European Commission
TEMPUS

Project No:530510-TEMPUS-1-2012-RS-TEMPUS-JPCR

Project title:

Assisting humans with special needs: curriculum for **HU**man-**TO**ol interaction **N**etwork

Acronym: HUTON

Deliverable 2.1:

Review of existing syllabi (EU and Serbian UNI)

Due Date: **April 21 2013**

Submission date: **April 15 2013**

Start date of project: **15/10/2012**

Duration: **36 months**

Lead beneficiary for this deliverable: **BU**

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Revision: **1.0**

Dissemination Level		
NL	National level	
IL	International level (including the Commission Service)	√

Deliverable 2.1: **Review of existing syllabi (EU and Serbia)**

This deliverable is the first action of the WP2**: Design of new courses and restructuring of existing courses with supporting teaching materials**

Introduction:

The wider objective of the project "Assisting humans with special needs: Curriculum for **HU**man-**TO**ol interaction **N**etwork (HUTON)" is the development of interdisciplinary and multidisciplinary curriculum with the laboratory educational support and the educational training network for the optimized use of technology that improves the quality of life of humans with special needs

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The specific objectives in the project are:

- Development of the **new interdisciplinary and multidisciplinary accredited curriculum**(**MECHATRONICS FOR REHABILITATION**) leading to the master degree in the domain of technologies for humans with special needs.
- Setup of the training **network in Republic of Serbia (RS) in the domain of mechatronics, rehabilitation engineering and medicine, and neurorehabilitation** that enables the delivery of the new interdisciplinary and multidisciplinary curriculum.
- Training of staff for providing on-the-job education and use of appropriate technologies which increases **new employment opportunities.**
- Training of staff for providing **better medical services** for humans with special needs.

The project is planned with eight work packages, where the first four are the development activities.

The assumptions in the WP2 are the following: Review of the existing programs in the domain of the project, the development of the new courses and integration of the existing and new courses. It was anticipated the Serbian partners have expertise for specific courses and capabilities for further improvements. The discussions with the EU partners led to the conclusions that some courses from Slovenian programs could be integrated into the new curriculum.

The WP2 initial activity was the review of existing courses which could be deployed in the new syllabus, but with the emphasis on the parallel development of new courses.The success of the works in the WP 2 is that the review led to the selection of courses that will form the core and set of elective courses.
The focus was on the courses which encircle practical knowledge and applicable skills. The specific action, harmonized with the activities in the WP 3, was to maximize the hands on approach and optimize the use of the instrumentation and equipment that will be purchased. It has been decided that the interdisciplinary approach could be successfully achieved exclusively with the expert team of the HUTON consortium

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The activities were dedicated to the review of the existing courses held either in Serbia or EU partners. Commitments within WP2 were delegated to Serbian partners, where should cover most of the new courses.

Specifically the following roles were delegated:

The decision was reached that the EU partners must be integrated, and that this would be made possible with the timed circulation of all relevant information and plans. This decision was reached at the meeting in Ljubljana, March, 12. 2013.

The main role of UP in WP2 would be in translation of accumulated know-how in design of the new educational methods and teaching skills. The specific know-how comes from the most recent TEMPUS grant in the domain of harmonization of the curricula in Biomedical engineering in Europe.

The main role of UL in WP2 would be assistance in the development of the curricula in Mechatronics and Neurorehabilitation that will be coordinated by the UB and UNS. The group in Ljubljana will also give a consultancy related to the development of the Laboratory work and appropriate teaching material.

The main role of UG in WP2 would be in the domain of the robotics and movement rehabilitation and the development of related courses. More specifically, curricula in Mechatronics and neurorehabilitation that are coordinated by UB and UNP.

A Brief review of HUTON compliant curricula at EU partner Universities':

1. University of Ljubljana 4 semester Master Program

- Biomedical Techniques Curriculum

  Biological systems
  IT in Biomedicine
  Sensoring in Biomedicine
  Electronics in Biomedicine
  Numerical methods in Biomedicine
  Neuro cybernetics
  Signal acquisition
  Biomedical patterns
  Robot-human interaction
  Biomechanics
  Image analysis
  Data processing in biomedicine
  BIO electromagnetism
  Biomedical technique
  Communications in development

- Robotics

  Digital steering
  Robot mechanics
  Measuring systems
  Integrated systems
  Electro mechanical design

Automating and virtual systems
Robotic visual sensing
Robot steering
Robot-human interaction
Bio mechanics
EU regulations
Quality assurance
Automating and portable systems
Mechanisms in robotics
Haptic robots

- Mechatronics

Circuits and signal in energetic
Conventional electrical energy sources
Industrial electronics
Generators and transformers
Mechatronics systems
Digital processing in Mechatronics
Electrical servo systems
Electric motors
Electric sources
Materials and technologies
Digital processing in Mechatronics
Integrated drive units
Transducers
Electric devices design

Findings:

- voluminous curricula of HUTON compliant Programs
- some courses are appropriate for HUTON Curriculum
- curriculum must be reduced to fit 2 semester HUTON Master Program

2. University of Genoa 4 semester Master Program

Biomedical Engineering

Statistics and data processing
Mathematics for engineers
Biomaterials, molecular and tissue engineering
Biomedical data analysis
Instruments for Biomedical engineering
Chemistry and biochemistry
Programming for bioengineering
Biosensors and Microsystems
Biomechanics and rehab engineering
Clinical engineering
IT systems
Hospital facilities
Tissue mechanics
Bio fluid dynamics
Continuum mechanic
Neuro engineering
Human robotics
Recognition systems

Findings:

- In most topics this curriculum is compliant to HUTON Program
- curriculum must be reduced to fit 2 semester HUTON Master Program

3. University of Patras 4 semester Master Program

Biomedical Engineering

Applications of Physics in Medicine
Biology and Biochemistry
Anatomy
Physiology and Pathophysiology
Quality management
Electronics in Medicine
Fundamentals of Signal Processing
Tissue mechanics
Biocompatible materials
BMI/ Biosensors
BMI/Ultrasound

BMI/Life support
Medical Imaging- Instrumentation and Measurements
Medical Imaging – Image Processing and Analysis
Monte Carlo Techniques in Biomedical Research
Measurement of Non Electric Parameters in the Human Body
Dynamic modeling of Biomechanical Systems
BMI/Biomedical Signal Processing
Pattern Recognition
Health Care Telemetry
Neural Networks
Clinical Engineering
Health Care Technology Assessment

Findings:

- In most topics this curriculum is compliant to HUTON Program
- A good balance of pure Engineering and Life Science Courses
- Curriculum must be reduced to fit 2 semester HUTON Master Program

A Brief review of HUTON compliant curricula at Serbian Universities':

4. University of Belgrade (UB) has no Curriculum aimed on Mechatronics.

5. Neither State University of Novi Pazar has accredited Curriculum on Mechatronics.

6. University of Novi Sad Master Program 4 semester

Mechatronics

Pulse Electronics
Industrial robotics
Technology through systems and components
Machine mechanics
Application of sensors and actuators
Automation of working process
Graphical communications and CAD
IT in biosystems
Mechatronics
Mechatronics in vehicles
Optimization methods
Fundamentals of internal combustion engine (ICE)

PLC programming and applications
Technology of materials
English/German basic course
Artificial Intelligence
Mechatronics for Civil Engineering machines
Mechatronics for Prime Movers
Computer integrated Production Lines
Optimization with Simulations
Monitoring and visualization systems
English/German for Engineers
Implementation of automated systems
IT in agriculture
Nonindustrial robotics
Mechatronics and accessories for ICE
Vehicle accessories
Power and motion transmission
Design of Production Lines
Transportation lines and manipulators

Findings:

- Some Courses from the Curriculum can be integrated into HUTON Master Program

After conducting a substantial analysis of the compliant Curricula at EU and Serbian Universities, the HUTON Program Committee outlined a draft version of the New Curriculum.

HUTON Master Program 2 semester **MECHATRONICS FOR REHABILITATION**

Core Courses:

Control of biological actuators
Control of movement
Mechatronic systems in rehabilitation
Signals and systems in rehabilitation

Elective courses

Mechanics of robots
Pneumatic and hydraulic actuators
Sensors for mechatronic systems in rehabilitation
Microcomputers
Disability and rehabilitation
Assessment of signals in rehabilitation
Robotics for rehabilitation

The Curriculum is still open for the inclusion of the new courses and integration of existing courses, taught at EU partner Universities.