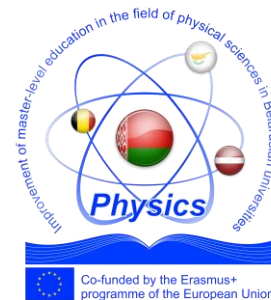




Co-funded by the  
Erasmus+ Programme  
of the European Union



# **Совершенствование образования мастер-уровня в области физических наук в белорусских вузах: «Физика»**

## **Improvement of master-level education in the field of physical sciences in Belarusian universities, Acronym: "Physics"**

The Final Conference, Minsk, September 12<sup>th</sup> 2018  
Anatolijs Zabašta, Nadežda Kuņicina  
Riga Technical University

# TEMPUS “Energy” 2012

Riga Technical university

Ku Leuven University

Belarusian State University

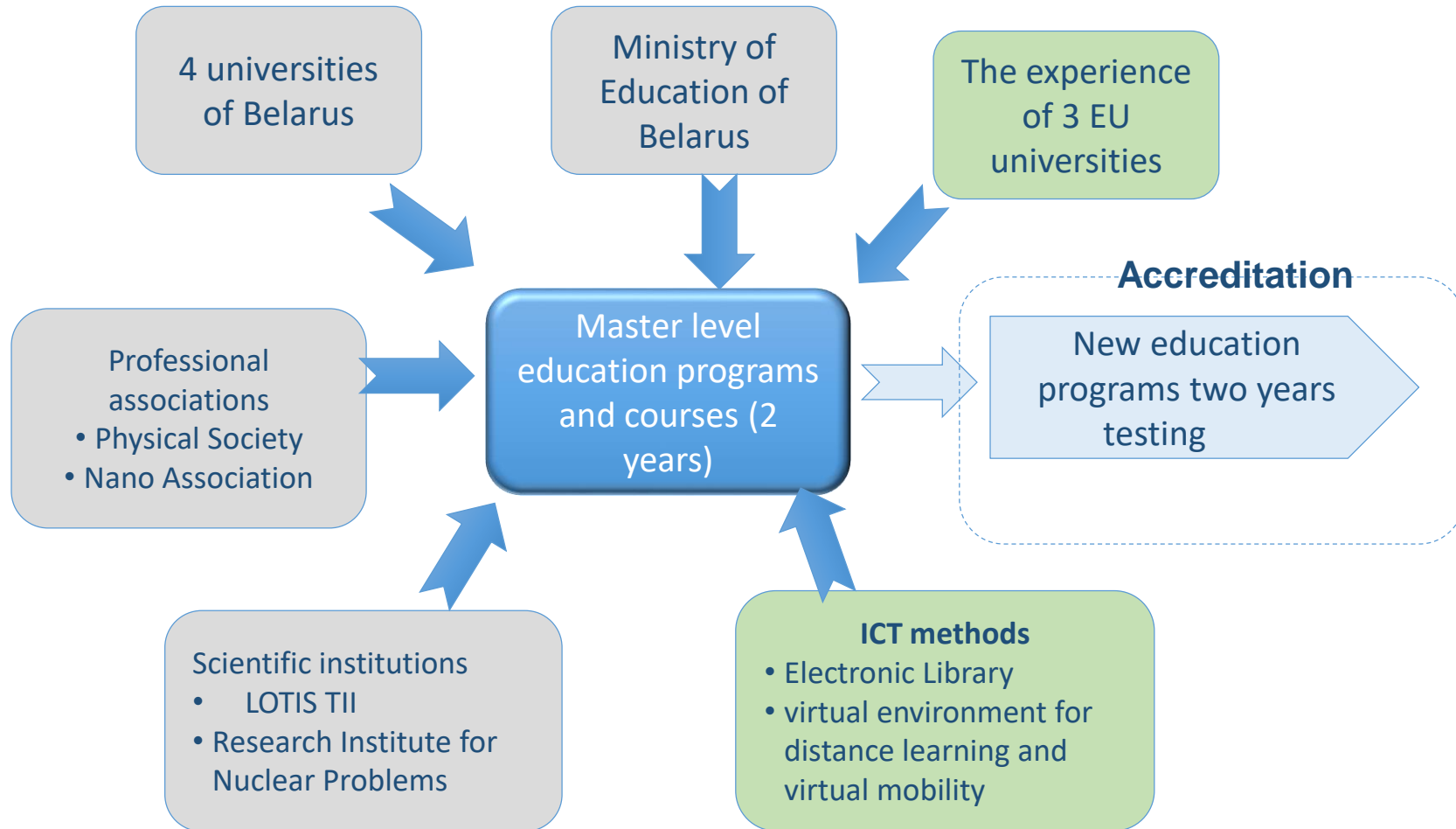
Belarusian National Technical University

Belarussian State Agrarian Technical University

# European High Education Area

Goals Declaration	Objectives Measurable	Tools
Social Dimension  Citizen of Europe  Employability  Lifelong Learning	3 cycle  Learner centered Academic Recognition  Quality Assurance and Enhancement	- Qualifications Framework - Learning Outcomes Levels  - ECTS - European Credit Transfer and Accumulation System - Diploma Supplement - Credits and Grades - Common structure  - Standards and Guidelines / Register

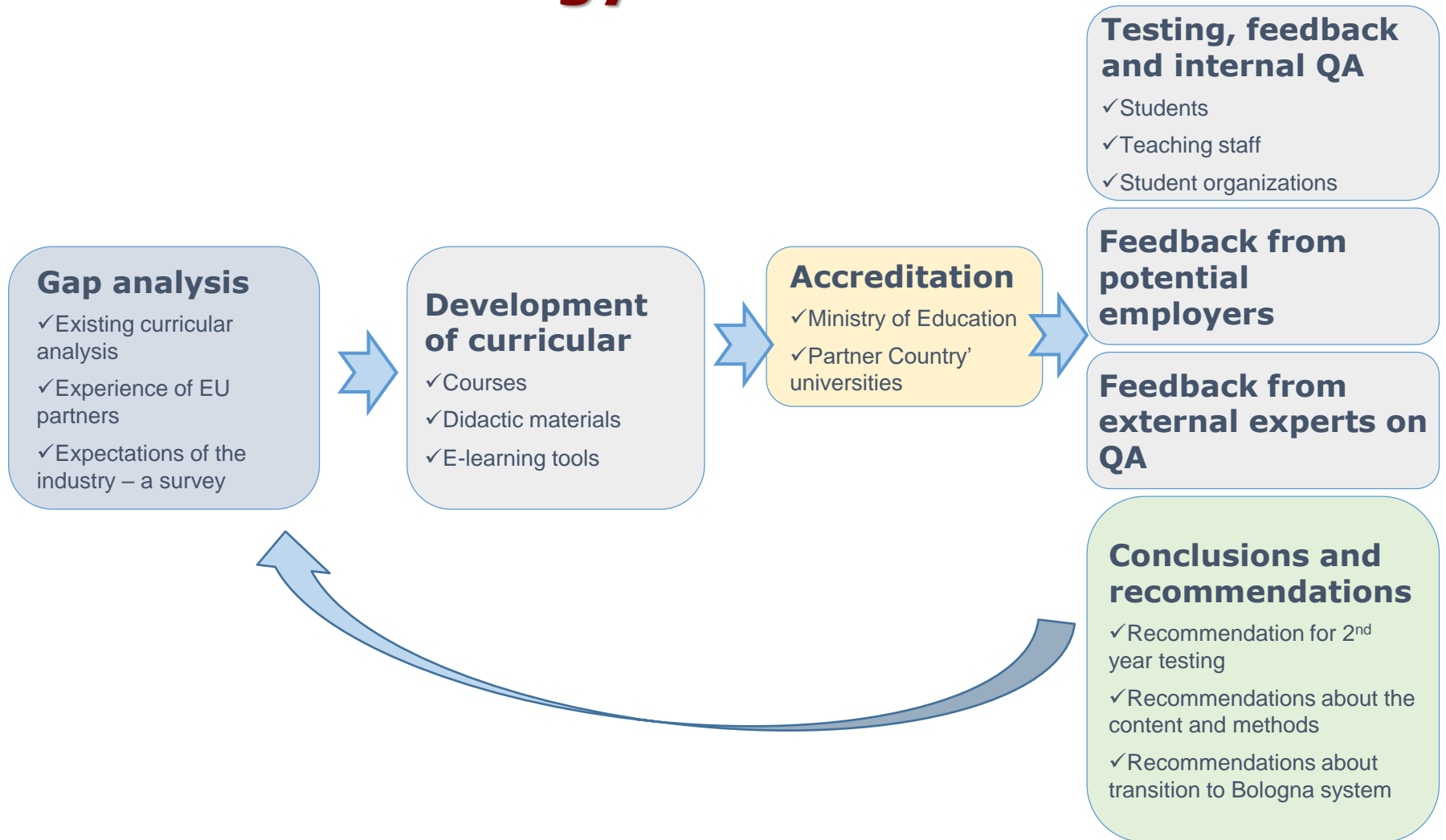
# Project “Physics” Approach



# Objectives

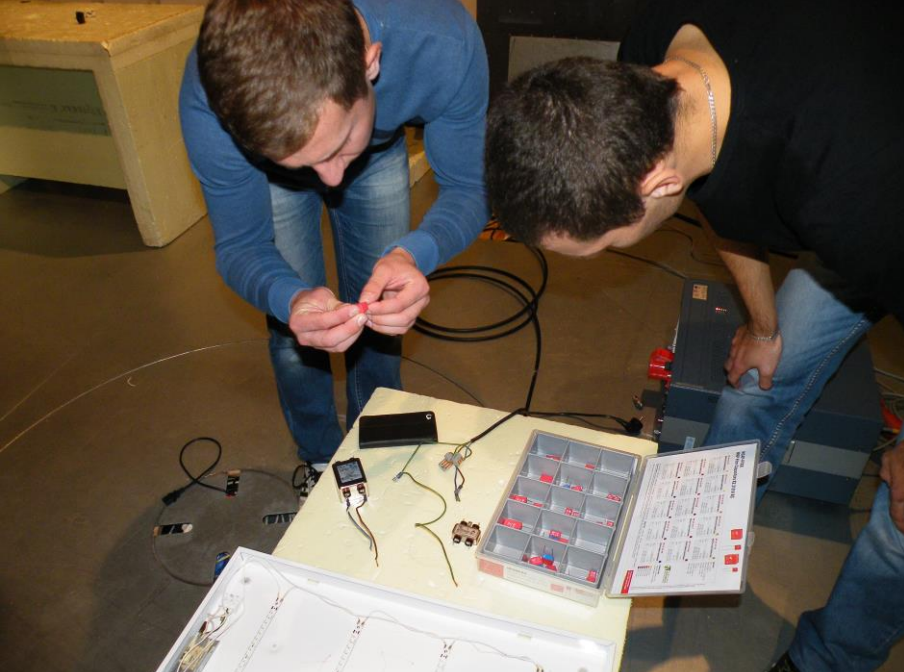
- To develop **modern master-level programs** in the field of functional nanomaterials, photonics and applied physics, and to implement it at four Belorussian universities;
- To develop and update courses and teaching materials for two **master-level model educational programs** *Functional nanomaterials and Photonics*;
- To improve teachers' qualifications and skills;
- To improve Belarusian academic staff competences for teaching of developed courses in English;
- To implement **modern technical infrastructure** for teaching and learning.
- To develop **innovative ICT based teaching and learning** environment;
- To bring the Higher Education Institutions of Belarusian **closer to the Labour Market needs**.

# Methodology



# **Students training in RTU in September 2017**









# Students and teachers survey

7	Recommended literature sources were accessible and helped in acquiring the course materials			✓					
8	The lecturer/professor's attitude to the students was positive and helpful	✓	✓						
9	The time for the completing of the practical tasks was enough	✓	✓						
10	The information about the classes organisation was clear and easy available	✓							
11	My knowledge of English language was sufficient to understand all learning materials presented by teacher		✓						

Do you have any comments, suggestions about the training? What did you like and what can you suggest for improvements? Please, write a few sentences below these questions!

Вы можете писать комментарии как на английском, так и на русском языке. Три самые подробные и интересные комментарии получат призы!

Мне очень понравились лекции Eling Gaile-Sarkane. Нам, это была первая лекция. Лекции очень интересны!

Касаясь таланта преподавателей и теоретических занятий: хотелось бы больше практических, т.е. в Беларуси и там много теоретических занятий. В Беларуси (там 7 февраля) было много занятий (тоже про-из-ЕРАНИИ), правда, были перемены.

Касаясь академического уровня: всё было понятно и интересно.

Также хотелось бы отметить прекрасное качество работы всех преподавателей.

Спасибо за хорошо проведенное время.

5	Creative thinking and problem solving was efficiently promoted		✓						
6	During the class the amount of theoretical material and practical tasks was balanced			✓					
7	Recommended literature sources were accessible and helped in acquiring the course materials			✓					
8	The lecturer/professor's attitude to the students was positive and helpful	✓							
9	The time for the completing of the practical tasks was enough			✓					
10	The information about the classes organisation was clear and easy available	✓							
11	My knowledge of English language was sufficient to understand all learning materials presented by teacher	✓							

Do you have any comments, suggestions about the training? What did you like and what can you suggest for improvements? Please, write a few sentences below these questions!

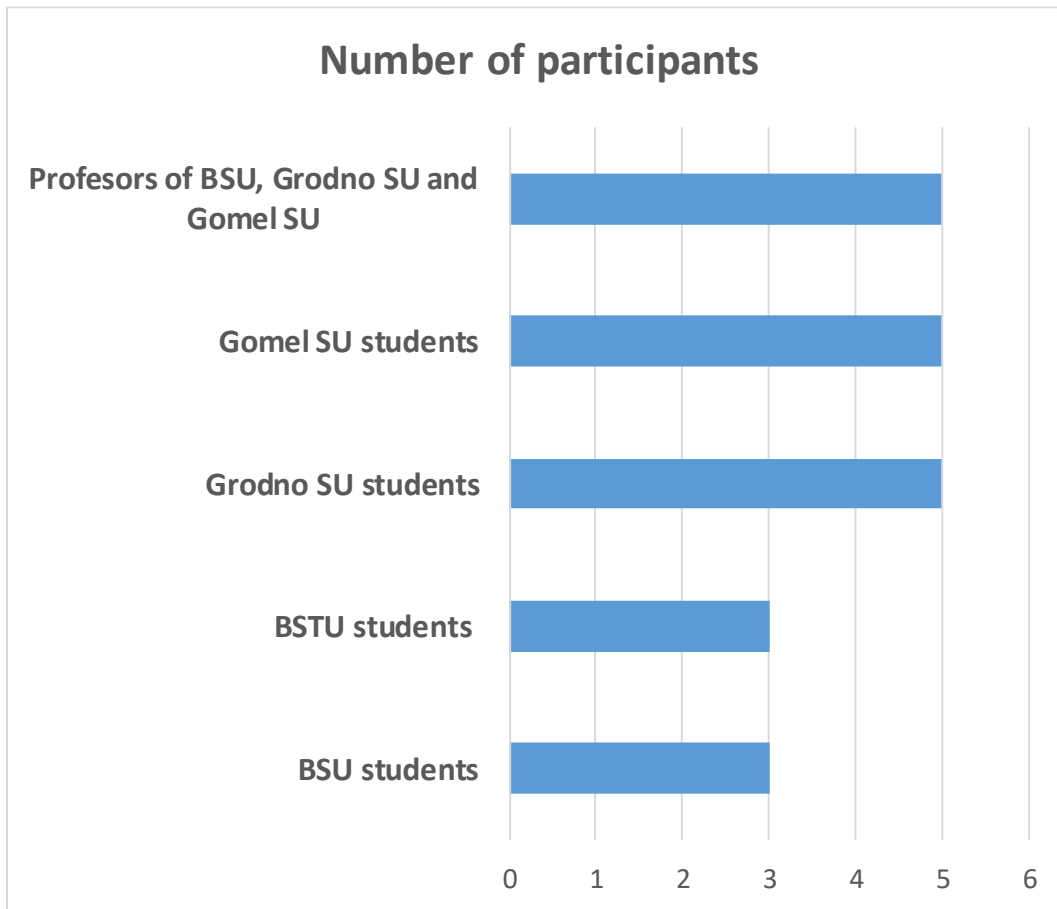
Вы можете писать комментарии как на английском, так и на русском языке. Три самые подробные и интересные комментарии получат призы!

Участие в финале проекта открыло для меня новый мир и позволило расширить мои знания в применении микро-контроллеров. Сопоставил теоретические и практические навыки, изученные во время обучения и управления системами. Проект, для которого необходимо было разработать новый модуль, позволил мне, что касается опыта, быть уверенным, если понадобится для этого и меня.

Моя работа, которую я «делал» самостоятельно, расширяла мои знания и навыки, которые я приобрел.

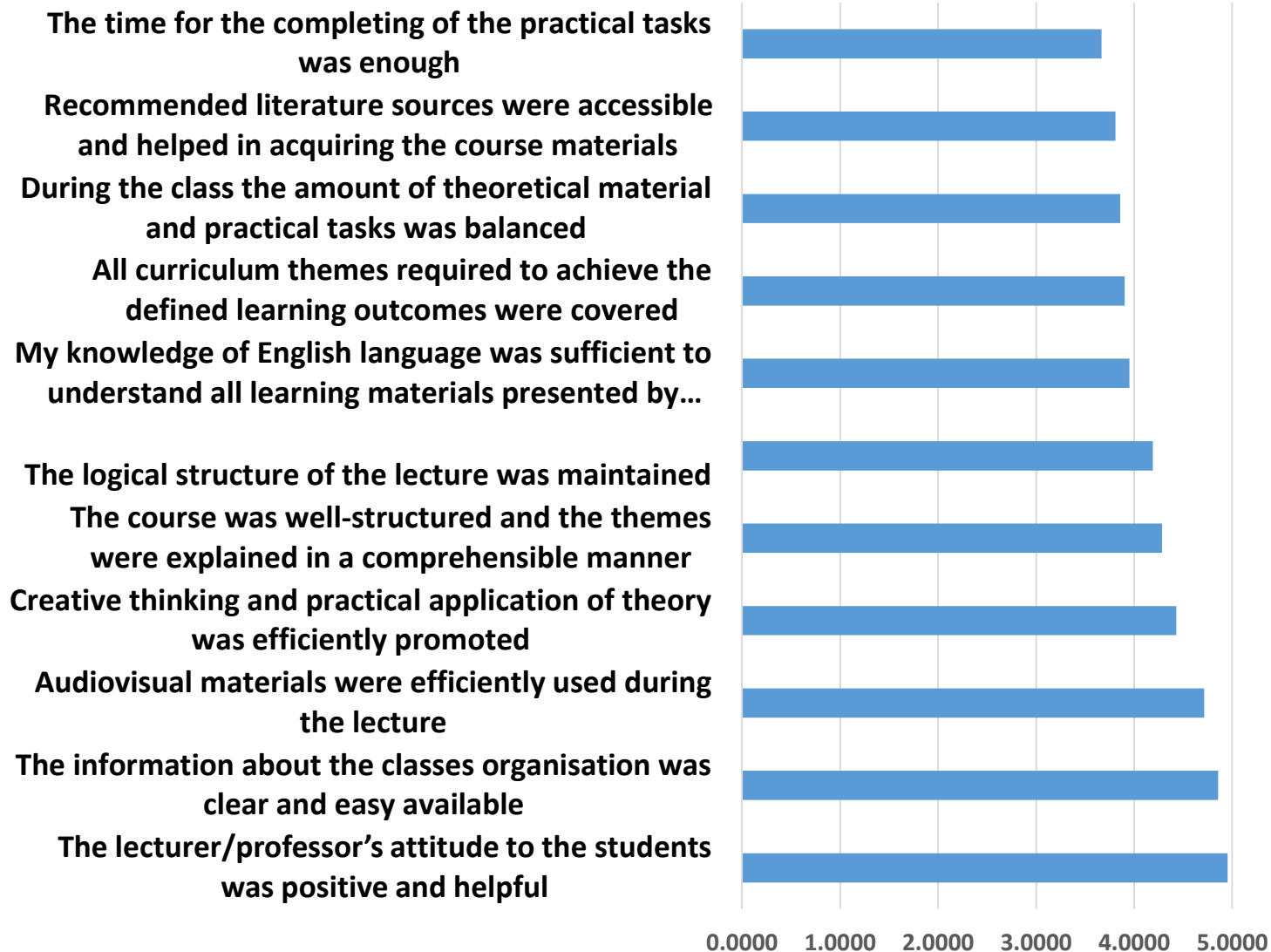


# Participants profile

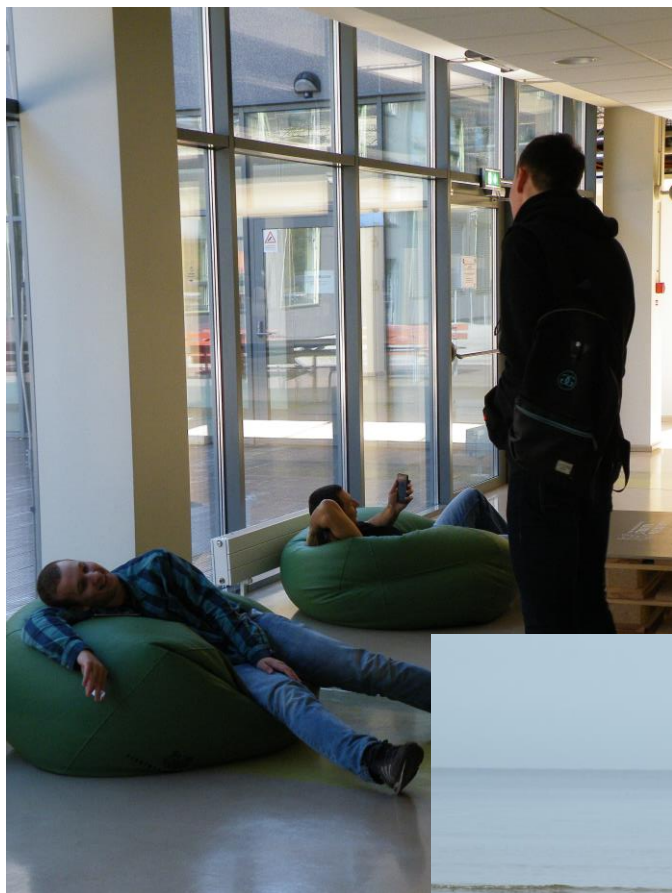


# Self-evaluation

Mean



# Between the training ...





# **Teachers training in RTU in February 2018**

# Teachers training seminar in Riga

- The target of the seminar was to **validate the topics and methodology of the courses and training programs developed during the project** as well as to **discuss the first results of new courses testing during the autumn semester.**
- Together with the teaching staff of four Belarusian universities, representatives of *Belarusian Nano-industry association, the Institute for Nuclear Problems and the Heat and Mass Transfer Institute* also participated in discussions.
- Different topics had been presented:
  - The Fundamentals of Nano-photonics, Technologies for formation of nanocomposite coatings, Application of functional nanomaterials in polymer compositions, etc.
  - One of the presentations was dedicated to Scientific research and training of specialists in the field of nanotechnology and nanomaterials at the Belarusian State University.

# Program for the February 5 – 9<sup>th</sup>

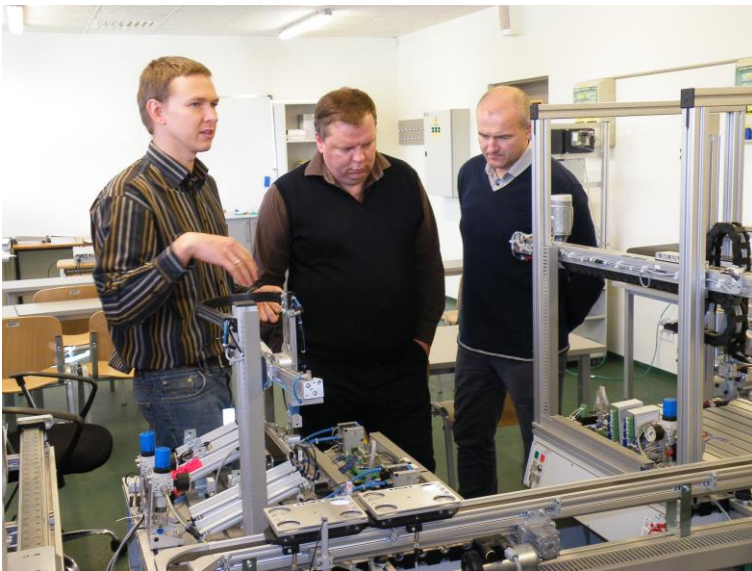
- **1<sup>st</sup> day:** RTU laboratories, Innovation management: RTU
- **2<sup>nd</sup> day:** Active use of a digital learning environment: KU Leuven
- **3<sup>rd</sup> day:** Visit to RTU filial in Cesis campus.
- **4<sup>th</sup> day:** Testing of new developed courses. Belarusian universities.
- **5<sup>th</sup> day:** Testing of new developed courses. Belarusian universities. A round table.

# Teachers training seminar in Riga

N	University	Position	Name, surname
1	GRSU	Professor, Department of General Physics	Strekal Natallia
2	GRSU	Docent	Vasilyuk Gennady
3	BSTU(БГТУ)		Krotava Volha
4	BSTU(БГТУ)		Uss Alena
5	BSTU(БГТУ)		Liubimau Aliaksandr
6	BSTU(БГТУ)	Docent	Vishnevskij Konstantin
7	BSU (БГУ)	Professor	Fedotov Alexander
8	BSU (БГУ)	Associated-professor	Gorbach Dmitry
9	BSU (БГУ)	Associated-professor	Melnikava Alena
10	GSU	Lecturer, Docent	Samofalov Andrey
11	GSU	Lecturer, Docent	Kupo Aliaksandr
12	РАНИ	Исполнительный директор Республиканской ассоциации наноиндустрии	Trukhanau Aliaksei
13	РАНИ	Заместитель директора НИИ ядерных проблем Белорусского государственного университета	Fedotova Julia Федотова Юлия Александровна
14	РАНИ	Старший научный сотрудник НИИ ядерных проблем Белорусского государственного университета	Kasiuk Julia Касюк Юлия Владимировна
15	РАНИ	Профессор, заведующий кафедрой Микро- и наноэлектроники Белорусского государственного университета информатики и радиоэлектроники	Borisenko Victor Борисенко Виктор Евгеньевич
16	РАНИ	Младший научный сотрудник лаборатории нанопроцессов и технологий Института тепло- и массообмена имени А.В. Лыкова НАН Беларуси	Zubar Tatsiana
17	KU Leuven	Professor	Joan PEUTEMAN
18	RTU		

# Teachers training seminar in Riga

- One-day session of the seminar was devoted to active use of a digital learning environment. The session was held by prof. J. Peuteman from Ku Leuven university.
- The seminar participants attended laboratories of RTU and acquainted the research topics, which are based by the laboratories.
- In the last day of the seminar a round-table discussion was held on the topics related academia – industry collaboration.
- Head of Department of Medical Physics and Engineering Y. Dekhtyar shared RTU experience about collaboration between RTU and the companies that provide job places for the graduates of RTU and personal experience during the transition to Bologna education system.







# **The preliminary results**

# Motivation

## **Belarus:**

- Involvement into Bologna process, recognition of curricula,
- New master level education courses and programs
- New equipment for laboratories
- Opportunity to travel and create network of researchers
- Additional salaries for teachers, interpreters and professionals

## **EU:**

- Opportunity to develop new courses for own needs
- Opportunity for scientific publications
- Opportunity to create a network of researchers and participate in new projects
- Additional salaries for teachers and professionals

# **New courses - developed and accredited**

## **Belarusian State University :**

- Standard master-level, bachelor and 5-year specialists' programs with ECTS system' application, accredited in the Ministry of Education – **5**
- education courses and labs with ECTS system' application, accredited in the BSU – **22**.

## **Grodno State University**

- Standard master-level programs with ECTS system' application, accredited in the Ministry of Education – **1**
- education courses and labs with ECTS system' application study courses accredited in the GrSU – **3**

## **Gomel State University**

- Standard master-level programs with ECTS system' application, accredited in the Ministry of Education – **2**
- education courses and labs with ECTS system' application study courses accredited in the GoSU – **9**

## **Belarusian State Technological University**

- Standard master-level programs with ECTS system' application, accredited in the Ministry of Education – **1**
- education courses and labs with ECTS system' application study courses accredited in the BSTU – **4**

# New course e-books

1. Applied Physics (curator – KU Leuven)
2. Functional nanomaterials (curator – BSU)
3. Photonics (curator – BSU)
4. Applied Informatics (curator - RTU)
5. Research towards master thesis/ scientific project management (curator – The University of Cyprus) [ISBN - 978-9934-22-101-9 \(pdf\)](#)



# ICT based teaching and learning environment

## WP3 Development of innovative ICT based teaching and learning environment

3.1. Creation of e-Library for e-Books, synopses and teaching /didactic materials;

3.2. Development of virtual /on line laboratory and virtual environment for distance learning


### Chapter 2: Conducted emission measurements

This folder contains course documents (including multimedia materials) which provide the student insight in performing conducted emission measurements.

 ROADMAP

 LEARNING OUTCOMES

 PRE-REQUISITES

 YOUTUBE

Students not familiar with the use of a frequency converter (also called a Variable Frequency Drive) have a clear explanation on the use and the working principle on Youtube: "**What is a Variable Frequency Drive?**"

 THEORETICAL LECTURE


Read carefully the document and try to understand the [theoretical lecture](#) "**Conducted emission measurements**".

 PPT PRESENTATION

Have a close look at the PowerPoint presentation "**A conducted emission measurement**" and take care to understand its content.

 MOVIE

Look and listen carefully to the MP4 [movie](#) "**A conducted emission measurement**" and take care to understand it. More details can be found in the [PPT presentation](#) which includes a spoken explanation leading to this MP4 file.

 MOVIES 1-5

Carefully study the MP4 movies 1-5 below dealing with:

1. conducted emission of a frequency converter
2. impact on a Long Wave radio receiver
3. conducted emission measurements and the impact on an AM radio receiver
4. the use of EMC filters
5. the propagation of conducted emission in a power grid

 MOVIE 1











 MOVIE 2

 MOVIE 3

 MOVIE 4

 MOVIE 5

17	18	19	20	21	22	23
24	25	26	27	28	29	30

-   Скрыть события сайта
-   Скрыть события категории
-   Скрыть события курса
-   Скрыть события группы
-   Скрыть события пользователя

# Social life



# Project closing

- **14th October** – The end of the project
- **30th October** - Final Financial Report by the partners
- – Final Activities Report by the partners
- **1 – 30<sup>th</sup> November** – Financial audit
- **December 14<sup>th</sup>** – submission to European Commission

# What is beyond the project?

- New course 2<sup>nd</sup> – year testing!
- Bilateral agreements for cooperation after the Physics.
- To maintain e-learning tools (Moodle, and methods, materials) in the partners universities.
- Initiate a new ERASMUS+ project

# Questions?