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**Erasmus+ KA2**

## **Capacity Building in Higher Education**

**«Development of practically-oriented student-centred education in  
Cyber-Physical Systems modelling» «CybPhys»**

**Official number: 609557-EPP-1-2019-1-LV-EPPKA2-CBHE-JP**

**WP 2/WP 5: Feedback from the stakeholders on new and modernized  
courses**

**Presented by:  
Professor Andrii Hnatov**

**Meeting 25.11.2022**



## KA2: «CybPhys»

### Acceptance of new study programs and courses

## KhNAHU: 2 new and 4 modernized courses

University	Course/Lab title	Updated or totally new	Level (Bachelor, Master)	ECTS credit points	The teaching/training methodologies developed/adopted	The link to the university' webpage	Date of accreditation	The status / document of accreditation
KhNAHU	Energy-saving technologies in transport	New	Master	8,5	Lecture, practicals, lab practicals	<a href="http://dl.khadi.kharkov.ua/course/view.php?id=1331">http://dl.khadi.kharkov.ua/course/view.php?id=1331</a>	autumn 2022	Completed, autumn 2022
KhNAHU	The structure of hybrid and electric vehicles	New	Master	4	Lecture, lab practicals	<a href="https://dl.khadi.kharkov.ua/course/view.php?id=1630">https://dl.khadi.kharkov.ua/course/view.php?id=1630</a>	autumn 2022	Completed, autumn 2022
KhNAHU	Electric systems of environmentally friendly vehicles	Updated	Master	4	Lecture, lab practicals	<a href="http://dl.khadi.kharkov.ua/course/view.php?id=1356">http://dl.khadi.kharkov.ua/course/view.php?id=1356</a>	autumn 2022	Completed, autumn 2022
KhNAHU	Methods of planning scientific research on vehicles	Updated	Master	5,5	Lecture, practicals, lab practicals	<a href="https://dl.khadi.kharkov.ua/course/view.php?id=1363">https://dl.khadi.kharkov.ua/course/view.php?id=1363</a>	autumn 2022	Completed, autumn 2022
KhNAHU	Mathematical modelling and methods of optimization	Updated	Master	3	Lecture, lab practicals	<a href="https://dl.khadi.kharkov.ua/course/view.php?id=1733">https://dl.khadi.kharkov.ua/course/view.php?id=1733</a>	autumn 2022	Completed, autumn 2022
KhNAHU	Intelligent information technologies and systems in transport	Updated	Master	8,5	Lecture, practicals, lab practicals	<a href="http://dl.khadi.kharkov.ua/course/view.php?id=1357">http://dl.khadi.kharkov.ua/course/view.php?id=1357</a>	autumn 2022	Completed, autumn 2022



## KA2: «CybPhys»

### List of scientific, academic staff and employers who took part in the survey

Number	Scientific and academic staff	Company	Industry	Position
1	Arhun Sh.	KhNAHU	Education	Professor
2	Bagach R.	Kharkiv State Polytechnic College	Education	Lecturer
3	Borysenko A.	KhNAHU	Education	Docent
4	Nechaus A.	KhNAHU	Education	Docent
5	Smirnov O.	KhNAHU	Education	Professor
6	Trunova I.	KhNAHU	Education	Docent
7	Yagup V.	KhNAHU	Education	Professor
<b>Employers</b>				
1	Biletsky S.	Alfa Diamant LLC	Transport	Deputy Director of Alfa Diamant LLC
2	Valkovsky O.	NMU "ELECTROPIVDENMONTAJ" LLC	Electric power industry	Head of NMU "ELECTROPIVDENMONTAJ" LLC
3	Gladun E.	SUZUKI "Technician-Center" car showroom	Transport	Director of the SUZUKI "Technician-Center" car showroom
4	Hubatiuk O.	LIMITED LIABILITY COMPANY AKRIS LOGISTICS	Transport	Head of Akris Logistics LLC
5	Latvinskyi V.	LIMITED COMPANY PAPER CUPS (PAPER CUPS)	Trading	PC operator "Paper Kaps" LLC
6	Rep'evskyi I.	"Avtodom Kharkiv" LLC	Transport	Standardization and quality engineer
7	Sarajev O.	Individual entrepreneur Saraev O.V	Transport	Individual entrepreneur Saraev O.V
8	Sokhin P.	Elcars	Transport	Owner of the company "Elcars"
9	Ulianets O.	Beetroot	IT	HR-manager



## KA2: «CybPhys»

### The results of processing Scientific and academic staff questionnaires, Part 1

**PART 1 Please give detailed answers to the following questions concerning the developed curricula in the specialties**

N	Question	Yes	No	Justification and notes
1	<b>What is your area of professional activity?</b> <input checked="" type="checkbox"/> science – <b>28,6%</b> <input checked="" type="checkbox"/> education – <b>100%</b> <input type="checkbox"/> other (denote)			Energy-saving technologies in transport/
2	<b>Have you had any previous or current experience in training specialists in the area of Cyber-Physical Systems (such as Automation, Computer Sciences, Cybernetics, IoT, AI, etc.)?</b> <input checked="" type="checkbox"/> yes <input type="checkbox"/> no When you answer is "yes", indicate the direction of preparation	<b>85,7%</b>	<b>14,3%</b>	I have experience in teaching disciplines in the field of intellectual information and technical systems. I have experience in teaching disciplines in the field of automation and automatic control systems. I have experience in teaching disciplines in the field of automation, cybernetics and teleautomation. I have experience in teaching disciplines in the field of automation, computer science and automatic control systems
3	<b>Have you had any previous or current work experience in the area of Cyber-Physical Systems (Automation, Computer Sciences, Cybernetics, IoT, AI, etc.)?</b> <input type="checkbox"/> yes <input checked="" type="checkbox"/> no If you answer is "yes," please specify the scientific direction, applied direction of what?	<b>14,3%</b>	<b>85,7%</b>	I have experience in maintenance and adjustment of automatic systems of electrical systems of autonomous objects

## KA2: «CybPhys»

### The results of processing scientific and academic staff questionnaires, Part 2

	Question	Yes	No
<b>1</b>	<b>Do you agree with the content of the training material in the program of this discipline or laboratory work</b>		
	Energy-saving technologies in transport	28,6%	71,4%
	The structure of hybrid and electric vehicles	57,1%	42,9%
	Electric systems of environmentally friendly vehicles	42,9%	57,1%
	Methods of planning scientific research on vehicles	85,7%	14,3%
	Mathematical modelling and methods of optimization	85,7%	14,3%
	Intelligent information technologies and systems in transport	100 %	-
<b>2</b>	<b>Do you have any suggestions for further improvement of this discipline?</b>		
	Energy-saving technologies in transport	42,9%	57,1%
	The structure of hybrid and electric vehicles	42,9%	57,1%
	Electric systems of environmentally friendly vehicles	14,3%	85,7%
	Methods of planning scientific research on vehicles	14,3%	85,7%
	Mathematical modelling and methods of optimization	71,4%	28,6%
	Intelligent information technologies and systems in transport	-	100%

## KA2: «CybPhys»

### The results of processing employers' questionnaires, Part 2

1	Question	Yes	No
	<b>Do you think that the proposed list of laboratory and practical works will help to develop all practical competence, declared by the discipline program?</b>		
	Energy-saving technologies in transport	88,9%	11,1 %
	The structure of hybrid and electric vehicles	88,9%	11,1 %
	Electric systems of environmentally friendly vehicles	88,9%	11,1 %
	Methods of planning scientific research on vehicles	100 %	-
	Mathematical modelling and methods of optimization	66,7 %	33,3 %
	Intelligent information technologies and systems in transport	55,6 %	44,4 %
2	<b>Do you have any suggestions for changing the list of lectures laboratory and practical works?</b>		
	Energy-saving technologies in transport	33,3 %	66,7 %
	The structure of hybrid and electric vehicles	22,2 %	78,8 %
	Electric systems of environmentally friendly vehicles	22,2 %	78,8 %
	Methods of planning scientific research on vehicles	-	100 %
	Mathematical modelling and methods of optimization	-	100 %
	Intelligent information technologies and systems in transport	44,4 %	55,6 %
3	<b>Do you have any recommendations for using specialized software for laboratory works?</b>		
	Energy-saving technologies in transport	11,1 %	88,9 %
	The structure of hybrid and electric vehicles	22,2 %	78,8 %
	Electric systems of environmentally friendly vehicles	22,2 %	78,8 %
	Methods of planning scientific research on vehicles	11,1 %	88,9 %
	Mathematical modelling and methods of optimization	33,3 %	66,7 %
	Intelligent information technologies and systems in transport	55,6 %	44,4 %

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### Conclusions

**A general recommendation for all courses from the scientific and academic staff** is to consider the possibility of adding practice in production, as well as expanding the list of practical and laboratory work for the relevant courses. **At the same time, employers offered** to conduct practical and laboratory classes in production, in service station conditions. This allows students to acquire skills in working with real equipment and significantly reduces, or even removes, the time for retraining and adaptation of a specialist at the start of his work. Also, it should be noted that this approach leads to **a double win situation**. One of the elements in the accreditation of an educational program is cooperation with employers, internships at employers' enterprises and conducting any types of classes by employers. Therefore, the implementation of the specified recommendations in the educational process will **contribute to the improvement of its quality**. Also, such master program becomes **attractive for the labor market** and, accordingly, for the applicant at the stage of its selection.

**The feedback received from academic staff and employers is a very important and necessary element** in ensuring the quality of the educational process for the specialty **"Electric Power Engineering, Electrical Engineering and Electromechanics"** under the master program **"Electric Vehicles and Energy-Saving Technologies"**. The recommendations received will be considered at a meeting of the **Vehicle Electronics Department**, which is the graduating (main) department in this specialty. Based on the results of this meeting, appropriate changes will be made to the courses, which will improve the quality of education and make the Master's program **"Electric Vehicles and Energy-Saving Technologies"** even more relevant to the labor market in the field of electrical engineering and transport.

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