків звіту, який буде

• Review of the curricula of courses and laboratory works for the specialties / study programs: "**Electric Vehicles and Automotive Electronics**" for the training of specialists in the field of physical sciences within the framework of the 4-year (bachelor) of teaching cycles; • Clarifying (comprehending) the requirements that employers (RSIs/ enterprises/ universities) impose on the training and qualification programs of graduates of a practice-oriented magistracy; • Identification of the requirements that employers (RSIs/ enterprises/ universities) apply to the process of training bachelor and master degree student The survey data will be used in Moldavian and Ukrainian universities to clarify the curricula and study programs of courses/laboratory works aimed at preparing engineering-oriented personnel (bachelors and undergraduates) for High-Tech and science in the field of electrical engineering, automobile transport, computer technologies, etc.	використано для навчальних програм, навчальних планів, дидактичних матеріалів. Цілі цього опитування: • Огляд навчальних планів курсів та лабораторних робіт за спеціальностями/навчальними програмами: «**Електромобілі та автомобільна електроніка**» для підготовки фахівців у галузі фізичних наук у рамках 4-річного (бакалаврського) циклів навчання; • Уточнення (усвідомлення) вимог, які роботодавці (НДІ/підприємства/ВНЗ) висувають до програм підготовки та кваліфікації випускників практико-орієнтованої магістратури. Дані опитування будуть використані в університетах Молдови та України для уточнення навчальних планів та навчальних програм курсів/лабораторних робіт, спрямованих на підготовку інженерно-орієнтованих кадрів (бакалаврів та магістрантів) для високих технологій та науки в галузі електротехніки, автомобільного транспорту , комп'ютерні технології та ін.

PART 1/ ЧАСТИНА 1 ***Please give detailed answers to the following questions regarding your professional activity*** **Просимо надати розгорнуті відповіді на наступні питання щодо розроблених курсів**				
N	***Question* /Запитання**	**Yes**	**No**	***Justification and notes* /Примітки, пояснення**
1.	*What is your area of professional activity?* Яка сфера Вашої професійної діяльності? ☐ science (наука, дослідження) ☐ education (освіта) ☐ production of high-tech products (виробництво high-tech продукції) ☐ other (denote) (інше)			
2.	*Have you had previous or current experience training in electrical, energy, electronics, automotive, transportation technology, etc.?* Чи був у вас попередній або поточний досвід навчання електриці, енергетиці, електроніці, автомобілям, транспортним технологіям тощо? ☐ yes /так ☐ no / ні *When you answer is "yes", indicate the direction of preparation* / Якщо відповідь «так», опишіть свій досвід			
3.	*Have you had previous or current work experience in scientific projects in electrical, energy, electronics, automotive, transportation technology, etc.?* Чи мали у вас попередній або поточний досвід роботи в наукових проектах у сфері електрики, енергетики, електроніки, автомобілів, транспортних технологій тощо? ☐ yes / так ☐ no / ні *If you answer is "yes," please specify the scientific direction, applied direction of what?* / У разі відповіді «так» вкажіть: науковий напрям, прикладний напрям			

If possible, could you please give us more information about your experience?

Чи могли б ви надати нам більше інформації про свій професійний досвід?
Experience in teaching (Досвід викладання): 3-7 year/ 7-15 year / 15-20 year / >20 year
Experience in science (Досвід наукової діяльності): 3-7 year / 7-15 year / 15-20 year / >20 year
Experience in production (Досвід виробничої діяльності): 3-7 year / 7-15 year / 15-20 year / >20 year

PART 2 / ЧАСТИНА 2 ***Questions by courses/laboratory work study programs* / Питання за програмами курсів/лабораторних робіт**				
N	***Question* /Запитання**	**Yes**	**No**	***Justification and notes* /Примітки, пояснення**
1	*Do you consider it necessary for the learning of students in the bachelor's program "**Electric Vehicles and Automotive Electronics**": (If you answer is "no," please justify your answer)* Чи вважаєте Ви необхідним вивчення наступної дисципліни в бакалаврській програмі «**Електромобілі та автомобільна електроніка»:** (Якщо відповідь «ні» – обґрунтуйте відповідь)			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
2	*Do you agree with the wording of the purpose of this academic discipline (If your answer is "no" - justify your answer)?* Чи згодні ви з формулюванням мети даної навчальної дисципліни (Якщо ви відповіли «ні» - обґрунтуйте свою відповідь)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			

	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
3	*Do you agree with the wording of the tasks of this academic discipline (If your answer is "no" - justify your answer)?* Чи згодні ви з формулюванням завдань даної навчальної дисципліни (Якщо відповідь «ні» – відповідь обґрунтуйте)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
4	*Do you agree with the formulation of the main competencies for which the development of this discipline is directed? (In your answer is "no," please specify which of the competencies need further clarification and/or modification):* Чи згодні Ви з формулюванням основних компетентностей, на які спрямований розвиток даної дисципліни:? (У відповіді «ні» - вкажіть, які з компетенцій потребують уточнення чи зміни):			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			

	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
5	*Do you agree that the ratio of the number of hours and hours for managed self-study (URS) of students in this program contributes to the full assimilation of this discipline (If your answer is "no," please give an explanation):* Чи згодні ви з тим, що співвідношення кількості аудиторних годин та годин на самостійну роботу студентів за цією програмою сприяє повноцінному засвоєнню даної дисципліни (При відповіді «ні» - дайте пояснення):			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
6	*Do you agree with the content of the training material in the program of this discipline or laboratory work (If your answer is "no" - specify which sections of the course need amendments or additions)?* Чи згодні Ви зі змістом навчального матеріалу в програмі даної дисципліни або лабораторної роботи (Якщо відповідь «ні» - вкажіть, які розділи курсу потребують змін чи доповнень)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
7	*Do you agree with the distribution of discipline in hours by types of educational classes of this discipline (If your answer is "no" - specify requirements for changes or additions)?*			

	Чи згодні Ви з розподілом годин за видами навчальних занять з даної дисципліни (Якщо відповідь «ні» - вкажіть вимоги щодо змін чи доповнень)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
8	*Do you agree with the list of recommended basic literature in the Information/ Methodological Part of the discipline or laboratory work (If you answer is "no" - specify the list of main literature)?* Чи згодні Ви з Переліком рекомендованої основної літератури (При відповіді «ні» - вкажіть рекомендації)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
9	*Do you agree with the list of recommended supporting (additional) literature in the Information and Methodological part of the course program or laboratory work (If you answer is "no" - specify the list of supporting literature):* Чи згодні Ви з Переліком рекомендованої допоміжної (додаткової) літератури (У разі відповіді «ні» - вкажіть перелік допоміжної літератури):			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			

	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
10	*What measures to control the quality of mastering knowledge in this discipline, given in the Information and Methodical part of the course program, do you consider necessary and sufficient (multiply options could be selected)*: Які заходи контролю якості засвоєння знань з даної дисципліни, наведені в інформаційно-методичній частині програми курсу, Ви вважаєте необхідними та достатніми: (можна обрати декілька):			
	☐ testing (тестування) ☐ control works (контрольні роботи) ☐ writing essays (творчі проектні роботи) ☐ workshops (майстеркласи, практичні завдання) ☐ additional (specify, which)			
11	*Do you agree with the recommendations for monitoring the quality of learning and attestation of what? (If your answer is"no," please provide further suggestions for improving this section of the program)?* Чи згодні Ви з рекомендаціями щодо контролю якості навчання та атестації (При відповіді «ні» – внесіть пропозиції щодо зміни цього розділу робочої програми)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
12	*In your opinion, which set of skills is the program of this discipline aimed at developing (multiple options could be selected):* На що, на вашу думку, спрямована програма даної дисципліни (можна обрати декілька):			

	☐ formal use of knowledge (формальне використання знань) ☐ development of critical thinking skills (розвиток критичного мислення) ☐ use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) ☐ development of practical experience and skills (розвиток практичного досвіду та навичок) ☐ development of new competencies (розвиток нових компетентностей) ☐ development of independent thinking (розвиток самостійності мислення) ☐ development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) ☐ other (інше)			
13	*In your opinion, what is the importance of this discipline:* У чому, на вашу думку, полягає важливість цієї дисципліни:			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1,) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
14	*Emphasize 3 main areas that you consider the most important for mastering this discipline:* Визначить 3 основні моменти, які ви вважаєте найважливішими для опанування цієї дисципліни:			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			

	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
15	*Do you have any suggestions for further improvement of this discipline?* Чи є у вас пропозиції щодо подальшого вдосконалення цієї дисципліни?			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) /Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) /Електроніка та мікросхемотехніка (Ч.2)			

Comments and suggestions / Зауваження та пропозиції

If you have any further comments or suggestions about the problem and/or the content of the questions, please write down your thoughts in this section / Якщо у вас є пропозиції щодо покращення анкети, запишіть свої думки в цьому розділі.

_____ position (посада)

_____ signature (підпис)

_____ Family name, name (ПІБ)

Attachments 2:

Questionnaire of the peer review of experts by courses/ laboratory works study programs from professional NGOs, research scientific institutes (RSI), enterprises and universities in the framework of ERASMUS+ Project DIGITRANS /**for the industry representatives/**

Questionnaire of the peer review of experts by courses/ laboratory works study programs from professional NGOs, research scientific institutes (RSI), enterprises and universities in the framework of ERASMUS+ Project DIGITRANS	**Анкета опитування експертів за навчальними програмами курсів/лабораторних робіт від професійних неурядових організацій, науково-дослідних інститутів (НДІ), підприємств та університетів у рамках проекту ERASMUS+ DIGITRANS**
The purpose of the survey In order to clarify the demand to future specialists, the business analysis was prepared at the pre-project's stage of DIGITRANS. Therefore, Moldavian and Ukrainian universities will finalize the survey of representatives of industry, research institutions, HEIs and professional association. This questionnaire has been developed in order during the project running to get additional feedback from the stakeholders: professional NGOs, research scientific institutes (RSI), enterprises and universities of Moldova and Ukraine in order to get more comprehensive analysis of the labor market. Based on these inputs the matrix of competences and profile of the required specialists will be created in each Moldavian and Ukrainian university. A Report that analyses the survey results will be submitted to MC. Workshop 2 to be held in Athens for discussion and elaboration the finding of the Report, which will be used for curriculum, syllabuses, didactic materials. <u>The objectives of this survey are:</u>	**Мета опитування** Для того, щоб уточнити попит майбутніх спеціалістів, на передпроектній стадії DIGITRANS був підготовлений бізнес-аналіз. Таким чином, молдавські та українські університети здійснюють опитування представників промисловості, наукових установ, вищих навчальних закладів та професійних асоціацій. Ця анкета була розроблена для того, щоб під час роботи проекту отримати додатковий зворотний зв'язок від зацікавлених сторін: професійних неурядових організацій, науково-дослідних інститутів (НДІ), підприємств та університетів Молдови та України з метою отримання більш повного аналізу ринку праці. На основі цих вхідних даних у кожному молдавському та українському університетах буде створено матрицю компетенцій та профіль необхідних спеціалістів. Звіт з аналізом результатів опитування буде подано до МС. Семінар 2 буде проведено в Афінах для обговорення та розробки висновків звіту, який буде

• Review of the curricula of courses and laboratory works for the specialties / study programs: "**Electric Vehicles and Automotive Electronics**" for the training of specialists in the field of physical sciences within the framework of the 4-year (bachelor) of teaching cycles; • Clarifying (comprehending) the requirements that employers (RSIs/ enterprises/ universities) impose on the training and qualification programs of graduates of a practice-oriented magistracy; • Identification of the requirements that employers (RSIs/ enterprises/ universities) apply to the process of training bachelor and master degree student The survey data will be used in Moldavian and Ukrainian universities to clarify the curricula and study programs of courses/laboratory works aimed at preparing engineering-oriented personnel (bachelors and undergraduates) for High-Tech and science in the field of electrical engineering, automobile transport, computer technologies, etc.	використано для навчальних програм, навчальних планів, дидактичних матеріалів. Цілі цього опитування: • Огляд навчальних планів курсів та лабораторних робіт за спеціальностями/навчальними програмами: «**Електромобілі та автомобільна електроніка**» для підготовки фахівців у галузі фізичних наук у рамках 4-річного (бакалаврського) циклів навчання; • Уточнення (усвідомлення) вимог, які роботодавці (НДІ/підприємства/ВНЗ) висувають до програм підготовки та кваліфікації випускників практико-орієнтованої магістратури. Дані опитування будуть використані в університетах Молдови та України для уточнення навчальних планів та навчальних програм курсів/лабораторних робіт, спрямованих на підготовку інженерно-орієнтованих кадрів (бакалаврів та магістрантів) для високих технологій та науки в галузі електротехніки, автомобільного транспорту , комп'ютерні технології та ін.

	PART 1/ ЧАСТИНА 1 ***Please give detailed answers to the following questions regarding your professional activity*** **Просимо надати розгорнуті відповіді на наступні питання щодо розроблених курсів**			
N	***Question* /Запитання**	**Yes**	**No**	***Justification and notes* /Примітки, пояснення**
4.	*What is your area of professional activity?* Яка сфера Вашої професійної діяльності? ☐ industrial enterprise (промислове підприємство) ☐ production of high-tech (IT) products (виробництво високотехнологічної продукції) ☐ IT-services (IT-послуги) ☐ transport (транспорт) ☐ non-government organization (громадська організація, товариство) ☐ other (denote) (інше)			
5.	*Have you had previous or current experience training in electrical, energy, electronics, automotive, transportation technology, etc.?* Чи був у вас попередній або поточний досвід навчання електриці, енергетиці, електроніці, автомобілям, транспортним технологіям тощо? ☐ yes /так ☐ no / ні *When you answer is "yes", indicate the direction of preparation* / Якщо відповідь «так», опишіть свій досвід			
6.	*Have you had previous or current work experience in scientific projects in electrical, energy, electronics, automotive, transportation technology, etc.?* Чи мали у вас попередній або поточний досвід роботи в наукових проектах у сфері електрики, енергетики, електроніки, автомобілів, транспортних технологій тощо?			

	☐ yes / так ☐ no / ні *If you answer is "yes," please specify the scientific direction, applied direction of what?* / У разі відповіді «так» вкажіть: науковий напрям, прикладний напрям			

If possible, could you please give us more information about your experience?
Чи могли б ви надати нам більше інформації про свій професійний досвід?
Experience in teaching (Досвід викладання): 3-7 year/ 7-15 year / 15-20 year / >20 year

Experience in science (Досвід наукової діяльності): 3-7 year / 7-15 year / 15-20 year / >20 year

Experience in production (Досвід виробничої діяльності): 3-7 year / 7-15 year / 15-20 year / >20 year

PART 2 / ЧАСТИНА 2 ***Questions by courses/laboratory work study programs* / Питання за програмами курсів/лабораторних робіт**				
N	***Question* /Запитання**	**Yes**	**No**	***Justification and notes* /Примітки, пояснення**
1	*Do you consider it necessary for the learning of students in the bachelor's program "**Electric Vehicles and Automotive Electronics**": (If you answer is "no," please justify your answer)* Чи вважаєте Ви необхідним вивчення наступної дисципліни в бакалаврській програмі **«Електромобілі та автомобільна електроніка»:** (Якщо відповідь «ні» – обґрунтуйте відповідь)			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			

	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
2	*Do you agree with the wording of the purpose of this academic discipline (If your answer is "no" - justify your answer)?* Чи згодні ви з формулюванням мети даної навчальної дисципліни (Якщо ви відповіли «ні» - обґрунтуйте свою відповідь)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
3	*Do you agree with the wording of the tasks of this academic discipline (If your answer is "no" - justify your answer)?* Чи згодні ви з формулюванням завдань даної навчальної дисципліни (Якщо відповідь «ні» – відповідь обґрунтуйте)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
4	*Do you agree with the formulation of the core competencies to which the discipline is intended to be mastered? (In your answer is "no," please specify which of the competencies need further clarification and/or modification):* Чи згодні ви з формулюванням основних компетенцій, якими передбачається опанувати дисципліну? (У відповіді «ні» - вкажіть, які з компетенцій потребують уточнення чи зміни):			
	Electric vehicle infrastructure / Інфраструктура електромобілів			

	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
5	*Do you think that the lecture material will allow students to reveal the essence of the discipline, will allow them to achieve the main goal and educational results of the discipline? (If your answer is "no," please give an explanation):* Як ви вважаєте, лекційний матеріал дозволить студентам розкрити сутність дисципліни, дозволить досягти основної мети та навчальних результатів дисципліни? (При відповіді «ні» - дайте пояснення):			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
6	*Do you think that the proposed list of laboratory and practical works will help to develop all practical competence, declared by the discipline program? (If your answer is "no" - specify which sections of the course need amendments or additions)?* Як ви вважаєте, чи допоможе запропонований перелік лабораторних і практичних робіт розвинути всі практичні компетенції, заявлені програмою дисципліни? (Якщо відповідь «ні» - вкажіть, які розділи курсу потребують змін чи доповнень)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			

	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
7	*Do you have any suggestions for changing the list of lectures laboratory and practical works? (If your answer is "yes" - specify which sections of the course need amendments or additions)?* Чи є у Вас пропозиції щодо зміни переліку лекційних лабораторних та практичних робіт? (Якщо відповідь «так» - вкажіть вимоги щодо змін чи доповнень)			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
8	*Do you have any recommendations for using specialized software for laboratory works? (If you answer is "yes" – give recommendations)* Чи є у Вас пропозиції щодо використання спеціалізованого програмного забезпечення для лабораторних робіт? (При відповіді «так» - вкажіть рекомендації)?			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
9	*What in your opinion, is the program of this discipline aimed at (multiple options could be selected):* На що, на вашу думку, спрямована програма даної дисципліни (можна обрати декілька):			

	☐ formal use of knowledge (формальне використання знань) ☐ development of critical thinking skills (розвиток критичного мислення) ☐ use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) ☐ development of practical experience and skills (розвиток практичного досвіду та навичок) ☐ development of new competencies (розвиток нових компетентностей) ☐ development of independent thinking (розвиток самостійності мислення) ☐ development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) ☐ other (інше)			
10	*What, in your opinion, is the importance of this discipline:* У чому, на вашу думку, полягає важливість цієї дисципліни:			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
11	*Emphasize 3 main areas that you consider the most important for mastering this discipline:* Визначить 3 основні моменти, які ви вважаєте найважливішими для опанування цієї дисципліни:			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			

	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			
12	*Do you have any suggestions for further improvement of this discipline?* Чи є у вас пропозиції щодо подальшого вдосконалення цієї дисципліни?			
	Electric vehicle infrastructure / Інфраструктура електромобілів			
	Energy supply and energy saving systems / Системи енергопостачання та енергозбереження			
	Electric drive theory (Part 1) / Теорія електроприводу (Частина 1)			
	Electric drive theory (Part 2) / Теорія електроприводу (Частина 2)			
	Electric machines and devices / Електричні машини та апарати			
	Electronics and microcircuit engineering (Part 1) / Електроніка та мікросхемотехніка (Ч.1)			
	Electronics and microcircuit engineering (Part 2) / Електроніка та мікросхемотехніка (Ч.2)			

Comments and suggestions / Зауваження та пропозиції

If you have any further comments or suggestions about the problem and/or the content of the questions, please write down your thoughts in this section / Якщо у вас є пропозиції щодо покращення анкети, запишіть свої думки в цьому розділі.

position (посада)	signature (підпис)	Family name, name (ПІБ)

Attachments 3:

CPNU Questionnaire of the peer review of experts by courses/ laboratory works study programs from professional NGOs, research scientific institutes (RSI), enterprises and universities in the framework of ERASMUS+ Project DIGITRANS.

Questionnaire of the peer review of experts by courses/ laboratory works study programs from professional NGOs, research scientific institutes (RSI), enterprises and universities in the framework of ERASMUS+ Project DIGITRANS «Digital transformation of HEIs education process in Ukraine and Moldova for sustainable engagement with enterprises»	Анкета опитування експертів за навчальними програмами курсів/лабораторних робіт від професійних неурядових організацій, науково-дослідних інститутів (НДІ), підприємств та університетів у рамках проекту ERASMUS+ DIGITRANS «Цифрова трансформація освітнього процесу вищих навчальних закладів в Україні та Молдові для сталої взаємодії з підприємствами»
This questionnaire was developed within the framework of the DIGITRANS project - deliverable D1.3 Studies and Report on curricula, needed to the labour market of Ukraine and Moldova - in order to receive additional feedback from stakeholders: professional non-governmental organizations, scientific -research institutes, enterprises and universities of Moldova and Ukraine in order to obtain a more complete analysis of the labor market. Objectives of this survey: • Review of existing educational programs and training plans for specialists in the direction of digitization; • Clarification (awareness) of the requirements that employers (research institutes/enterprises/universities) put forward for training and qualification programs for graduates of practice-oriented bachelor's/master's degrees in the direction of digitalization. Based on these input data, each Moldovan and Ukrainian university will create a matrix of competencies and a profile of the necessary specialists in the direction of	Ця анкета була розроблена в рамках проекту DIGITRANS - результат D1.3 Дослідження та звіт про навчальні програми, необхідні ринку праці України та Молдови - з метою отримання додаткового зворотного зв'язку від зацікавлених сторін: професійних неурядових організацій, науково-дослідних інститути, підприємства та університети Молдови та України з метою отримання більш повного аналізу ринку праці. Цілі цього опитування: • Перегляд існуючих освітніх програм та планів підготовки фахівців у напрямку цифровізації; • Уточнення (усвідомлення) вимог, які роботодавці (НДІ/підприємства/університети) висувають до програм підготовки та підвищення кваліфікації випускників практико-орієнтованого бакалавра/магістра напряму цифровізації. На основі цих вхідних даних кожен молдовський та український університет створить матрицю компетенцій та профіль необхідних спеціалістів у напрямку цифровізації освіти. Звіт з аналізом

digitalization of education. A report analyzing the results of the survey will be submitted to the MC. Workshop 2 will be held in Athens to discuss and develop the conclusions of the report, which will be used for curricula, curricula, didactic materials. The survey data will be used in the universities of Moldova and Ukraine to clarify educational plans and syllabi of training programs of courses/laboratory work aimed at training engineering-oriented personnel (bachelor's and master's students) for high technologies and science in the fields of digital electrical engineering, electric mobile transport, computer technologies, etc.	результатів опитування буде подано до МК. Семінар 2 відбудеться в Афінах для обговорення та розробки висновків звіту, які будуть використані для навчальних планів, навчальних планів, дидактичних матеріалів. Дані опитування будуть використані в університетах Молдови та України для уточнення навчальних планів і навчальних програм курсових/лабораторних робіт, спрямованих на підготовку інженерно-орієнтованих кадрів (бакалаврів і магістрів) для високих технологій і науки в галузі цифрових технологій. електротехніка, електромобільний транспорт, комп'ютерні технології та ін.

N	***Question* /Запитання**	***Justification and notes* /Примітки, пояснення**
1	*What is your area of professional activity?* Яка сфера Вашої професійної діяльності? ☐ science (наука, дослідження) ☐ education (освіта) ☐ production of high-tech products (виробництво high-tech продукції) ☐ other (denote) (інше)	
2.	*Have you had previous or current experience training in digitalization area.?* Чи був у вас попередній або поточний досвід навчання у сфері діджиталізації? ☐ yes /так ☐ no / ні *When you answer is "yes", indicate the direction of preparation* / Якщо відповідь «так», опишіть свій досвід	
3.	*Have you had previous or current work experience in scientific projects in digitalization area.?* Чи мали у вас попередній або поточний досвід роботи в наукових проектах у сфері діджиталізації? ☐ yes / так ☐ no / ні *If you answer is "yes," please specify the scientific direction, applied direction of what?* / У разі відповіді «так» вкажіть: науковий напрям, прикладний напрям	

If possible, could you please give us more information about your experience?
Чи могли б ви надати нам більше інформації про свій професійний досвід?

Experience in teaching (Досвід викладання): 3-7 year/ 7-15 year / 15-20 year / >20 year
Experience in science (Досвід наукової діяльності): 3-7 year / 7-15 year / 15-20 year / >20 year
Experience in production (Досвід виробничої діяльності): 3-7 year / 7-15 year / 15-20 year / >20 year

PART 2 / ЧАСТИНА 2 *Questions by courses/laboratory work study programs* / Питання за програмами курсів/лабораторних робіт				
N	***Question* /Запитання**	**1**	**2**	***Justification and notes /Примітки, пояснення***
1	*Do you support the inclusion of such a discipline in the specified educational program: 1- «Yes», 2- "No"? (If you answer is "No," please justify your answer)* Чи підтримуєте Ви включення такої дисципліни у вказану освітню програму: *1- «Так», 2- «Ні»* (Якщо відповідь «Ні» – обґрунтуйте відповідь)			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			
	Systems on Chip / Системи на чіпі			
	Design of Digital Devices / Проектування цифрових пристроїв			
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем			
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			
2	*Which block should this course be assigned to: 1 - selected, 2 -mandatory?* *Чи згодні ви з віднесенням дисципліни до вказаного блоку дисциплін: 1 – вибіркові, 2 – обов'язкові*?			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			
	Systems on Chip / Системи на чіпі			

	Design of Digital Devices / Проектування цифрових пристроїв			
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем			
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			
3	*In your opinion, what should be the percentage distribution of theoretical and practical training in this course 1- theoretical, 2 -practical?* *Яким на ваш погляд повинен бути розподіл теоретичної та практичної підготовки з даної дисципліни у відсотках: 1 – теортетична, 2 - практична?*			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			
	Systems on Chip / Системи на чіпі			
	Design of Digital Devices / Проектування цифрових пристроїв			
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем			
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			

	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			
4	For each of the courses, its program should be aimed at the following (several options can be chosen): *1- «Yes», 2- "No"?* Для кожної дисципліни, її програма повинна бути спрямована нв (можна обрати декілька варіантів): *1- «Так», 2- «Ні»*?			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем • formal use of knowledge (формальне використання знань) • development of critical thinking skills (розвиток критичного мислення) • use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) • development of practical experience and skills (розвиток практичного досвіду та навичок) • development of new competencies (розвиток нових компетентностей) • development of independent thinking (розвиток самостійності мислення) • development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) • other (інше)			
	Systems on Chip / Системи на чіпі • formal use of knowledge (формальне використання знань) • development of critical thinking skills (розвиток критичного мислення) • use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) • development of practical experience and skills (розвиток практичного досвіду та навичок) • development of new competencies (розвиток нових компетентностей)			

	• development of independent thinking (розвиток самостійності мислення) • development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) • other (інше)			
	Design of Digital Devices / Проектування цифрових пристроїв • formal use of knowledge (формальне використання знань) • development of critical thinking skills (розвиток критичного мислення) • use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) • development of practical experience and skills (розвиток практичного досвіду та навичок) • development of new competencies (розвиток нових компетентностей) • development of independent thinking (розвиток самостійності мислення) • development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) • other (інше)			
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем • formal use of knowledge (формальне використання знань) • development of critical thinking skills (розвиток критичного мислення) • use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) • development of practical experience and skills (розвиток практичного досвіду та навичок) • development of new competencies (розвиток нових компетентностей) • development of independent thinking (розвиток самостійності мислення)			

	• development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) • other (інше)			
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій • formal use of knowledge (формальне використання знань) • development of critical thinking skills (розвиток критичного мислення) • use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) • development of practical experience and skills (розвиток практичного досвіду та навичок) • development of new competencies (розвиток нових компетентностей) • development of independent thinking (розвиток самостійності мислення) • development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) • other (інше)			
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів • formal use of knowledge (формальне використання знань) • development of critical thinking skills (розвиток критичного мислення) • use of methods of cause-and-effect analysis (використання методів причинно-наслідкового аналізу) • development of practical experience and skills (розвиток практичного досвіду та навичок) • development of new competencies (розвиток нових компетентностей)			

	• development of independent thinking (розвиток самостійності мислення) • development of the ability for non-standard approaches in solving problems and making decisions (розвиток здатності до нестандартних підходів у вирішенні проблем і прийнятті рішень) • other (інше)			
5	For each of the courses, its program should be aimed at the following (several options can be chosen): *1- «Yes», 2- "No"?* Для кожної дисципліни, її програма повинна бути спрямована нв (можна обрати декілька варіантів): *1- «Так», 2- «Ні»*?			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем • testing (тестування) • control works (контрольні роботи) • writing essays (творчі проектні роботи) • workshops (майстеркласи, практичні завдання) • additional (specify, which)			
	Systems on Chip / Системи на чіпі • testing (тестування) • control works (контрольні роботи) • writing essays (творчі проектні роботи) • workshops (майстеркласи, практичні завдання) • additional (specify, which)			
	Design of Digital Devices / Проектування цифрових пристроїв • testing (тестування) • control works (контрольні роботи) • writing essays (творчі проектні роботи) • workshops (майстеркласи, практичні завдання) • additional (specify, which)			
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			

	Electrical Circuit Design / Проектування електричних схем • testing (тестування) • control works (контрольні роботи) • writing essays (творчі проектні роботи) • workshops (майстеркласи, практичні завдання) • additional (specify, which)			
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій • testing (тестування) • control works (контрольні роботи) • writing essays (творчі проектні роботи) • workshops (майстеркласи, практичні завдання) • additional (specify, which)			
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів • testing (тестування) • control works (контрольні роботи) • writing essays (творчі проектні роботи) • workshops (майстеркласи, практичні завдання) • additional (specify, which)			
6	*Can your organization facilitate practical training in the specified discipline: 1- «Yes», 2 – "No"?* *Чи може ваша організація сприяти практичній підготовці за вказаною дисципліною: 1- «Так», 2- «Ні»?*			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			
	Systems on Chip / Системи на чіпі			

	Design of Digital Devices / Проектування цифрових пристроїв			
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем			
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			
7	*Is your organization interested in specialists in the field of discipline: 1- «Yes», 2 -" No"?* *Чи зацікавлена ваша організація у фахівцях з напряму дисципліни: 1- «Так», 2- «Ні»?*			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			
	Systems on Chip / Системи на чіпі			
	Design of Digital Devices / Проектування цифрових пристроїв			
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем			
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			

	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			
8	*What information resources, in your opinion, should be included in the teaching of this discipline? (Please, answer in the notes)* Які інформаційні ресурси, на вашу думку, слід долучити до викладання даної дисципліни? (,будь ласка, надайте відповідь у примітках)			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			
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	Design of Digital Devices / Проектування цифрових пристроїв			
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем			
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			
9	*The study of which software and hardware tools should be included for this discipline? (Please, answer in the notes)* *Вивчення яких програмних та апаратних засобів бажано включити для даної дисципліни? (Будь ласка, надайте відповідь у примітках)*			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			
	Systems on Chip / Системи на чіпі			
	Design of Digital Devices / Проектування цифрових пристроїв			

	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем			
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			
10	*In your opinion, what is the importance of this course? (Please, answer in the notes)* У чому, на вашу думку, полягає важливість цієї дисципліни? *(Будь ласка, надайте відповідь у примітках)*			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			
	Systems on Chip / Системи на чіпі			
	Design of Digital Devices / Проектування цифрових пристроїв			
	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electrical Circuit Design / Проектування електричних схем			
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			

11	*Emphasize 3 main points that you consider the most important for mastering this course: (Please, answer in the notes)* Визначить 3 основні моменти, які ви вважаєте найважливішими для опанування цієї дисципліни: *(Будь ласка, надайте відповідь у примітках)*			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			
	Systems on Chip / Системи на чіпі			
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	bachelor's program "Telecommunications and Radio Engineering" / бакалаврській програмі «Телекомунікації та радіотехніка»			
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	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			
12	*Do you have any suggestions for the implementation of this course? (Please, answer in the notes)* Чи є у вас пропозиції щодо впровадження даної дисципліни? *(Будь ласка, надайте відповідь у примітках)*			
	bachelor's program "Computer Engineering" / бакалаврській програмі «Комп'ютерна інженерія»			
	Microcontroller Systems Programming / Програмування мікроконтролерних систем			
	Systems on Chip / Системи на чіпі			
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	Electrical Circuit Design / Проектування електричних схем			
	master's program "Telecommunications and Radio Engineering" / магістерській програмі «Телекомунікації та радіотехніка»			
	Digital Systems of Telecommunications / Цифрові системи телекомунікацій			
	bachelor's program "Electronics of robotic systems and complexes" / бакалаврській програмі «Телекомунікації та радіотехніка»			
	Electronics of robotic systems and complexes / Електроніка робототехнічних систем і комплексів			