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Partner(s) Contributing:

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 :	

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1 Executive summary

This deliverable presents the report on the analysis of the possibilities of AIISM courses integration in the curricula of Master Programs at the Faculty of Physics, Mathematics and Information Technologies that is responsible for MEDIS Project in the S.Toraighyrov Pavlodar State University of Kazakhstan.

2 Introduction

The Faculty of Physics, Mathematics and Information Technologies was founded in 2003. It consists of three departments:

1. Department of Physics and Instrumentation;
2. Department of Mathematics and Informatics;
3. Department of Computer Engineering and Programming.

In the scientific field of basic research areas include faculty research in the physics of wave propagation; development of methodical training system logical-algebraic disciplines in higher education; modernization methodical system of training in the mathematical disciplines of economic universities; problems of modern theoretical algebra (bourhood groups); problems of training competent IT-specialist. Currently, research is being conducted at the Faculty of program quality, efficiency, programmer, software verification, code metrics software.

In academic sphere of the Faculty of Physics, Mathematics and Information Technologies offers 9 Bachelor Programmes (4 years) and 6 Master Programmes (2 years after a Bachelor Programme).

The Department of Physics and Instrumentation conducts teaching in the following programs:

- Bachelor Programme 5B060300 – “Mechanics”
- Bachelor Programme 5B060400 – “Physics”,
- Bachelor Programme 5B071600 – “Instrumentation”
- Master Programme 6M060400 – “Physics”. In 2012, developed and implemented a joint educational program for masters in "Physics" (educational program "Information Processes and Systems") with the National Research Tomsk State University, Russia.
- Master Programme 6M071600 – “Instrumentation”.

The Department of Mathematics and Informatics conducts teaching in the following programs:

- Bachelor Programme 5B060100 – “Mathematics” (educational program “Actuarial Mathematics”);
- Bachelor Programme 5B010900 – “Mathematics”;
- Bachelor Programme 5B060200 – “Informatics”;
- Bachelor Programme 5B070300 – “Information Systems” (educational programmes “Information Systems in Economics”; “Information Systems in Engineering”).
- Master Programme 6M060100 – “Mathematics”;
- Master Programme 6M011100 – “Informatics”;
- Master Programme 6M060200 – “Informatics”;
- Master Programme 6M070300 – “Information Systems”.

The Department of Computer Engineering and Programming conducts teaching in the following programs:

- Bachelor Programme 5B070400 – “Computers and software”

3 Analysis of the Unit Responsible for MEDIS Project

The Department of Mathematics and Informatics has been chosen as the unit responsible for the fulfilment of MEDIS Project. This decision is caused by the following reasons:

1. This department is preparing masters 6M070300 - "Information systems", 6M060200 - «Computer." Educational programs are closely connected with modern information technologies, computer systems. Graduates of these master programs have to be competent concerning the software for the solution of applied professional problems of informatics in the field of development, introduction of innovative projects in the IT -sphere.

2. Of the total number of theoretical training 65 credits of the Republic of Kazakhstan (RK) at the state level approved seven credits. The department of may define the rest. Thus, can to integration of AIISM courses into curricula the above mentioned programmes.

3. This department has solid long-term collaboration with IT-industry what will enable the receiving of the feedback about the quality of new Master Programme students’ professional skills from the following organizations:

- "Pavlodar regional center of information technologies";
- "Center analytical information"
- "Education Department of Pavlodar";
- Branch of "National Centre of Excellence" Orleu "Institute for Advanced Studies of teachers of Pavlodar region"

4. This department has both relevant experience and high potential for the effective participation in the project. Additional staff from other departments can be involved to the project if necessary.

4 Degree Structures

4.1 Master Programme “Information Systems”

The Master Programme 6M070300 – “Information Systems” includes 120 credits of ECTS. It is based on the Bachelor Programme 5B060200 – “Informatics” and the Bachelor Programme 5B070300 – “Information Systems”.

The degree structure of the Master Programme 6M070300 – “Information Systems” for 2013/2014 academic year is presented in Table 1.

Table 1

First Year			
First Semester		***Second Semester***	
Course Title	*Credit RK/ECTS*	*Course Title*	*Credit RK/ECTS*
History and Philosophy of Science	2/4	Logic programmer culture	3/5

Continuation of Table 1

Foreign language (professional)	2/4	Information systems architecture	2/4
Pedagogy	2/4	Infrastructure Information Systems	3/5
Psychology	2/4	Theory pattern networks	3/5
Business Kazakh language	2/4	Informatics and mathematical methods of designing Internet resources	3/5
Programming Theory and specification	4/6	Educational Practices	3/3
Research work	1/4	Research practice	1/4
		Research work	1/4
Total	***15/30***	***Total***	***19/35***
Second Year			
Third Semester		***Fourth Semester***	
Course Title	*Credit RK/ECTS*	*Course Title*	*Credit RK/ECTS*
Graph theory and graph representation of programs	4/6	Research practice	2/8
Computer networks, the Internet and multimedia technology	3/5	Research work	4/16
Human-Computer Interaction	4/6	Comprehensive Exam	1/1
Methods of teaching IT-disciplines in higher education	3/5	Appearance and defense of master's thesis	3/4
Research work	1/4		
Total	***15/26***	***Total***	10/29
Total for the Programme	***120** ECTS*		

4.2 Master Programme “Informatics”

The Master Programme 6M060200 – “Informatics” includes 120 credits of ECTS. It is based on the Bachelor Programme 5B060200 – “Informatics” and the Bachelor Programme 5B070300 – “Information Systems”.

The degree structure of the Master Programme 6M060200 – “Informatics” for 2013/2014 academic year is presented in Table 2.

Table 2

First Year			
First Semester		***Second Semester***	
Course Title	*Credit RK/ECTS*	*Course Title*	*Credit RK/ECTS*
History and Philosophy of Science	2/4	Business Kazakh language	2/4
Foreign language (professional)	2/4	Computer networks, the Internet and multimedia technology	3/5
Pedagogy	2/4	Development and use of educational electronic publications and online resources	3/5
Psychology	2/4	Algorithms and their complexity	3/5
Cryptology	3/5	Computer design of content learning in higher education	3/5
Logic programmer culture	3/5	Educational Practices	3/3
Research work	1/4	Research practice	2/8
		Research work	1/4
Total	***15/30***	***Total***	***29/39***
Second Year			
Third Semester		***Fourth Semester***	
Course Title	*Credit RK/ECTS*	*Course Title*	*Credit RK/ECTS*
Software engineering	2/4	Research practice	1/4
Theory pattern networks	4/6	Research work	4/16
Programming Theory and specification	4/6	Comprehensive Exam	1/1
Methods of teaching IT-disciplines in higher education	4/6	Appearance and defense of master's thesis	3/4
Research work	1/4		
Total	***15/26***	***Total***	***9/25***
Total for the Programme	***120** ECTS*		

4.3 Bachelor Programme “Software Engineering”

The Bachelor Programme 5B070300 – “Information Systems” includes 240 credits of ECTS. It is a basis for both the Master Programme 6M060200 – “Informatics” and the Master

Programme 6M070300 – “Information Systems”.

The degree structure of the Bachelor Programme 5B070300 – “Information Systems” is presented in Table 3.

Table 3

№	Module	ECTS
1	Mathematical analysis	5
2	Algebra and Geometry	5
3	Physics	6
4	Probability theory and mathematical statistics	5
5	Informatics	5
6	Philosophy and Political Science	8
7	Ecology and life safety	6
8	Fundamentals of information systems and algorithms	8
9	Logical culture programmer and programming technologies	10
10	Architecture computer systems	5
11	Information marketing	5
12	Numerical Methods	5
13	Software tools for economic calculations	5
14	Optimization techniques and fundamentals of queuing theory	10
15	Isskusstvennogo intelligence system	5
16	Computer graphics and computer simulation	9
17	Design and construction of multimedia systems	5
18	IP database	5
19	Data analysis in ekoromicheskih information systems and programming	9
20	Predicate programming and program verification methods	5
21	Computer Networks	5
22	New information technology network	6
23	Basic research	5
24	New technologies in economic information systems	5
25	Information Security and Web Technology	9
26	Programming Technology on 1C	5
27	Social Studies	9
28	Language training in the specialty	4
29	Foundations of Law and Economic Theory	6
30	Poliyazykovaya training	20
31	Accounting and auditing	5
	Total theoretical training	**205**
32	Practice	25
33	Final state certification	10
	In total	**35**
	Only	**240**

4.4 Bachelor Programme “Informatics”

The Bachelor Programme 5B060200 – “Informatics” includes 240 credits of ECTS. It is a basis for both the Master Programme 6M060200 – “Informatics” and the Master Programme

6M070300 – “Information Systems”.

The degree structure of the Bachelor Programme 5B060200 – “Informatics” is presented in Table 4.

Table 4

№	Module	ECTS
1	Mathematical analysis	6
2	Analytic geometry and linear algebra	5
3	informatics	5
4	Ecology and life safety	6
5	Philosophy and Political Science	8
6	discrete Mathematics	5
7	Algorithms and Data Structures	5
8	Programming Languages and Technologies	5
9	Theory of database languages and automata	9
10	Foundations of information science	5
11	Software tools for mathematical calculations and numerical methods	10
12	Architecture computer systems	5
13	Logical culture programmer	5
14	Basic research	5
15	Optimization techniques, the basics of queuing	10
16	computer graphics	5
17	Operating Systems	5
18	System of artificial intelligence and computer simulation	10
19	Planning, design and multimedia information systems	9
20	Predicate programming and program verification methods	5
21	Computer Networks	5
22	Modern programming languages	5
23	System Programming	5
24	New information technology network	6
25	Information security and data protection	5
26	Web-technology	4
27	parallel Computing	5
28	Programming Technology on 1C	5
29	social Studies	8
30	Language training in the specialty	6
31	Foundations of Law and Economic Theory	6
32	Poly language training	19
	Total theoretical training	207
33	Practice	23
34	Final state certification	10
	Only	**240**

5 Analysis of Possibilities for the Integration of AIISM Courses

The analysis of both the proposed AIISM courses (fulfilled on the basis of available Deliverables of WP1) and the curricula of the programmes

- Master Programme 6M070300 – “Information Systems”,
- Master Programme 6M060200 – “Informatics”,
- Bachelor Programme 5B070300 – “Information Systems”,
- Bachelor Programme 5B060200 – “Informatics”

enables to conclude the following:

1. The duration of the proposed courses is 15 weeks and the duration of each semester in the S.Toraighyrov Pavlodar State University is 15 weeks.
2. Both Master Programs (6M070300 – “Information Systems” and 6M060200 – “Informatics”) can be used as the basis for AIISM implementation.
3. The proposed AIISM courses can be integrated into curricula as courses of a variable part of a Master Program. According to current regulations a variable part equals to 58 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. Both Bachelor Programs 5B070300 – “Information Systems” and 5B060200 – “Informatics” doesn’t provide prospective future undergraduates with sufficient knowledge in electronics (in particular in analog electronics) necessary for some AIISM courses. To overcome this gap in knowledge will be administered on the first semester module analog electronics. AIISM modules should be included in the second and third semesters. Fourth semester for undergraduates is not training.
5. Both Bachelor program 5B070300 - «Information Systems" and 5B060200 - «Science» Future undergraduates provide a sound knowledge of computer architecture and programming that will meet the requirements AIISM courses.

6 Available Equipment

The Department of Mathematics and Informatics for training uses two computerized educational laboratories (Laboratory "Software for e-learning" and laboratory "New information technology network"), 3 specialized audience ("Computer", "Information Systems", "Computer technology").

The above educational laboratories and specialized audience stands equipped to meet modern requirements. In specialized offices are 7 computers. educational laboratories are available for 12 computers. In classrooms installed interactive whiteboards and multimedia projectors, which are widely used during the sessions. University computer labs are connected to the Internet.

The Department of Mathematics and Informatics has several classrooms that can be reorganized into specialized laboratories according to MEDIS Project requirements.

7 Conclusion

The fulfilled analysis presented above enables to conclude that the effective adaptation of AIISM into curricula of both the Master Programme 6M070300 – “Information Systems” and the Master Programme 6M060200 – “Informatics” is possible as well as the unit responsible for the new curricula has enough potential for the successful implementation of MEDIS project.