BELARUSIAN STATE PEDAGOGICAL UNIVERSITY NAMED AFTER MAXIM TANK

Mathematics and informatics

OVERVIEW REPORT OF HIGHER EDUCATION STUDY PROGRAMME

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INFORMATION ON EVALUATED STUDY PROGRAMME

Title of study programme	Mathematics and informatics
Study area	Computer sciences
Study cycle	First
Study mode (length in years)	Full time (4), part time (5)
Volume of the study programme in ECTS credits	240
Degree and (or) Professional qualifications awarded	Bachelor

CONTENT

Erasmus+ **Co–funded by the Erasmus+ Programme of the European Union**

INTRODUCTION

The experts assessed the study programme and provided recommendations to coordinators for improving the study programme. During the updating of the study programme "Mathematics and informatics" experts and coordinators constantly communicated. The programme coordinators took into consideration the recommendations of experts and even some versions of the study programme were submitted. Evaluation of the study programme involve the analysis of:

- Aims and learning outcomes of the study programme "Mathematics and informatics";
- Corellation between learning outcomes and subjects of the study programme "Mathematics and informatics";
- Correlation between learning outcomes of the study programme and the educational standard approved by the Ministry of Education of the Republic of Belarus;
- Curriculum compliance with the aims of the project.

I. ANALYSIS OF THE PROGRAMME

1.1. Programme aims and learning outcomes

Main goal of the programme:

Learning outcomes are listed according to Dublin Descriptors: **K – knowledge, P – professional skills, R – research skills, S – social skills.**

Main learning outcomes of "Mathematics and informatics" specialist:

1. Apply basic scientific and theoretical knowledge to solve practical problems. **K**
2. Develop data structures for use in information systems, operational analysis systems and intellectual systems. **P**
3. Perform modeling, design of software tools and documentation to support activities in various subject areas. **P**
4. Perform comprehensive testing of the developed software products and applied software. **P**
5. Plan and organize automated support of various activities. **P**
6. Build and optimize models of various systems and processes. **P**
7. Analyze perspectives and directions of development of information systems and technologies. **R**
8. Work independently and in a team. **S**
9. Generate new ideas focusing on creativity, critical thinking, communication and collaboration. **S**

The programme aims and learning outcomes are well defined and clear, they are based on the academic and professional requirements, public needs and the needs of the labour market.

Foreign experts provided methodology for formulating study goals and outcomes, presented examples and actively participated in the process of creation the goals and outcomes.

It was important for the coordinators that the goals and learning outcomes of the study programme comply with the educational standard approved by the Ministry of Education of the Republic of Belarus, and for the experts – that the goals and learning outcomes of the study programme comply with Bologna process requirements.

For this reason the correlation between learning outcomes of "Mathematics and informatics" and the educational standard approved by the Ministry of Education of the Republic of Belarus was proposed to make for coordinators (Table 1). Correlation table is done and submitted in the description of the study programme.

Table 1

Study programme learning outcomes	Belarusian standard
1. Apply basic scientific and theoretical knowledge to solve practical problems.	AC-1. Be able to apply basic scientific and theoretical knowledge to solve theoretical and practical problems
	AC-7. Have skills related to the use of technical devices, information management and work with a computer.
2. Develop data structures for use in information systems, operational analysis systems and intellectual systems.	AC-2. Possess a system and comparative analysis.
	AC-7. Have skills related to the use of technical devices, information management and work with a computer.
3. Perform modeling, design of software tools and documentation to support activities in various subject areas.	AC-6. Have an interdisciplinary approach to problem solving.
	AC-10. To be able to carry out educational and research activities.
4. Perform comprehensive testing of the developed software products and applied software.	AC-2. Possess a system and comparative analysis.
	AC-4. To be able to work independently.
	PCS-15. Develop educational opportunities of students on the basis of systematic pedagogical diagnostics.
5. Plan and organize automated support of various activities.	AC-1. Be able to apply basic scientific and theoretical knowledge to solve theoretical and practical problems.
	AC-2. Possess a system and comparative analysis.
	AC-6. Have an interdisciplinary approach to problem solving.
	SPC-3. Have the ability to interpersonal communication.
6. Build and optimize models of various systems and processes.	AC-6. Have an interdisciplinary approach to problem solving.
	AC-11. Be able to regulate educational relations and interactions in the pedagogical process.
	PCS-1. Effectively implement educational activities.
	PCS-3. Use the optimal methods, forms, teaching tools.
7. Analyze perspectives and directions of development of information systems and technologies.	AC-6. Have an interdisciplinary approach to problem solving.
	PCS-23. Organize a holistic pedagogical process taking into account modern educational technologies and pedagogical innovations.
8. Work independently and in a team.	AC-5. Be able to generate new ideas (have creativity).
	SPC-6. To be able to work in a team.
	SPC -7. Be capable of self-education and self-improvement of professional activities.
9. Generate new ideas focusing on creativity, critical thinking, communication and collaboration.	AC-5. Be able to generate new ideas (have creativity).
	AC-11. Be able to regulate educational relations and interactions in the pedagogical process.
	SPC-2. Be skilled in social interaction.
	SPC-3. Be able to effect interpersonal communication.
	SPC-8. Be able to implement valuable and oriented activities.
	PCS-4. Carry out the optimal selection and effectively

implement the technology of education.
PCS-22. To carry out self-education and self-improvement of professional activity.

In the final version of the study programme "Mathematics and informatics" the goal and learning outcomes are in compliance with legal acts and other documents establishing academic and professional requirements for the qualifications of specialists trained.

The correlation between learning outcomes and subjects was done too (Table 2). It is commendable that all the subjects in the study plan, not just updated during the project, were presented in correlation with the study programme outcomes. In the evaluation of the relationship it has been observed that the subjects correlate with the outcomes of the study programme, are related and include all learning outcomes.

Table 2

Courses	Study programme learning outcomes								
	1(K)	*2(P)*	*3(P)*	*4(P)*	*5(P)*	*6(P)*	*7(R)*	*8(S)*	*9(S)*
The series of socio-humanitarian disciplines									
State component									
Integrated module "History"								x	x
Philosophy	x							x	x
Integrated module "Economics"	x		x			x		x	x
Integrated module "Politology"								x	x
Component of higher education institution									
Law in IT sphere/ Intellectual Property and Information Protection	x							x	x
The series of general scientific and general professional disciplines									
State component									
Pedagogy	x							x	x
Psychology	x		x					x	x
Information technology in education	x		x	x	x	x	x	x	x
Foreign language [5]		x						x	
Safety of human vital activity	x							x	
Belarusian language (professional)	x	x	x					x	
Component of higher education institution									
Introduction to the pedagogical profession								x	
Team building								x	x
Age-specific physiology and school hygiene								x	
Distance learning technologies	x					x		x	x
Physics	x	x	x			x	x		
Astronomy	x	x	x			x	x		
State component									
Mathematical logic and discrete mathematics		x							x
Analytical geometry and plane transformations	x					x			
Methods of figures images and fundamentals of geometry	x					x			
Algebra	x		x			x			
Number theory	x	x							
Mathematical analysis	x	x							
Differential equations	x	x	x						
Methods of teaching mathematics							x	x	x
Programming technologies and algorithms	x	x	x	x	x	x	x		
Computer graphics and multimedia [6]	x	x	x	x	x	x	x		
Information systems and networks [7]	x	x	x	x	x	x	x	x	
Methods of teaching informatics	x		x	x	x	x	x	x	x
Course work [2]	x		x						
Course work [3]	x		x						
Component of higher education institution									
Introduction to mathematics	x	x							
Differential geometry	x		x						
Function theory	x		x			x			
Elementary mathematics and practical work on solving problems	x		x						

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	1	2	3	4	5	6	7	8	9
Computer networks	x	x	x	x	x	x	x	x	
Workshop on solving problems in informatics	x	x	x	x	x	x	x		x
Integrated course of school mathematics	x	x	x						
Workshop on methods of teaching mathematics	x	x	x	x	x				
Computational methods and computer modeling	x	x	x	x	x	x	x		x
Theory of probabilities and mathematical statistics	x	x	x		x	x	x		
Disciplines for student choice[4]									
Entertaining and Olympiad mathematical problems / Functional analysis / Solving complex and Olympiad problems in programming	x	x	x	x	x				
Modern approaches to teaching students in mathematics / Formation of students' research skills in solving problems with parameters	x				x			x	
Management of IT projects / Technologies of network pedagogical interaction	x		x					x	x
Additional types of training									
Psychology of information perception	x							x	x
Physical Culture								x	x

Integrated courses

The programme aims and learning outcomes are consistent with the type and level of studies and the level of qualifications offered. The name of the programme, its learning outcomes, content and the qualifications offered are compatible with each other.

1.2. Curriculum Design, Study process and Student Performance

The study programme was upgraded introducing 12 new innovative courses (56 credits, 24%), defining new goals, outcomes and skills of the study programme as well as formulating principles of organization in implementation and innovative methods (Table 3).

Table 3

No	Courses EN	BSPU need to integrate during the project, ECTS	Course title in study plan	ECTS
1	Law in the IT sphere / Право в IT сфере	**3**	Law in IT sphere/	3
2	Intellectual Property and Protection of Information / Интеллектуальная собственность и защита информации	**3**	Intellectual Property and Information Protection	3
3	Psychology of Information Perception / Психология восприятия информации	**3**	Psychology of information perception	3
4	Management of IT Projects / Управление ИТ проектами	**3**	Management of IT projects / Technologies of network pedagogical interaction	3
5	Multimedia Creation and Processing Technologies / технологии создания и обработки мультимедиа	**6**	Computer graphics and multimedia[6]	6
6	Computer Networks / Компьютерные сети	**3**	Computer networks	3
7	Web Technologies / веб технологии	**3**	Information systems and networks[7]	6
8	English for Specific Purposes / Профессиональный английский	**8**	Foreign language[5]	11
9	Team building / Командообразование	**6**	Team building	6
10	IT technologies in Education / ИТ технологии в образовании	**5**	Information technology in education	5
11	Technology of Distance Learning / Технологии дистанционного образования	**4**	Distance learning technologies	4

12	Technology of Pedagogical Interaction Network/ технологии педагогического взаимодействия	3	Technologies of network pedagogical interaction	3
	ECTS	**50**		**56**

As a supplements and changes to the curriculum for the academic disciplines "Foreign Language[5]", "Computer Graphics and Multimedia[6]", "Information Systems and Networks[7]", the sections "Professional English", " Technologies for creating and processing Multimedia", " Web Technologies" are included.

Instead of the 50 credits that BSPU need to integrate during the project, 56 credits are allocated in the study programme plan for the courses to be integrated. This will let achieve higher competencies in the training of the specialists of this area.

The curriculum design meets legal requirements. Newly integrated study courses are spread evenly, their themes are not repetitive. The content of the courses is consistent with the type and level of the studies. The content and methods of the courses are appropriate for the achievement of the intended learning outcomes. The content of the newly integrated study courses reflects the latest achievements in science and technologies.

The experts of Alytaus kolegija evaluate newly integrated courses descriptions and the methodological material presenting their conclusions and recommendations. Conclusions about course descriptions have already been written and submitted to course developers, methodological material is being prepared.

The relationship was maintained during the preparation of the courses between the learning outcomes of the programme, learning outcomes of the courses and study methods.

II. RECOMMENDATIONS

1. To publicize the study programme on TV, press, university website.

2. To collaborate with stakeholders, constantly review goals and learning outcomes of the study programme, implement innovations and new technologies.

3. To publicize the program in the international space in order to attract foreign students who can study in the Erasmus+ programme.

4. To promote students' research skills and engage in research activities.

5. Create freely accessible learning material for the new courses, adapt it to teaching foreign students.

6. Acquire e-learning equipment and provide opportunities for virtual mobility.