

Curricula Reform in Space Technology in Kazakhstan, Russia, Ukraine

CRIST

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Final Conference

24-26th November 2011 - Astana, Kazakhstan



Preamble

A good example of aerospace education development, which is worth studying and distribution, is cooperation of 11 leading universities of Ukraine, Russia, Kazakhstan, Germany, Belgium, and the Netherlands under Tempus European program (2009-2011).

The project is intended for implementation of newly developed curricula, focusing on microsatellites development (on the basis of the advanced technologies of Berlin Technical University) and aerospace management, in the universities of Ukraine, Russia, and Kazakhstan.



This project has been funded with support from the
European Commission

Project's Main Goals

New Curricula and Modules:

- ✓ Small satellites, systems and subsystems
- ✓ Digital wireless data transmission for small satellites
- ✓ „CAD/CAM/CAE for space engineering
("Pro/ENGINEER" and "Altium Designer")
- ✓ International management, marketing and logistic
- ✓ Space management



New supporting infrastructure

- ✓ Small satellite's laboratories and PC pools
- ✓ Ground segments for small satellites
- ✓ International academic network of small satellite ground stations

Developing the stakeholder's network "CRIST- PLUS"

Participating Organisations



- Technical University of Berlin, DE
- ECM Office, DE
- LESSIUS-Mechelen University, Campus DeNayer, BE
- Fontys University of Applied Science, NL
- German Society for Aeronautics and Astronautics (DGLR), DE
- Samara State Aerospace University (SSAU), Samara, RU
- Baltic State Technical University (BSTU), Sankt-Petersburg, RU
- Dnepropetrovsk National University (DNU), Dnepropetrovsk, UA
- National Technical University of Ukraine (NTU), Kiew, UA
- National Aerospace University (NAU), Charkiw, UA
- Siberia State Aerospace University (SibSAU), Krasnoyarsk, RU

Participating Organisations

- Eurasian National University (ENU), Astana, KZ
- Karaganda State Technical University (KSTU), Karaganda, KZ
- Agency of high education , RU
- Chamber of Commerce and Industry of Kazakhstan KZ
- Ministry of science and education of Kazakhstan, KZ
- Ukrainian Youth National Aerospace Education Center, UA
- „Yuzhnoye“ State design office, Dnepropetrovsk, UA
- Chamber of Commerce and Industry of Dnepropetrovsk, UA
- State Research & production space centre "TsSKB-Progress", Samara, RU
- Information Satelliten Systeme "ISS", Krasnojarsk, RU
- Engineering Centre „Technologytransfer“, Astana, KZ
- Chamber of Commerce and Industry of Centre Siberia region, Krasnojarsk, RU

Note:

Industrial partners - the key manufacturers of rocket-space hardware are the whole show in the project: KB “Ju” as a producer of the rockets DNEPR, CICLON; Progress as a producer of the rockets SOJUZ.



Project Outputs

Retrain academic staff in the new curricula methodologies

- 2 training courses in EU-UNI (duration à 18 days) took place in the Technical University of Berlin (Germany) and Lessius University (Belgium): 54 academic teachers in all will be retrained acquiring new practice oriented methodology and practical exercises for integrated labs /PC pools.

Training thematics

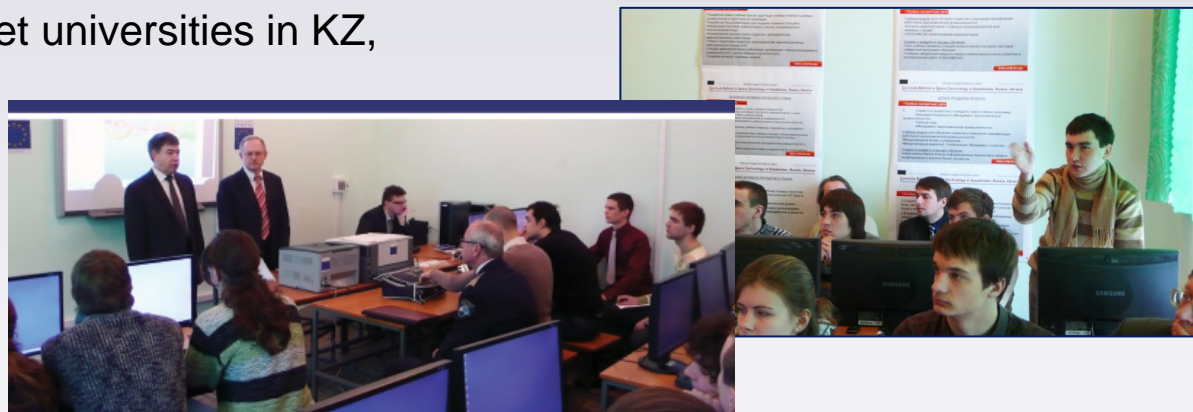
- ✓ Data transmission systems for space communication
- ✓ CAD/CAM/CAE: Pro Engineer, ECAD electronic design ALTIUM
- ✓ Small Satellite platform design
- ✓ Aerospace management
- ✓ Ground control station for small satellites



Project Outputs

Master Classes in Target Universities

- 18 master classes in target universities in KZ, UA, RU took place



Prepare, publish, purchase the new teaching materials, handbooks, syllabi

- 9 syllabi in the field of Space Technology were developed and published



Project Outputs

Ground segments for small satellite

Ground Station UHF-VHF

A small satellite communication ground station is specifically designed for small satellites in LEO

The satellite ground stations are suited for a number of different applications:

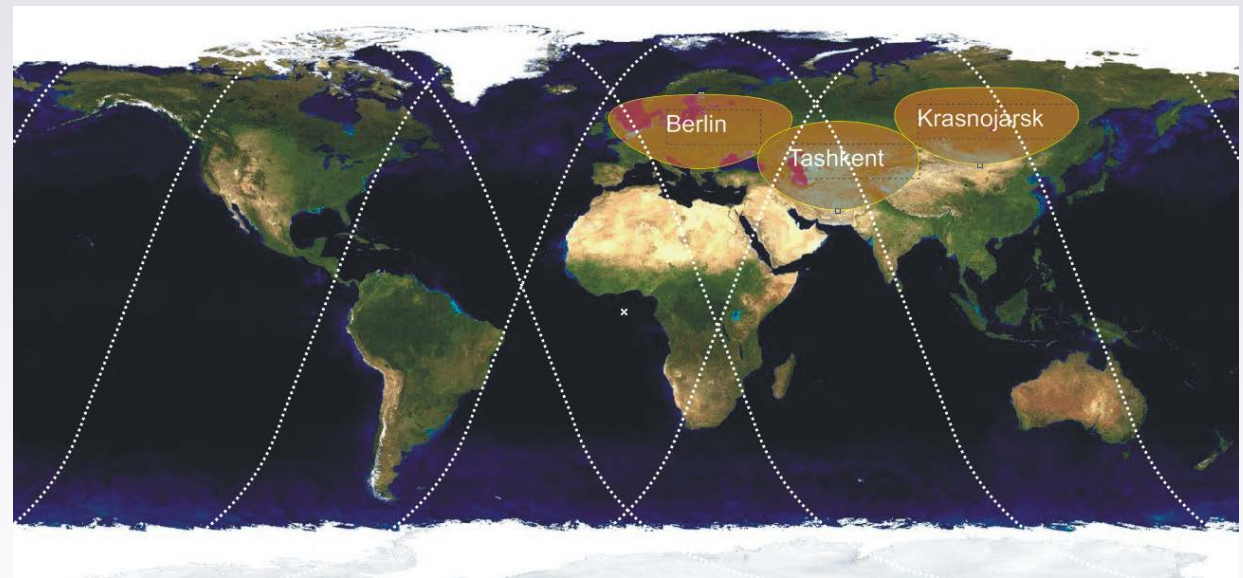
- Satellite command ground station
- Telemetry and tracking station
- HAM radio activities
- Educational projects



Project Outputs

International academic network of small satellite ground stations

Mission operations will be performed by the mission control center at the TU-Berlin and a network of cooperative ground stations will be connected to exchange satellite data.



In the world there is no similar new instrument of practice oriented education as it is the net of universities' ground stations which are being constructed during the project life.

Project Outputs

International academic network of small satellite ground stations



As a project result a network of 10 ground stations was established:

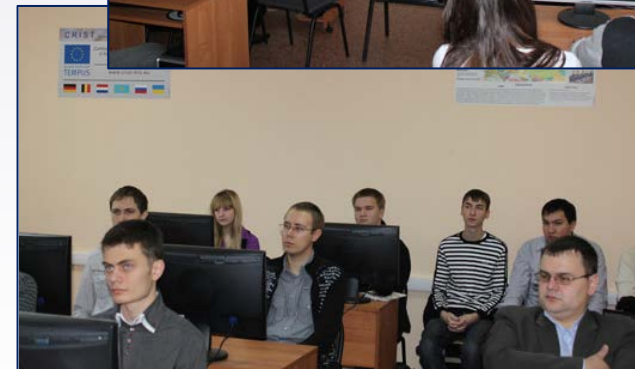
- Berlin, Germany
- Mechelen, Belgium
- Kiev, Ukraine
- Kharkov, Ukraine
- Dnepropetrovsk, Ukraine
- Astana, Kazakhstan
- Karaganda, Kazakhstan
- Tashkent, Uzbekistan

Project Outputs

Pilot Teaching / Operating

From October 2011, In the target universities (KZ, RU, UA), there was started a pilot teaching program for students (bachelors and masters) according new curricula, which were developed within the project. Also, supporting practical lessons, including laboratory work, took place (pc-pool, satellite-construction laboratory, ground station).

In each of the target universities, there was built a coordination-technical-office (CTO), which started the pilot operation to serve for linking among academia, Labour Market and the industry.



Project Outputs

Disseminations & Sustainable Activities

- 3 international conferences and 9 regional coordination meetings were held in KZ, UA, RU
- Project web portal as environment for space education
- Involving stakeholders in CRIST-Plus consortium
- Finding and attracting sponsors (CTO-activities)
- Commercialization of results (CTO-activities)

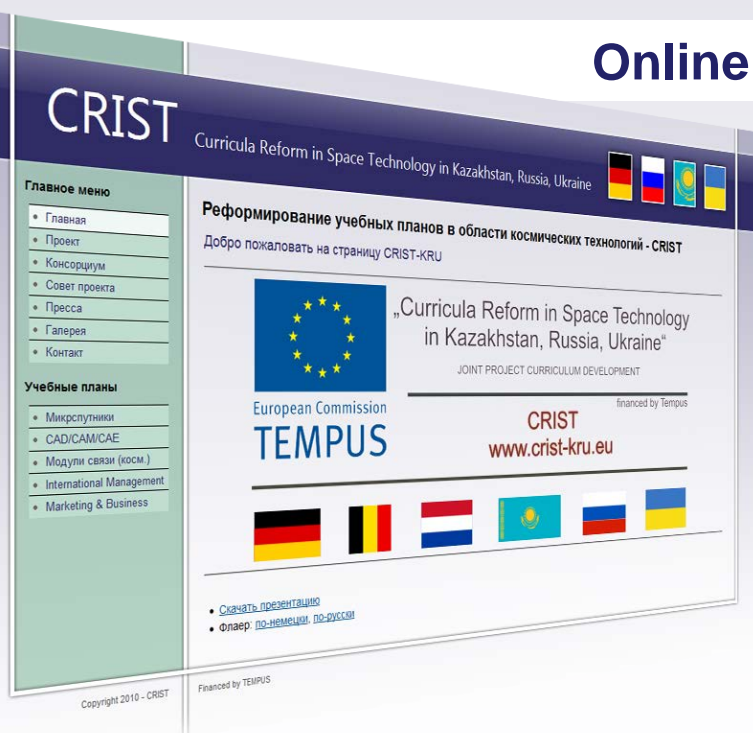


Project Outputs

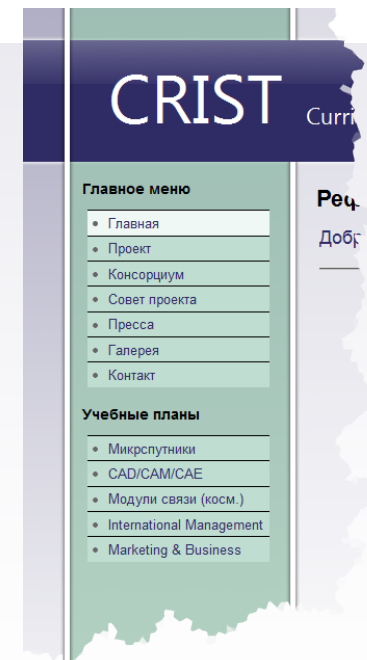
Project Website

www.crist-kru.eu

Online Teaching Material



- ✓ Data transmission systems for space communication
 - ✓ CAD/CAM/CAE: Pro Engineer, ECAD electronic design ALTIUM
 - ✓ Small Satellite platform design
 - ✓ Aerospace management
 - ✓ International Management & Economics
 - ✓ Relationship Marketing and International Business
- CRIST-Plus Agreement for download



Resume

Team work of the universities and industry enterprises has led not only to the mutual knowledge enrichment. Common approaches on development of the aerospace education system and its unification were formed. In particular, it was found that the issues of formation of continuous space education system, strengthening the role of scientific organizations and industry enterprises in training and job placement of the specialists are actual not only for Ukraine but for other countries.

The most important result of the Tempus project is a fact that cooperation of scientific teams able to solve complex issues in the area of space researches was formed; these issues are the following:

- development of small spacecrafts (e.g. university satellites) for remote sensing, navigation etc.;
- creation of the ground stations network for data reception and processing etc.

This cooperation has formed new prospective goals.

Good bye!



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