

**Project Acronym:** MEDIS

**Project Title:** A Methodology for the Formation of Highly Qualified Engineers at Masters Level in the Design and Development of Advanced Industrial Informatics Systems

**Contract Number:** 544490-TEMPUS-1-2013-1-ES-TEMPUS-JPCR

**Starting date:** 01/12/2013

**Ending date:** 30/11/2016

**Deliverable Number:** 3.1

**Title of the Deliverable:** Adaptation AIISM - Analyze Curricula

**Task/WP related to the Deliverable:**

**Type (Internal or Restricted or Public):** Internal

**Author(s):** Poteknin V.

**Partner(s) Contributing:**

1

**Project Co-ordinator**

Company name :	Universitat Politecnica de Valencia (UPV)
Name of representative :	Houcine Hassan
Address :	Camino de Vera, s/n. 46022-Valencia (Spain)
Phone number :	+34 96 387 7578
Fax number :	
E-mail :	husein@upv.es
Project WEB site address :	

**Contractual Date of Delivery to the CEC:**

**Actual Date of Delivery to the CEC:**

1

Deliverable 3.1

## Context

WP 3	Adaptation of AIISM to specific curricula in PC
WPLLeader	NTUU-KPI
Task 3.1	Adaptation AIISM - Analyze Curricula
Task Leader	NTUU-KPI
Dependencies	
Starting date	
Release date	

Author(s)	
Contributor(s)	Ambrajei A.
Reviewers	

## History

Version	Date	Author	Comments
1.0	2014/01/31	Poteknin V	Initial version
1.2	2014/02/16	Poteknin V, Ambrajei A	Revised version
2.0	2014/02/28	Poteknin V, Ambrajei A	Revised version

## Table of Contents

1. Executive Summary	4
2. Introduction	4
2.1 General information about the unit responsible for the new curricula	4
2.2 Target groups	4
2.3 Master degree programme	4
3. Analysis of Possibilities for the Integration of AIISM Courses	7
4. Laboratory Equipment	7
5. Conclusion	8

# **1. Executive Summary**

St. Petersburg State Polytechnic University is a Russian National Research Polytechnic University, which is a multidisciplinary for Russian polytechnic education, a leader in multidisciplinary scientific research, a meta-branch of the world class technology and knowledge based on innovation.

The main goal of SPbSPU Development Programme is the modernisation and development of the Polytechnic University as a university of a new generation, integrating world-class, multidisciplinary scientific research and meta-branch technology with the purpose of increasing the competitiveness of the national economy.

## **2. Introduction**

### **2.1 General information about the unit responsible for the new curricula**

The Institute of Information Technology and Control Systems (IITCS) graduates developers of modern information technologies, automation control systems and cybernetic systems. The basis of educational process is a profound five fundamental training in such areas as modern computer science, informatics and programming, microelectronics, information security, automation control systems, systems analysis and management, distributed computing and computer networks, information and measurement technology, measuring systems, computer mathematics and modelling, electronic object protection systems.

Control Systems and Technologies Department as a part of IITCS was organised in 2012 on the base of three fields of interest: Automated Control Systems, Integrated Computer Technologies in Industry and Distributed Intelligent Systems.

### **2.2 Target groups**

- Teachers.
- Students.
- Administrative and other non-teaching staff.

### **2.3 Master degree programme**

Control Systems and Technologies Department provides Master degree programmes in the fields:

230100 Information Science and Computer Engineering:

- Intelligent Systems and Technologies.
- Distributed Intelligent Control Systems.
- Intelligent Systems (International Master degree programme in English language).

220400 Control in Technical Systems:

- Distributed Intelligent Control Systems.
- Control Systems for Electrical Drives.
- Automation of Technological Processes and Production.

The scope of these programmes is 120 ECTS. Education is provided in Russian and English languages, also possible to use distance learning with the help of foreign scientists and professors.

As an example we can consider one of the programmes “Intelligent Systems and Technologies.” Curriculum of this programme present in Table 1. Types of teaching hours for each discipline are present in Table 2.

**Table 1** Curriculum of the programme “Intelligent Systems and Technologies”

№	Code	Title of the discipline	ECTS
	GS	<b>General Sciences</b>	18
	GSB	<i>Basic part</i>	6
1	GSB1	Intelligent Systems	3
2	GSB2	Methods of optimisation	3
	GSV	<i>Variable part</i>	12
3	GSV1	Knowledge Engineering	2,5
4	GSV 2	Mathematical Modelling and Simulation	4,5
5	GSV3S	Elective discipline	5
5.1	GSV3S1	Digital Image processing	
5.2	GSV3S2	Distributed Intelligent Systems	
	PS	<b>Professional Subjects</b>	43,5
	PSB	<i>Basic Part</i>	13
6	PSB1	Computing Systems	5
7	PSB2	Software Development Technologies	3,5
8	PSB3	Modern problems of Information Science and Computer Engineering	4,5
	PSV	<i>Variable Part</i>	30,5
9	PSV1	Neuroinformatics and Neurotechnologies	5
10	PSV2	Intelligent Computing	5
11	PSV3	Intelligent Systems for Data Processing	3,5
12	PSV4	CAD Engineering	4

13	PSV5	Signals and Information Theory	5
14	PSV6S	Elective discipline	8
14.1	PSV6S1	Intelligent Control Systems	
14.2	PSV6S2	Cognitive Multiagent Systems	
15	PR	Practices and research work	46,5
16	SC1	Final State Certification	12

**Table 2** Forms of instruction

Title of the discipline	Lectures	Type and number of hours					Total
		Lectures	Labs	Practical classes / Seminars	Contact hours	Self-study	
Control Systems and Technologies	18	0	18	36	72	108	
Knowledge engineering	18	0	36	54	36	90	
Methods of optimisation	18	0	18	36	72	108	
Mathematical modelling and simulation	36	18	0	54	108	162	
Digital image processing	18	0	36	54	126	180	
Distributed intelligent systems	18	0	36	54	126	180	
Computing systems	36	18	0	54	126	180	
Software development technologies	36	18	0	54	72	126	
Modern problems of information science and computer engineering	36	0	18	54	108	162	
Neuroinformatics and neurotechnologies	36	18	0	54	126	180	
Intelligent computing	18	18	18	54	126	180	
Intelligent systems for data processing	36	0	18	54	72	126	
CAD engineering	18	18	18	54	90	144	
Signals and information	18	0	36	54	126	180	

theory							
Intelligent control systems		18	36	36	90	198	288
Cognitive multiagent systems		18	36	36	90	198	288
Practice and research work		0	0	180	180	694	874

Presented courses (Microcontroller-based systems, Apply mobile devices, Industrial networks and fieldbuses to achieve the control, Design of controllers and simulators, and Industrial computer) can be integrated as a variable part of the programme instead of courses Neuroinformatics and neurotechnologies, CAD engineering, Signals and information theory, Intelligent control systems, and Cognitive multiagent systems, for example, see Table 1.

### 3. Analysis of Possibilities for the Integration of AIISM Courses

The analysis of five proposed AIISM courses and the curricula of the programme “Intelligent Systems and Technologies” enables to conclude the following:

- The duration of the proposed courses is 15 weeks and the duration of each semester in the St. Petersburg State Polytechnic University is 18 weeks. Thus, 3 weeks can be used for additional training skills.
- The proposed AIISM courses can be integrated into curricula as courses of a variable part of a Master Programme. According to current regulations a variable part equals to 4 or 5 credits of ECTS and may include several alternatives (elective courses). Thus, the proposed courses can be considered as elective courses to be chosen by students.

### 4. Laboratory Equipment

Developed and implemented of courses can be based on the use of laboratory equipment of Control Systems and Technologies Department:

- Intelligent control network of industrial controllers and automatic machines with hierarchical architecture and software for modelling of environment decentralised control of distributed objects and technological processes.
- Robotic assembling line based on hierarchic control network with multi-agent architecture.
- Reactor and filtration station for imitation of chemical production for designing of intelligent control systems for continues technological processes.
- Universal control system of distributed mobile transport systems and android

robots.

- Universal control system of distributed actuators and executive elements of industrial automation.
- Distributed system of digital sensors of industrial electronics.
- Industrial monitoring system Siemens SiPLUS CMS.
- NI Embedded Vision System for GigE Vision.
- LabView Robotics software bundle.

## **5. Conclusion**

The presented above master's programme is developed to provide preparation of masters in engineering and technology area – highly skilled experts in the field of intelligent systems and control technologies. Students wishing to be enrolled in that programme should have knowledge in the field of information technology, computer science, applied mathematics and informatics which enables to study courses on MEDIS methodology.