

ERASMUS +

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HIGHER EDUCATION CAPACITY BUILDING

Erasmus+ Project

**Crisis and Risks Engineering for Transport Services
(CRENG)**

Information Management Package

Recommendations and informational materials regarding implementation of project activities according to the Bologna Process principles and guidelines of European Education, Audiovisual and Culture Executive Agency

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Tab. 1. Project Activities incl. deadlines and distribution of responsibilities among consortium partners

№	Activities	Responsible:	Ref. №	Term of implementation (up to...)	Clarification notes
1	Each target university/organization has to develop its own internal plan of activities of the project.	P1, P5-13	1.1	15.12.2018	Assign responsible persons as a work group for the execution of each work package (WP1 – WP5 (Ref. 1.1. – 5.2.): See Tab. 2 and 10 Identify a project coordinator at the University, according to local conditions organize the project work group (under participation of university management, target departments /entities, representatives of teachers, students/graduate students, potential employers)
2	The analysis of current curricula in Program Countries (PC) Universities	P1, P6-13	1.1	20.12.2018	On the stage on CRENG project proposal development the list of recommended curricula for Master program CRENG was developed. This recommended curricula were chosen based on analysis of best EU practices on CRENG studying and information on current demand of labor market in PCs, provided by PC Universities (Ukraine, Azerbaijan, Turkmenistan). In order to make a final decision on content of Master Program “CRENG” and to distribute tasks among partners, please, compare current curricula in your University with recommended curricula on Master program CRENG. Draft of report will be developed by P7 and sent to participants till 01.12.2018,
4	Design and sign Agreement and guidelines on instructional strategies for MA program “CRENG” development	All partners	1.2.	31.03.2019	Draft of agreement will be prepared by P2 up to kick-off meeting
5	a) The EU Universities are responsible for the content/teaching materials of curricula. b) P1-P3 should develop and transmit draft content to the target universities (P5-P13) + teaching materials c) The seminar for presenting new curricula by P1-P3 to P5-P13 will be held	P1-P4	2.1	a) 30.04.2019 b) 30.04.2019 c) 15.05.2019	The lists of new subjects/courses see Tab. 4 The transfer of content/teaching materials will be carried out in 2 steps: 1. P2-P4 should prepare a list of topics for theoretical and practical/laboratory classes, curricula description for each disciplines incl. ECTS (Tab. 3), the list of the recommended teaching materials (literature, text books etc), presentations in .ppt for each of the topics, deliver all the materials to P5-P13. 2. Prepare draft of curricula descriptions of new core curricula and transferable modules inclusive innovative teaching/ learning facilities; develop syllabi –Tab. 3
6	a) Each target University (P5-P13) examines and adopts the received materials and develops on this basis their own courses, curricula, modules.	P5-P13	2.2	a) 30.04.2020 b) 30.04.2020 c) 30.07.2020 d) 30.07.2020	Select and appoint a leader/specialist for the development of the curricula in the university and teachers responsible for the development and introduction of new disciplines, courses and curricula. It is advisable to involve these teachers in training in European universities in 2019-2020.

	<p>b) Target universities should develop digital versions-drafts (.doc files) of their OWN manuals/text books/methodology incl. recommendations for students and teachers for each of the curricula/course/module</p> <p>c) For each developed/updated curriculum PCs universities will create e-learning course and update it to the MOODLE platform</p> <p>d) PCs universities should update existing curricula</p>				<p>All developed set of materials should be updated to the web-based platform, which will be created and on service from 15.11.2018 (see 4.2).</p> <p>New disciplines should be in accordance with the Bologna recommendations course description in English and national languages including the ECTS points (Tab. 3)</p> <p>It is recommended to introduce at least 20% of lessons /courses in English.</p>
7	<p>a) Accreditation of developed curricula in accordance with valid University rules.</p> <p>b) Accreditation at the national level.</p>	P6-P13	2.3	<p>a) 30.07.2020</p> <p>b) 30.09.2021</p>	<p>PCs Universities should appoint responsible persons for preparing set of documents for accreditation of new MA program “CRENG” on institutional and national levels. This person should be experienced in accreditation procedures and Bologna process.</p>
8	<p>a) Prepare a set of documentation for CRENG Labs and VCRs in each target universities</p> <p>a) Purchase the equipment incl. software; install the equipment</p>	P4-P13	2.4	<p>a) 01.09.2019</p> <p>b) 01.09.2020</p>	<p>The list of equipment and software was discussed with PCs universities of the stage of project preparation. This list will be approved at the kick-off meeting.</p> <p>Typical layout of the rooms and basic requirements to them will be given to the target universities by P4.</p> <p>The contact data of the responsible persons at the partner universities must be sent to P4.</p> <p>P5-P13 are responsible for the contracting, purchase and delivery of equipment.</p>
9	<p>a) Develop criteria for the selection of teachers to participate in trainings planned at EU universities</p> <p>b) Plan and carry out actions to prepare the selected candidates to participate in trainings including language training</p> <p>c) EU universities will develop training programs/schedule of trainings and inform target universities.</p> <p>d) Retrain academic teachers in new curricula incl. IPBL using innovative teaching/ learning facilities and agreed instructional strategies</p> <p>e) Conduct a seminar to share experience gained in the target universities will be conducted</p>	<p>a-b) P5-P13</p> <p>c-d) P1-P3</p> <p>e) P5-P13</p>	2.5	<p>a) 30.03.2019</p> <p>b) 30.05.2019</p> <p>c) 30.05.2019</p> <p>d) from 01.06.2019 till 30.08.2020</p> <p>e) 30.10.2019</p>	<p>Example of selection criteria: the age-not more than..., competences in English, experience in teaching - not less ..., Publications, own plan for future improvement.</p> <p>In EU universities 3 trainings for teachers are planned.</p> <p>2-3 teachers from each target University can participate in the trainings, i.e. total 6-7. A larger number of participants is possible on the basis of co-financing. Duration of trainings: from 10 till 14 days.</p> <p>IPBL (International project based learning) is a new teaching approach which will be established in P5-P13.</p> <p>In contrast to classical Project Based Learning, IPBL is teaching method in which students gain knowledge and skills by working for an extended period of time in international student groups to investigate and respond to an authentic, engaging and complex question, problem, or challenge. IPBL focused on global business problem solving, which is especially topical for CRENG. IPBL has additional advantages:</p>

					graduates will acquire global business communication and management skills, English learning in international groups will be provided. IPBL will force collaboration between EU and PCs HEIs. Recommendations for IPBL implementation will be developed by P7 and downloaded to WEB platform till 30.10.2019.
10	a) Developing guidelines of SW implementation in PCs universities b) Conducting webinars on SW for teachers c) Implementation of SW in PCs universities	a-b) P5 c) P5-P13	2.6	a) 30.09.2019 b) 30.11.2019 c) 30.01.2020	SW is a model which help future employees to acquire specific skills required for particular position. Skills wallet helps: universities and enterprises to become close; to increase employability of graduates; to make enterprises more flexible to implementation of innovations. Model of SW is created by P5. P5 will develop guidelines of SW implementation in PCs universities and conduct webinars for teachers. CRENG SOs will be responsible for SW implementation in PC universities (see 4.5).
11	Pilot teaching and operation of CRENG LABs and VCR	P5-P13	2.7	Start 01.09.2020	
12	a) Starting performance of demonstration master classes (MC) for new subjects/modules b) pilot operation of CRENG LABs and VCR	a) P1-P4, P5-P13 b) P5-P13	2.8	a) start: 01.09.2020 b)start: 30.03.2021	MCs are carried out in the form of demonstration lessons with students in the target universities. The MC will be conducted by professors from European universities, responsible for the content of the curricula. Participants of MC should be the teachers who received trainings in European universities. New technical equipment purchased in the frame of the project will be used during the MCs.
13	a) Develop and approve a package of organizational documents for CRENG SO creation in each target University. b) Each university should purchase and install equipment c) conduct training for employees of CRENG SO d) Establish CRENG SO	P1, P6-P13	2.9	a) 01.09.2019 b) 01.09.2019	a) Regulations of the structural division, job descriptions should be included in the organizational documents for CRENG SO. Learn more about CRENG SO (see Tab. 5 b) see c) responsible for organizing and conducting the training – P3 & P4
14	a) Development of quality assurance plan/strategy for the project b) Development of quality assurance plan in each university c) Development of recommendations for quality indicators for peer review of new curricula/courses d) Periodical survey of students (P5-P13 should prepare a questionnaire) in order to assess quality of	a) P4 b) P5-P13 c) P4 d) P1, P5-P13 f) P7	3.1	a) 15.12.2018 b) 15.01.2019 c) 31.03.2019 d) 31.03.2019	a) P4 is responsible b) On the basis of the project's QA plan to develop a QA plan in each of the universities. P5-P13 should create a quality group which will ensure high quality level of project implementation. c) P4 provides recommendations; P5-P13 organize peer review of updated/new courses d) Template/recommendations for a questionnaire will be provided by P4 e) consortium will define an external expert; the expert will work on sub-contract basis f) Responsible for content quality control is P7. P7 create content control group with representatives of qualified specialists. The

	<p>master classes; lectures during the pilot teaching</p> <p>e) External quality evaluation</p> <p>f) Content Quality control.</p>				<p>aim of Content control is to assure quality of teaching/ learning materials (its volume and relevance of information to the MA program topic, relevance of practical part of learning to purchased equipment etc.) and it's relevance to Bologna requirements. P7 will support/ consult PCs universities in all questions regarding curricula content development.</p>
15	<p>a) Develop a plan/strategy for dissemination and sustainability of the project</p> <p>b) Develop a plan for dissemination and sustainability of the project in each university, including activities on involving new participants in the project</p>	<p>a) P4</p> <p>b) P5-P13</p>	<p>4.1</p> <p>4.2</p>	<p>a) 01.12.2018</p> <p>b) 15.01.2019</p>	<p>Recommended components of the dissemination and sustainability plan of the project:</p> <ul style="list-style-type: none"> ✓ Each university should assign a “blogger”, who will responsible for the posting information about the project in the Internet ✓ Plan of publications (e.g.1 publication every 6 months). ✓ Schedule of local sustainability activities and dissemination of the project results (e.g.– one event per quarter). ✓ Plan of local and regional meetings. <p>It is recommended to use scheduled periodic internal and external events (meetings, conferences, various meetings).</p> <ul style="list-style-type: none"> ✓ Post information about participation in the project on the universities’ website (with a link to the project page) ✓ Post on social networks (Facebook): each university should create a page on Facebook dedicated to the project and post there regularly ✓ Consortium members must provide informational materials for posting on the website of the project. ✓ Partners should organize dissemination of leaflets about the project amongst students and teachers. ✓ Recommendations for the design of information materials about the project are given in Tab. 6
16	Web-Based platform updating	P1-P13	4.2	Throughout the project until 14.11.2021	<p>WEB based platform will be created by P3 supported. Information on the web-site will be provided in English. The main functions of website and WEB based platform in WP4 are: providing open access to information about the project, main projects events; charting; sharing information and recourses developed during the project with target groups inside and outside the consortium (according rules, presented in DEP); sharing information about CRENG Service Offices by providing links.</p>
17	<p>a) establishing, pilot operating of CRENG Service Offices network;</p> <p>b) signing “CRENG +” Agreement.</p>	<p>a) P5-P13</p> <p>b) P1, P4</p>	4.3	from 01.09.2020 and after the project	<p>a) The aims of CRENG Service Offices network are:</p> <p>1. Promote new teaching methodology International Project Based Learning (IPBL, see 2.5) and engage students from different PCs and EU in joined global oriented problems solving projects. For this purpose PCs and EU HEIs will propose topics for</p>

					<p>future projects, CRENG Service Offices will disseminate this information through the network, gather IPBL teams, conducts webinars and skype conference of IPBL projects participants.</p> <p>2. Provide integration to the global risks and crisis engineering community</p> <p>b) After establishing and networking of CRENG Service Offices CRENG + Agreement will be developed by P4 and signed by P1 and universities, enterprises, other organizations, which are not participants of the consortium, but interested in cooperation. CRENG + Agreement is dedicated to disseminate project results on providing links among PCs HEIs and enterprises and commercialization of projects results. CRENG + Agreement will be valid during 5 years after the end of the project. An Agreement will be signed with 45 organizations out of consortium.</p>
18	Conduct refresh courses for graduates	P5-P13	4.4	from 01.09.2020 and after the project	CRENG Service Offices will be responsible for planning, organization and quality control of refreshing courses for graduates (see Tab.5).
19	Promoting of Skills Wallet	P5-P13	4.5	from 01.09.2020 and after the project	<p>CRENG Service Offices of PCs universities will:</p> <ul style="list-style-type: none"> ✓ create a webpage of SW on PCs HEIs web site; ✓ conduct information seminars for students and training courses for academic teachers of PC HEIs; ✓ disseminate of information about vacancies provided by employers; ✓ be in touch with employers by conducting of information presentations, disseminate guidelines on SW, signing Career Support Agreement; ✓ negotiation with enterprises and academic teachers on SW modules content and evaluation of students skills.
20	Management of the project including project management online, daily project administration and coordination	P1, P6-P13	5.1	Throughout the project	Preparing documentation of the management events and activities of the project incl. preparation of minutes by the local coordinator.
21	Coordination meetings	All partners	5.1	Throughout the project	Development of meeting plan will be created every year (incl. international, regional and local meetings).
22	Monitoring and controlling of project activities: development of questionnaires for partner universities regarding project implementation	P1, P5-P13	5.1	<p>First template will be sent in 01.03.2019</p> <p>Reporting schedule: 01.04.2020 01.10.2020 01.04.2021 01.10.2021 01.04.2022 01.10.2022</p>	P4 will develop a questionnaire for each 6-month-period that partner universities should fill in until the given deadlines, reporting on the implementation of the project in the university. The complete reports should be sent back to P4.

23	Ensure using SKYPE to held meetings of the project consortium team.	All partners	5.1	Throughout the project	Local coordinators! Notify to ECM SKYPE nickname to arrange time and frequency of SKYPE conference. Skype meeting of local coordinators should be conducted every 3 months
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Tab 2. Recommendations regarding work groups

The first step for the organization of the project implementation is to form a project work group in every university.

According to the existing experience and recommendations of the national Erasmus+ office, a work group can consist of approximately 7-11 persons. The groups should be formed and approved until November-December 2018.

List of the participants of the work group should include:

- ✓ Coordinator + contact person of the project
- ✓ Academic leader responsible for the development and implementation of updated/new teaching modules/curricula/courses content of the project. Should have experience in these activities
- ✓ Teachers, who possess knowledge of the project themes
- ✓ Student representatives
- ✓ Representatives of the administration
- ✓ Representatives of employers interested in project results

Participants of the work group should possess competence, which respond to the requirements of the implementation of the project work plan. It is necessary to allocate responsibilities among the participants of the work group regarding the implementation of the activities of the project work packages, taking into consideration the deadline of each activity.

Work Groups of Partner University/ Template

No	Name, Surname, email	Position in the university	Responsibility (Work Packages tasks according to the Work Plan)

Approved by: _____ (signature, stamp)

Tab. 3. Template of the Curriculum/Module Description

Pay a special attention to the usage of verbs in “Learning outcomes of module”. The recommended verbs are highlighted in blue

Short Name of the University/Country code Date (Month/Year)	
TITLE OF THE Curricula/Module	Code
Intelligent Mechatronic Systems	

Teacher(s)	Department
Coordinating: Fedoreev Sergey Others: Goman Viktor Muhutdinov Ruslan	Information and Communications Technology

Study cycle	Level of the module	Type of the module
BA/MA/PhD	Master	

Form of delivery	Duration	Language(s)
offline	16 weeks	Ukrainian

Prerequisites	
Prerequisites: To know: Electronics and Electrical Engineering Programming Fundamentals Mathematical Modelling of Engineering System Possess: basic programming skills	Co-requisites (if necessary):

ECTS (Credits of the module)	Total student work load, hours	Contact hours	Individual workhours
5	180	34	146

Aim of the module (course unit): competences foreseen by the study programme
This course forms the skills for selecting and applying various elements of mechatronic systems, applying modern methods of machine learning for the intellectualization of mechatronic systems. The knowledge obtained as a result of mastering the discipline is necessary for solving practical problems in the field of professional activity, designing and developing intelligent mechatronic systems

Learning outcomes of module (course unit)	Teaching/learning methods	Assessment methods
<p>To know: To point: •the field of application of mechatronic and robotic systems;</p> <p>To explain: • structure of modern mechatronic and robotic systems;</p> <p>To numerate: • principles of the action of sensors used in mechatronic systems and industrial automation systems, the structure of measurement systems</p> <p>To recognize: • types of actuators in mechatronic systems and industrial automation systems;</p> <p>To give examples of: • types of control and communication devices in mechatronic systems and industrial automation systems.</p> <p>To describe: • basic methods and algorithms for constructing artificial intelligence systems, control systems with fuzzy logic, expert systems and neural network control systems, genetic algorithms;</p> <p>To formulate: • basic principles, methods and tasks of machine learning.</p>	<p>Lectures, independent study of the material</p>	<p>Quiz</p>
<p>To be able to:</p> <ul style="list-style-type: none"> • calculate and select the necessary types of mechatronic systems and their elements in the solution of a specific problem; • develop and analyze intelligent management systems using MATLAB software packages; • develop algorithms for control systems with fuzzy logic and neural networks in their structure; • use modern methods of machine learning for the practical solution of data analysis problems. 	<p>Implementation of the training project</p>	<p>Presentation of an educational project</p>
<p>Possess:</p> <ul style="list-style-type: none"> • to build of intelligent control systems; • to develop of tools for machine learning and data mining; • to evaluate of various mechatronic systems and their elements for suitability for a specific task. 	<p>Implementation of the training project</p>	<p>Presentation of an educational project</p>

Themes	Contact work hours						Time and tasks for individual work		
	Lectures	Consultations	Seminars	Practical work	Laboratory work	Placements	Total contact work	Individual work	Tasks
Fundamentals of mechatronics	3	0	0	3	0	0	6	24	Development of a mechatronic system for a technological facility; Development and research of the positioning system based on the electric drive with the position sensor; Development of a control system for interconnected electric drives.
Elements of mechatronic systems	5	0	0	5	0	0	10	40	Development of a mechatronic system based on proportional hydraulic drives/pneumatic actuators; Calculation and adjustment of the servomotor; Forming the trajectory of moving the manipulator on the basis of analyzing the images of products in the work area; Calculation and selection of actuators of mechatronic systems; Programming of logic controllers.
The Basics of Artificial Intelligence	4	0	0	4	0	0	8	36	Application of machine learning technologies in robotics; Application of an artificial neural network to control the mechatronic system; Application of fuzzy logic to control the mechatronic system; Application of the genetic algorithm for optimizing the projected mechatronic system.
Introduction to machine learning	5	0	0	5	0	0	10	46	Studying methods and tools for data preprocessing; The application of the probabilistic model of learning; Solution of problems of the equipment cassation with the use of neural networks; Application of learning algorithms for static multilayer neural networks for controlling the mechatronic system; Application of dynamic learning algorithms for multi-layer neural networks for controlling the mechatronic system.
Total	17	0	0	17	0	0	34	146	

Assessment strategy	Weight in %	Deadlines	Assessment criteria
Running control 1	15	8 week	preliminary presentation of the project
Running control 2	70	14 week	Presentation of an educational project
Final exam	15	16 week	Final quiz

Compulsory literature/Author	Year of issue	Title	No of periodical or volume	Place of printing. Printing house or internet link
T.I. Gorbenko	2012	Fundamentals of mechatronics and robotics		Tomsk, TSU, http://e.lanbook.com/book/44908
P. Plakh	2015	Machine learning		Moscow
L.N. Yasnitskiy	2012	Artificial Intelligence		Moscow, http://www.biblioclub.ru/book/115598/
V.P. Ivshin	2014	Modern automation in process control systems		Moscow
Additional literature				
N. Virt	2010	Algorithms and data structures		Moscow, http://www.biblioclub.ru/book/86483/
V.V. Viugin	2013	Mathematical Fundamentals of Machine Learning and Forecasting		Moscow, http://e.lanbook.com/books/element.php?pl1_id=56397
M.T. Jons	2011	Программирование искусственного интеллекта в приложениях		Moscow, http://e.lanbook.com/books/element.php?pl1_cid=25&pl1_id=1244

ANOTATION /course summery

This course forms the skills for selecting and applying various elements of mechatronic systems, applying modern methods of machine learning for the intellectualization of mechatronic systems. The knowledge obtained as a result of mastering the discipline is necessary for solving practical problems in the field of professional activity, designing and developing intelligent mechatronic systems

List of themes and short description

Themes	Contact work hours
Fundamentals of mechatronics Basic terminology. Origin and development of the concept of "Mechatronics." General trends in the development of mechatronic systems. Integration, intellectualization, miniaturization of mechatronic systems. Levels of integration. The concept of constructing mechatronic systems. Structure and elements of mechatronic and robot-technical systems: mechatronic modules of motion, information-measuring systems, control systems.	6
Elements of mechatronic systems Classification of sensors in mechatronic systems and automation systems. Typical signals and methods for connecting sensors. Structure of theme assuring channel. Features of analog-to-digital conversion of signals from analog sensors. The main types of actuators in mechatronic systems (electro-, hydro-, pneumatic actuators). Comparison. Classification of program able logic controllers. Devices of human-machine interaction, personal and built-in industrial computers. The review of industrial networks of data transmission of field and first level and applied communication devices.	10

<p>The Basics of Artificial Intelligence Thinking and intellect. The definition of artificial intelligence (AI). Terminology. Philosophical aspects, problems of artificial intelligence systems (possibility of existence, safety, usefulness). History and prospects of the development of AI systems, the field of their practical use. Architecture and the main components of AI systems. Expert systems. Basic ideas and practical application no fuzzy logic. Linguistic variables and their description. Operations over fuzzy sets. The basic structure and principle of the fuzzy logic system. Fuzzification, rules of logical inferences and defuzzification. Example of using a system with fuzzy logic. Genetic algorithms.</p>	<p>8</p>
<p>Introduction to machine learning Basic terminology. The notion of Big Data. Trees of solutions. Logical models of machine-learning. Probabilistic learning models. Metric models. Artificial neural networks. Neuron and his model. The simplest perceptron. Systems such as Adaline. Adaline with a sigmoid at the exit. Classification of artificial neural networks. Static linear single-layer neural networks. Static multi-layer neural networks. Algorithms for the training of static multilayer neural networks. Dynamic learning algorithms for multi-layer neural networks. An algorithm for back propagation of an error.</p>	<p>10</p>

Tab.4. List of Curricula CRENG

<p>9 new core curricula 1. New technologies and big data for innovations in crisis and risk management + IT Security - 6 ECTS; 2. Risk and crisis forecast, Analysis and Reduction Methods and Tools - 10 ECTS; 3. Disaster preparedness – challenges, principles, recourses, systems and tools - 6 ECTS; 4. Safety Management and Incident Investigation - 6 ECTS; 5. Emergency Response & Crisis Management - 6 ECTS; 6. Hazard Identification - 5 ECTS; 7. Human Factors in Design & Operations – 5 ECTS; 8. Humanitarian logistics and transport services in disasters conditions - 6 ECTS; 9. Informational-Analytic and Diagnostics for Sociotechnical System - 6 ECTS.</p>	<p>3 new transferrable curricula 1. Project management and leadership in logistics and research, through open communication and team-working - 5 ECTS; 2. Research methods and professional development - 5 ECTS; 3. Carrier Managing, Soft skills for engineer, basics of technical creativity - 3 ECTS.</p>
<p>4 existing core curricula to update: 1. Risk and crisis engineering of Transport systems - 5 ECTS; 2. New challenges for crisis and risk management in logistics systems - 5 ECTS; 3. Supply chain management and networks - 5 ECTS; 4. Health, Safety & Environmental Management Systems - 6 ECTS.</p>	

Tab. 5. Concept / objectives of CRENG SO

CRENG SO strategic objective is to create conditions for the development of the project results after its completion and to facilitate the flow of funds for maintenance and development created by the project laboratory facilities. Legal form of CRENG SO may differ from structural unit of the University to separate legal entity. CRENG Service Offices will be responsible for planning, organization and quality control of refreshing courses for graduates.

The activities plan will be following:

1. identification of the need in training courses, for this the list of target organizations should be worked out among small business, large regional enterprises, local authorities of transport management etc., the survey should be conducted to find out main questions on which the training courses will be focused according to regional aspects;
2. creation of three days training courses programs;
3. involving of stakeholders and signing agreement between university and stakeholder;
4. conducting refresh courses by academic teachers of P5-P13 using teaching environment, which will be created owing to project: new modules on CRENG, CRENG Labs, teaching materials located on WEB-based platform and MOODLE;
5. each listener will receive certificate on professional development;

6. after courses conduction the survey among courses visitors will be executed to find out if the service satisfy customer. P1-P4 will consult P5-P13 in all activities.

Possible scope of activities of CRENG SO:

- ✓ marketing of the needs in the area of CRENG and the development of appropriate services for different target groups.
 - ✓ periodical conducting of the University audit on existing training courses aiming to replace/ upgrade of outdated curricula and develop new ones,
 - ✓ studying the needs of industrial enterprises, transport and logistics companies in service training of professional personnel,
 - ✓ searching for interested organizations and sponsors,
 - ✓ support IPBL by providing links between EU and PCs universities inside and outside the consortium;
- CRENG SO can be considered as an integral part of new or existing student startups for innovative technology development enterprises, business incubators, technology parks or subdivisions.

One of the main tasks of CRENG SO is carrying out of introduction seminars regarding CRENG. Universities can create CRENG SO based on new laboratories in the frame of the project to expand their capabilities. CRENG SO can provide services based on the development of the materials created within the project disciplines e.g. seminars on CRENG; engineering services on request of interested persons / companies in relevant fields.

Tab. 6. Recommendations for the design of information materials on the project

Each university should select a “blogger” who will post information about the project in the Internet.

It is recommended to specify the following information:

- ✓ The name of the project, Internet: _____ (will be available in December 2018)
- ✓ Creation of a Facebook page about the project by each university
- ✓ Name of the project: Crisis and Risks Engineering for Transport Services / CRENG
- ✓ Logo of the project and address of the main website of the project in all electronic resources should be mentioned
- ✓ Logo of the ERASMUS+ programme - available to download from the website of EACEA
- ✓ https://eacea.ec.europa.eu/about-eacea/visual-identity-and-logos-eacea/erasmus-visual-identity-and-logos_en
- ✓ The following disclaimer shall be added to the inner pages of the publications and studies written by external independent bodies with support from the European Commission:
"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."
- ✓ Flags of the participating countries and/or logos of the organizations participating in the project
- ✓ Next, depending on the specific objectives and the availability of space for placement of information: the composition of the project consortium, project implementation, goals and objectives of the project achieved / planned results, upcoming events.
- ✓ Photos of the project team, faculty and staff involved in the project
- ✓ Photos of project events
- ✓ Details of contact person for further information.

Model Press Release on the events of the project in the target universities for placement on the website of the project:

- a) Name of the event, date and venue
- b) Programme (agenda) of the event
- c) List of participants (name, organization, position)
- d) Short description of the activity: goals/objectives, outcomes of the event
- e) Photos of the event (2-5 pictures); videos

**Crisis and Risks Engineering for Transport Services
CRENG
Organigram**

CONSORTIUM

EU partners: 3 Universities, one Spin OFF Enterprise

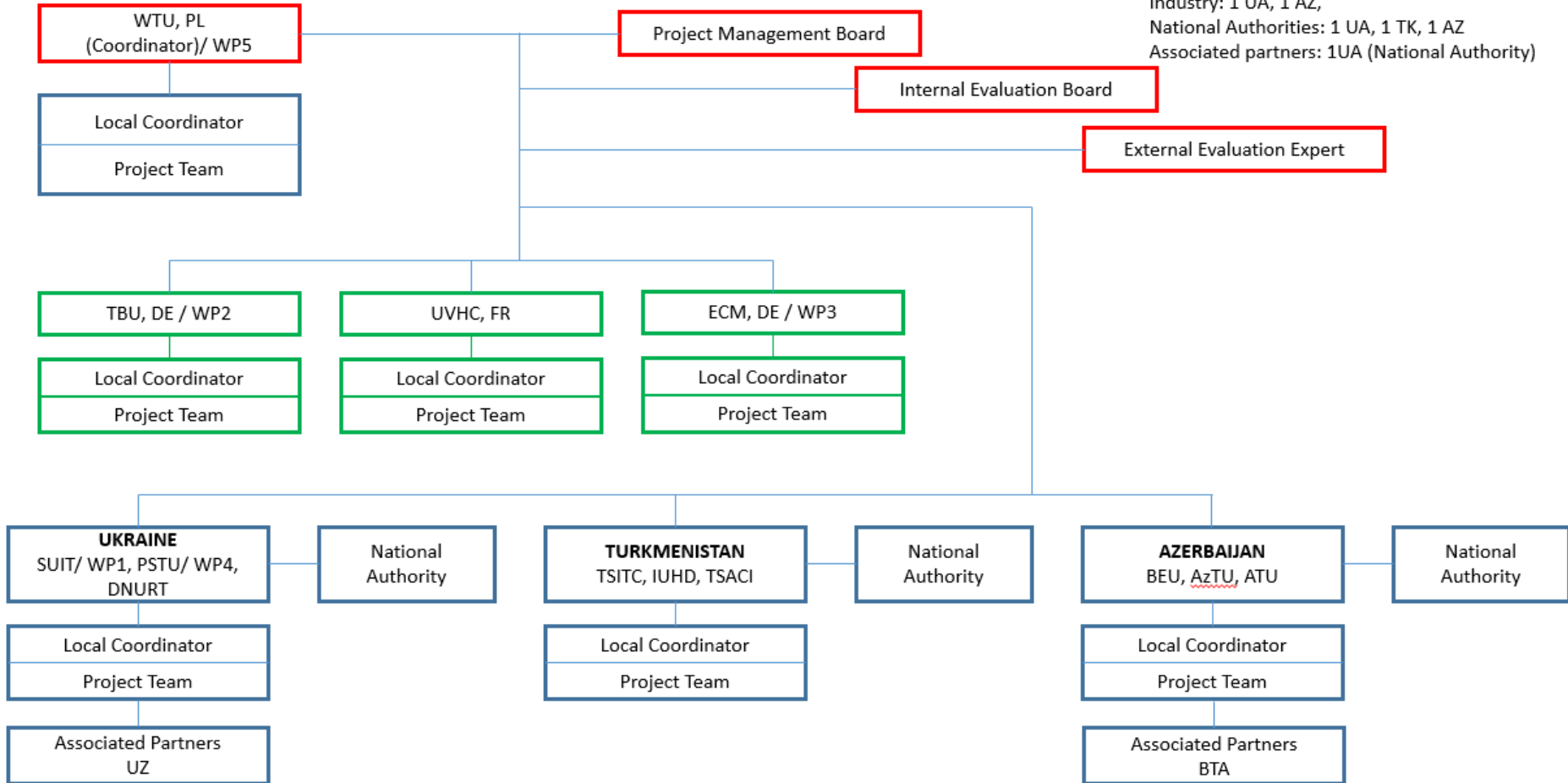
Program countries:

Universities: 3 UA, 3 TK, 3 AZ

Industry: 1 UA, 1 AZ,

National Authorities: 1 UA, 1 TK, 1 AZ

Associated partners: 1UA (National Authority)



Tab. 7. Organigram CRENG

Tab. 8. Table of project partners:

No	Partner	Acronym	Location
P1	Warsaw University of Technology	WTU	PL/ Warsaw
P2	Berlin Technical University	BTU	GE/ Berlin
P3	University of Valenciennes	UVHC	FR/ Valenciennes
P4	ECM Space technologies GmbH	ECM	GE/ Berlin
P5	Pryazovskyi State Technical University	PSTU	UA/ Mariupol
P6	Dnipropetrovsk National University of Railway Transport named after Academician V. Lazaryan	DNURT	UA/ Dnipro
P7	State University of Infrastructure and Technologies	SUIT	UA/ Kyiv
P8	Baku Engineering University	BEU	AZ/ Baku
P9	Azerbaijan Technical University	AzTu	AZ/ Baku
P10	Azerbaijan Technological University	ATU	AZ/ Ganja
P11	Turkmen State Institute of Transport and Communications	TSITC	TK/ Ashgabat
P12	International University for the Humanities and Development	IUHD	TK/ Ashgabat
P13	Turkmen State Architecture and Construction University	TSACI	TK/ Ashgabat
P14	The Ministry of Education of the Republic of Azerbaijan	MoEAZ	AZ/ Baku
P15	Ministry of Education of Turkmenistan	MET	TK/ Ashgabat
P16	Baku Transport Agency	BTA	AZ/ Baku
P17	The Ukrainian Railway (Ukrzaliznytsia)	UZ	UA/ Kyiv

Tab. 9. List of Associated Partners

Name of organization	Type of institution	Website	City	Country	Role in the project	Activities and related Work Packages
The Ministry of Education and Science of Ukraine	Governmental Body	https://mon.gov.ua/ua	Kyiv	Ukraine	Ministry will support all activities related to the project as a part of internationalization strategy, highlighted in UA Law on education.	WP3: Monitoring of quality of projects activities: employability of graduates on CRENG; reweaving of existing governmental standards of educational fields "Transport Technologies": specifying required skills in line with new requirements of labour market; WP4: Visiting conferences, seminars; highlighting projects success in mass media and own website; WP5: Consulting in UA national legislation for successful project implementation.

Tab.10. Work plan

Activities		Start	End
Ref.nr/ Sub-ref nr	Title		
1.1 Prep.	a) designing and signing Agreement and guidelines on instructional strategies for MA program “CRENG” development; b) the report of curricula analysis and specific needs of PCs universities (will be presented at the kick-off-meeting on 15.12.2018).	a) 15.11.2018 b) 15.11.2018	a) 15.12.2018 b) 15.12.2018
2.1 Dev.	Development new and updating existing core and transferable curricula on CRENG (by EU) a) conducting seminar to present new curricula. the universities, who are responsible for the content will develop and transmit to each target university teaching materials, drafts materials of the curricula, model-drafts of the curricula description, list of recommended literature.	15.12.2018 a) 15.05.19	30.04.2019
2.2 Dev.	Development of teaching/learning materials and updating Join Web Platform, e-learning courses (by PCs) a) develop, publish, purchase the new tutorials, handbooks, syllabi; b) update WEB based platform (see .4.2); c) develop of e-learning courses. Each target university examines delivered materials and develop (in national language of teaching or in English), in accordance with local requirements of the labour market, their own teaching materials and curricula incl. curricula description, performs accreditation procedures under existing institutional / national regulations.	a) 01.09.2019 b) 01.09.2019 c) 01.05.2020	a) 30.07.2020 b) 30.07.2020 c) 30.07.2020
2.3 Dev.	Development and accreditation of new MA program “CRENG” (by PCs) a) prepare a set of new curricula and modules; b) adopt on institutional; c) adopt on accredit on national level. Each PCs university will develop their own MA program “CRENG” relevant to their specific needs.	a) 01.05.2020 b) 01.07.2020 c) 01.08.2021	a) 30.07.2020 b) 30.07.2020 c) 30.09.2021
2.4 Dev.	Develop documentation/ purchase, install equipment for the CRENG Labs and VCRs (virtual class-room).	01.12.2018	01.09.2019
2.5 Dev.	Development guidelines and holding the courses to retrain academic teachers in new curricula methodology incl. IPBL (by EU).	01.06.2019	30.08.2019
2.6 Dev.	Developing of Skills Wallet (by PC university). SW is a model which help future employees to acquire specific skills required for particular position. Skills wallet helps: universities and enterprises to become close; to increase employability of graduates; to make enterprises more flexible to implementation of innovations. a) develop a model; b) conduct on-line courses for teachers; c) implement in PCs universities.	01.09.2019 a) 01.09.2019 b) 01.10.2019 c) till 30.01.2020	30.01.2020 a) 30.09.2019 b) 30.11.2019
2.7 Dev.	a) pilot teaching of students on new curricula in CRENG new learning/teaching environment incl. IPBL; b) pilot operating of CRENG Labs and VCR; c) updating MA curriculum, if necessary.	01.09.2020	30.07.2021
2.8 Dev.	Master Classes on new curricula (in PCs).	01.09.2020	30.03.2021

2.9 Dev.	CRENG Service Offices a) developing documentation, purchase and install equipment; b) staff training (in EU); c) establishing of CRENG Service Offices.	a) 01.12.2018 b) 01.08.2019 c) 01.09.2019	a) 01.09.2019 b) 30.08.2019 c) 30.09.2019
3.1 Qal.	Internal/external evaluation; internal and external QC of processes and deliverables.	01.10.2018	30.09.2021
4.1 Diss.& Exp	a) dissemination strategy and event plan (will be developed and presented at the kick-off meeting); b) international, regional, local information conferences/ dissemination events.	a) 01.12.2018 b) 15.12.2018	a) 30.12.2018 b) 15.10.2021
4.2 Diss.& Exp	Full media coverage of the project activities a) publications; b) creating and updating project web pages; c) creating and updating WEB based platform; d) creating and updating of Facebook society / You Tube channel	a) 15.11.2018 b) 15.11.2018 c) 15.12.2019 d) 01.10.2018	a) 15.10.2021 b) 15.10.2021 c) 15.10.2021 d) 15.10.2021
4.3 Diss.& Exp	a) establishing, pilot operating of CRENG Service Offices network; b) signing “CRENG +” Agreement.	a) 01.09.2020 b) 01.09.2020	a) 15.10.2021 b) 15.10.2021
4.4 Diss.& Exp	Refresh courses for graduates (by PCs) a) develop course program, finding target organizations; b) conduct courses.	01.09.2020 a) 01.09.2020 b) 01.11.2020	15.10.2021 a) 15.10.2020 b) 15.10.2021
4.5 Diss.& Exp	Promoting of Skills Wallet by CRENG Service Office.	01.09.2019	15.10.2021
5.1 Mngt.	a) overall project management; b) financial management; c) steering group/consortium meetings; d) formal reporting to the EACEA; e) monitoring reports from each partner every three months; f) everyday project coordination/administration.	15.11.2018	15.10.2021

Important milestone:

2.6. Pilot teaching updated/new curricula/modules/courses start: 01.09.2020