



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: Development and modernizing of curricula

Development, testing and accreditation of newly developed and modernized courses

Leader: Kharkiv National Automobile and Highway University

Presented by:

Professor Andrii Hnatov

Meeting 25.11.2022

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- 2.1. Development curricula and study programs for education. Teaching materials for the bachelor- and master-students study programs and courses. (14.08.2021) Completed
- 2.2. Teaching staff training on curricula topics. Students training on curricula topics. (14.11.2021.) In-progress (Extended due to the war in Ukraine.)
- 2.3. Teachers training on professional English languages skill. (14.11.2020.) Completed
- 2.4. Workshops for curricula and study programs development: WS2 WS9. (14.11.2022) In-progress (Extended due to the war in Ukraine.)
- 2.5. Curricula accreditation in the universities and Accreditation offices of PCs. (30.06.2021.) In-progress (Extended due to the war in Ukraine. Postponed to 2023 by the decision of the Ministry of Education of Ukraine)
- 2.6. Testing and validation of the developed education programs, courses and lab practices. (14.06.2022) Completed
- 2.7. Tuning of curricula and study programs in PCs universities. (14.11.2022) In-progress (Extended due to the war in Ukraine.)
- 2.8. Measuring of a feedback of stakeholders. (14.08.2022) Completed
- 2.9. Double Degree Master program development and accreditation. (14.08.2022) In-progress (RTU and KhNAHU start preparation for The student admission. Extended due to the war in Ukraine.)

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Acceptance of new study programs and courses

CPNU: 5 new and 2 modernized courses



New: master degree courses in the new master program "Industrial Automation". The program will be accredited by the Education and Science of Ukraine.

- Model-oriented control in Digital Manufacturing
- Programming of Automation Systems
- Design and Simulation of Power electronics components
- Modelling and Measurement of physical processes in Robotics.
- Simulation of Manufacturing Environment

Updated courses in the existing Bachelor program "Computer systems of automation"

- ➤ Introduction to electronic systems
- Development of electromechanical robotic systems.



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Acceptance of new study programs and courses

CPNU: 5 new and 2 modernized courses



University	Course/Lab title	Updated or totally new	Level (Bachelor, Master)	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' webpage	Date of accreditation	The status / document of accreditation
CITYO	Model-oriented control in Digital Manufacturing	New	Master	5	training methodologies developed ,	https://stu.cn.ua/wp- content/uploads/2021/ 04/new-courses20- 1.pdf	April 27,/2020	Accreditation of the specialty "Computer engineering", master level. Certificate of accreditation series ND № 2685401 from June 27, 2017. The certificate is valid until July 1, 2024
CPNU	Programming of Automation Systems	New	Master	5	teaching		_"_	_"_
CPNU	Design and Simulation of Power electronics components	New	Master	5	training methodologies developed	_"_	_"_	
CPNU	Modelling and Measurement of physical processes in Robotics	New	Master	5	teaching	_"_	_"_	
	Simulation of Manufacturing Environment	New	Master	5	training methodologies developed	_"_	_"-	_"_
CPNU	Introduction to electronic systems	Updated	Bachelor	6	adopted	_"_	Marth 25,/2019	Accreditation of the specialty "Electronics", bachelor level. Certificate of accreditation series ND № 2687200 from July 31, 2017. The certificate is valid until July 1, 2024
CITO	Development of electromechanical robotic systems	Updated	Bachelor	4	adopted	-"-	_"_	-"-



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Acceptance of new study programs and courses

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KhNAHU: 2 new and 4 modernized courses

To develop 2 new training courses for master's students program "Electric Vehicles and Energy-Saving Technologies". The program will be accredited by the Education and Science of Ukraine.

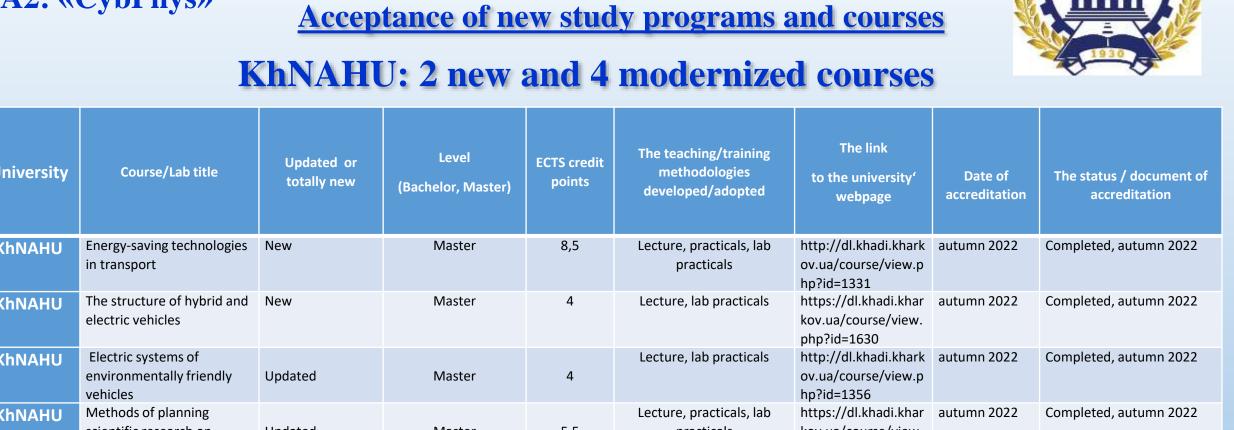
- Energy-saving technologies in transport;
- > The structure of hybrid and electric vehicles;

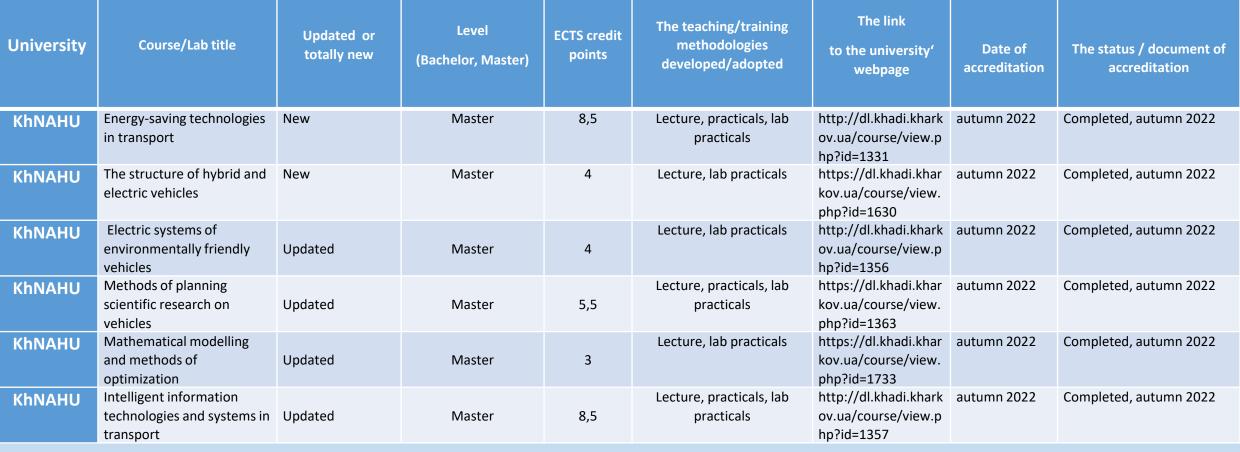
4 training courses will be upgraded and renewed for Master's students in "Electric Vehicles and Energy-Saving Technologies":

- > Electric systems of environmentally friendly vehicles;
- Methods of planning scientific research on vehicles;
- Mathematical modelling and methods of optimization;
- > Intelligent information technologies and systems in transport.



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Kharkiv National Automobile and Highway University

Acceptance of new study programs and courses

KNU: 3 new and 4 modernized courses



New: master degree

- > Smart manufacturing based on cyber-physical systems
- ➤ Machine Learning for Cyber Physical Systems and Industry
- > Transportation Cyber-Physical Systems

Updated master degree: Training courses will be upgraded and renewed for Master's students in "Cyber-physical systems" and "Automobiles and Fleet".

- Project approach to the designing of cyber-physical systems
- Adaptive and Robust Systems
- Open-Pit Transport Cyber-Physical Systems
- ➤ Modern Information Technologies in Transport





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Acceptance of new study programs and courses



KNU: 3 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
NI CO	Smart manufacturing based on cyber- physical systems	new	Master (mandatory)	8	Discipline teaching plan, syllabus, lectures, distant learning materials	https://classroom.google.com/c/MjU0NjlyMzc2NjU5?cjc=i4jbi5l	Autumn 2022	Approval protocols: - №8 from 09.02.21 – Department of Automatiom, Computer Scienses and Technologies - №7 from 22.02.21 – Faculty of international Technologies - №7 from 23.02.21 Academic Council of KNU. Order №109 from 24.02.21 on the implementation of the Stydy Programm and teaching plans
	Machine Learning for Cyber Physical Systems and Industry	new	Master (mandatory)	6	Discipline teaching plan, syllabus, lectures, distant learning materials	https://classroom.google. com/c/NDAwNjE0Mzg4M TYw?cjc=s2lfpam		Approval protocols: - №8 from 09.02.21 – Department of Automatiom, Computer Scienses and Technologies - №7 from 22.02.21 – Faculty of international Technologies - №7 from 23.02.21 Academic Council of KNU. Order №109 from 24.02.21 on the implementation of the Stydy Programm and teaching plans
KNU	Transportation Cyber-Physical Systems	new	Master (variable)	8	Discipline teaching plan, syllabus, lectures, distant learning materials	https://classroom.google. com/c/NDI2MjU0MDAxM Tkx?cjc=chhhhvg	Autumn 2022	Approved by ACST dep. #1 from 25.08.21
KNU	Open Pit Intelligent Transportation System	updated	Master (variable) Bachelor (variable) for specialty 275 – Transportation technologies (on road transport)	8	discipline curriculum, syllabus, lectures	https://classroom.google. com/c/NDI2MjM5ODI0M zI3?cjc=swvawpr		Approved by ACST dep. #1 from 25.08.21 Approved by KNU authorities prot #7 from 14.05.2020

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Acceptance of new study programs and courses

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KNU: 3 new and 4 modernized courses

University	Course/Lab title	Updated or totally new	Level (Bachelor, Master 5-year course)	ECTS credit points	The teaching/training methodologies developed/adopted	The link to the university' webpage	Date of accreditation	The status / document of accreditation
KNU	Modern Information Technologies in Transport		Master (variable) Bachelor (variable) for specialty 275 – Transportation technologies (on road transport)		discipline curriculum, syllabus, lectures	https://classroom.google. com/c/NDAyNzc1ODk0M zM1?cjc=2sbxy6v	Autumn 2022	Approved by ACST dep. #1 from 25.08.21 Approved by KNU authorities prot #7 from 14.05.2020
KNU	Adaptive and Robust Systems	updated	Master (mandatory)		Discipline teaching plan, syllabus, lectures, distant learning materials	https://classroom.google. com/u/1/c/MjI0NDQ4Mj U3MTg3	Autumn 2022	Approval protocols: - №8 from 09.02.21 – Department of Automatiom, Computer Scienses and Technologies - №7 from 22.02.21 – Faculty of international Technologies - №7 from 23.02.21 Academic Council of KNU. Order №109 from 24.02.21 on the implementation of the Stydy Programm and teaching plans
KNU	Project Approach to the Designing of Cyber-Physical Systems	updated	Master (variable)		Discipline teaching plan, syllabus, lectures, distant learning materials	https://classroom.google.com/u/1/w/MjI0MTE5Mjg1MTg3/t/all		Approval protocols: - №8 from 09.02.21 – Department of Automatiom, Computer Scienses and Technologies - №7 from 22.02.21 – Faculty of international Technologies - №7 from 23.02.21 Academic Council of KNU. Order №109 from 24.02.21 on the implementation of the Stydy Programm and teaching plans



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Double Diploma Master Program between Riga Technical University and

Kharkiv National Automobile and Highway University

An agreement was signed between Riga Technical University and Kharkiv National Automobile and Highway University on the introduction of a double degree diploma in the educational process of the master's degree program "Electric Vehicles and Energy-Saving Technologies" (within 141 specialties "Electric Power, Electrical Engineering and Electromechanics").







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Laboratory of Energy-saving technologies in transport

The lab "Laboratory of Energy-saving technologies in transport" was created.

















Arrangements for testing of new developed and modernized courses

УНІВЕРСИТЕТ ФАКУЛЬТЕТИ	ОСВІТА НАУКА	АБІТУРІЄНТАМ СТУДЕНТУ МІЖНАРОДНА ДІЯЛЬНІСТЬ ERASMUS+ ONLINE						
НАВЧАЛЬНИЙ ВІДДІ	л	Анкетування						
науково-методич	НА РАДА	АНКЕТИ						
КАТАЛОГ ОСВІТНІХ Г	ТРОГРАМ	Анкета опитування випускників освітніх програм						
КАТАЛОГ ВИБІРКОВИ ДИСЦИПЛІН	ıχ	Анкета опитування роботодавців РЕЗУЛЬТАТИ ОПИТУВАНЬ						
відкриті освітні ра	ЕСУРСИ	Результати опитування роботодавців за освітньо-професійною програмою «Транспортні системи і логістика» для здобувачів другого (магістерського) рівня вищої освіти за спеціальністю 275 «Транспортні технології (на						
ДИСТАНЦІЙНЕ НАВЧ	RННА	автомобільному транспорті)» Результати опитування здобувачів вищої освіти ХНАДУ щодо задоволеності якістю викладання освітніх компонентів на освітній програмі «Автоматизоване управління технологічними процесами» за спеціальністю 151 «Автоматизація та комп'ютерно-інтегровані технології» другого (магістерського) рівня вищої освіти у 2021/2022 н.р. Результати опитування роботодавців за освітньою програмою «Автоматизоване управління технологічними						
НАВЧАЛЬНІ ЦЕНТРИ								
АСПІРАНТУРА ТА ДОКТОРАНТУРА								
ВІДДІЛ АКРЕДИТАЦІ СТАНДАРТИЗАЦІЇ ТА		процесами» за спеціальністю 151 «Автоматизація та комп'ютерно-інтегровані технології» другого (магістерського) рівня вищої освіти						
UABIIAUUG		Результати опитурация випусуции iв XHA ПV за освітньою програмою «Автоматизоване управління						

It is proposed to develop additional courses on behalf of «CybPhys»

The KhNAHU team is ready to:

<u>Develop 1 course for PhD Level</u>, Specialty 141 "Electric Power, Electrical Engineering and Electromechanics":

- Progressive technologies in road transport 4 ECTS credit.
- Modernize 4 courses for bachelor level, Specialty 141 "Electric Power, Electrical

Engineering and Electromechanics":

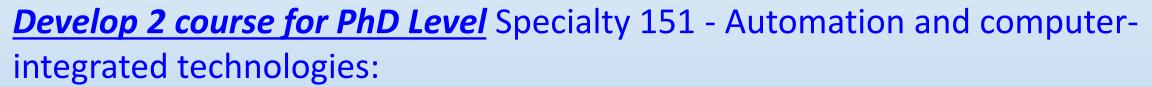
- Electric drive theory 11 ECTS credit;
- Electronics and integrated circuits 15 ECTS credit;
- Electrical machines 5 ECTS credit;
- ➤ Electrical engineering, electronics and microprocessor technology 9.5 ECTS credit.

Kryyyi Rih National University

It is proposed to develop additional courses

on behalf of «CybPhys»

The KNU team is ready to:



- Cloud computing in cyber-physical systems;
- > Intelligent control systems for cyber-physical systems.

Develop 1 discipline for master's level, Specialty 274 - Road transport

Transport systems of big cities.

It is proposed to develop additional courses on behalf of «CybPhys»

The CPNU team is ready to:

Develop for master's level, Specialty "Computer engineering and Industrial Automation"

1 new course:

- Modern methods and technologies of data processing 5 credits; 1 Modernised course:
- > Design of embedded computer systems 5 credits.

Develop for bachelor level, Specialty "Computer systems of artificial intelligence"

- 3 new courses:
- > Neural networks and evolutionary computations 3 credits;
- Data mining 4 credits;
- > Theory of statistical solutions 4 credits.
 - 1 Modernised course:
- > Systems modeling 5 credits.

Development of E-books

- 1. Bringing innovations to the market (leader RTU).
- 2. Mathematical Modelling of Mechatronic Systems (leader –KU Leuven).
- 3. Model-oriented control in Intelligent Manufacturing Systems (leader CPNU). _RTU Publishing House is processing electronic text books electronic issue
- 4. Modern Mathematical Physics: Fundamentals and Application (leader BSU).
- 5. High-Performance Scientific Computing and Data Analysis (leader BSU).
- 6. Cyber-Physical Systems modelling and simulation (leader UCY). _RTU Publishing House is processing electronic text books electronic issue
- 7. Cyber-Physical Systems for Clean Transportation (leader KhNAHU). _RTU Publishing House is processing electronic text books electronic issue
- 8. Control methods for critical infrastructures and IoT interdependencies analysis (leader RTU).
- 9. Computer modelling of physical processes (leader MSPU).

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Linkedin

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