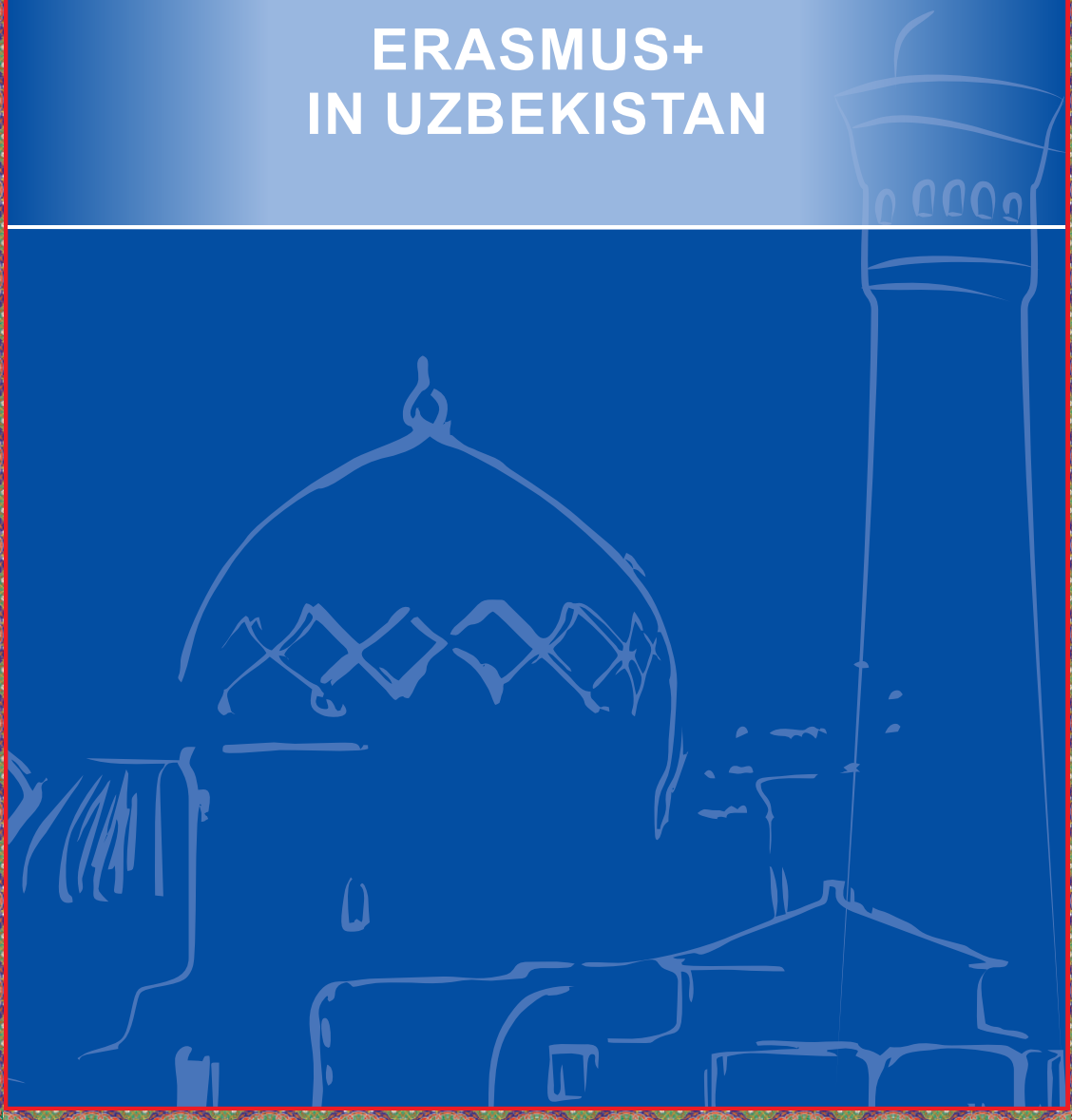
with the support of the
Erasmus+ Programme
of the European Union

ERASMUS+
IN UZBEKISTAN



Tashkent - 2021

Prepared by the National Erasmus+ Office in Uzbekistan

Financed by the Erasmus+ programme of the European Union

The conclusions and views expressed herein are those of the authors and do not necessarily reflect an official view of the European Commission

Ўзбекистондаги Erasmus+ миллий офиси томонидан тайёрланган

Бу нашр Европа Иттифоқининг Erasmus+ дастури

томонидан молиялаштирилган

Ушбу нашрда акс эттирилган хулосалар Европа Комиссиясининг

фикрини ифода этмайди

Подготовлено Национальным офисом Erasmus+ в Узбекистане

Издание профинансировано программой Erasmus+ Европейского Союза
Выводы и заключения, содержащиеся в статьях, не отражают мнения
Европейской Комиссии

ANALYSIS AND COMPARISON OF MECHATRONICS TEACHING SYSTEMS IN EU AND UZBEKISTAN: TOWARDS THE DEVELOPMENT OF A BACHELOR DEGREE IN UZBEKISTAN THROUGH INNOVATIVE IDEAS AND DIGITAL TECHNOLOGY

Maria Drakaki[1], Anastasios Ntabizas[2], Thomas Thomidis[3]

[1] Department of Science and Technology, International Hellenic University ,14th Km Thessaloniki – N. Moudania, 57001, Thermi, Greece
[2] SEERC – South East European Research Centre, 24, Proxenou Koromila st., 54622, Thessaloniki, Greece
[3] Department of Nutritional Sciences and Dietetics, International Hellenic University, PO Box 141, 57400, Thessaloniki, Greece

Abstract

This paper aims to present some of the main findings of the work package one (WP1) of the "Modernization of Mechatronics and Robotics for Bachelor degree in Uzbekistan through Innovative Ideas and Digital Technology (MechaUz)" Erasmus+KA2 project (2020-2022). The work package aimed, primarily, to implement an analysis and comparison of mechatronics teaching systems and methods in HEIs of EU and Uzbekistan, at both undergraduate and graduate level.

1. Introduction

Mechatronics has been identified as an interdisciplinary field. The main characteristic in mechatronics is the synergism and integration of mechanical engineering, computers, control systems and electronics in the design process (Craig and Stoffi, 2002).

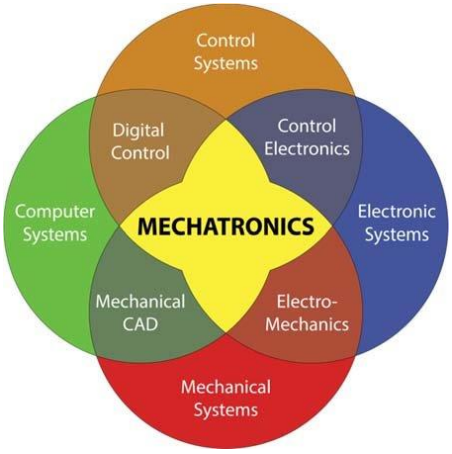


Figure 1: Mechatronics synergism and integration in the design (Craig and Stoffi, 2002).

It has been defined as “an intelligent and unifying paradigm, that offers an area of interdisciplinary knowledge and interactions regarding ways of working and thinking, practical experiences, as well as theoretical knowledge” (Maki et al., 2013; Liliana and Florina, 2015). There is no unique definition of Mechatronics, based on the findings of WP1. As a result, different Mechatronics degree programmes, at both the bachelor and master degree level, present their own perspective of Mechatronics. A mechatronics definitions, based on the findings of WP1, follows.

> “Mechatronics is a fusion of mechanical, electrical and control engineering. In order to compete successfully in a global market, modern manufacturing companies must have the ability to integrate electronics, control, software and mechanical engineering into a range of innovative products and systems. Graduates of this programme will have this interdisciplinary knowledge, skill and approach to engineering.” (BEng Mechatronics, School of Engineering, University of Glasgow (UK)).

An analysis and comparison of mechatronics teaching systems and methods in HEIs of EU and Uzbekistan, at both undergraduate and graduate level was implemented in WP1 of the MechaUz project. Furthermore, the studying experience of the EU MechaUz partners in the implementation of standards, curriculum and teaching materials in the field of Mechatronics was investigated and identified. Finally, a list of good practice examples, based on the studying experience of the EU partners, was compiled.

2. Methodology

A template (MechaUZ - Working Template for WP1) was used by the MechaUZ Partners for filling out information required for the completion of the relevant tasks 1 in WP1. The collected information has been included in appendix B. The template was introduced by the MechaUz coordinator and WP1 leader, the International Hellenic University (IHU).

The template was divided into Part A and Part B. Part A involved the analysis and comparison of mechatronics teaching systems and methods in HEIs of EU and Uzbekistan.

Data on Part A included bachelor and/or master degrees in Mechatronics for EU and Uzbekistan. The programmes listed for each country of interest should cover the essential information about the corresponding teaching systems in the respective countries and therefore the provided list of relevant degree programmes should not be exhaustive. Information in Part A included (for each identified bachelor/master degree programme): programme title; department; University; Country; URL; degree of study programme; ECTS; duration (in years); language; bachelor project; teaching methodology (Theory, lab sessions, development of projects, connection with industry, seminars, other); course-specific learning aims/outcomes/competences; the structure of the programme;

profile of the programme (distribution of the course subjects); and any further comments (such as collaboration with industry, industrial experience, etc.).

Information in Part B included a list of good practice examples. Partners were asked to provide their own studying in the implementation of standards, curriculum and teaching materials in the field of Mechatronics. They could also list URL addresses.

3. WP1 Results – Discussion

Detailed results and relevant discussion have been included in the report of WP1 of the MechaUz project.

3.1 Mechatronics and Mechatronics related programme titles at a bachelor degree level

In total, 50 bachelor degree programmes from 24 countries were identified, in EU and UK. Degree programmes in EU and UK include Mechatronics, Mechatronics Engineering, combined degrees such as Mechatronics and Robotics, Mechatronics and Business Management and Automotive Mechatronics.

Other degree programmes include Automation Engineering, Automation and Control Engineering, Informatics: Robotics and Intelligent Systems, Automotive Engineering, Mechanical and Manufacturing Engineering, Production Engineering and Management and Industrial Engineering and Management.

In Uzbekistan, degree programmes include Mechatronics and Robotics and Computer Engineering.

3.2 Mechatronics and Mechatronics related programme titles at a master degree level

29 master degree programmes from 14 countries were identified, in EU and UK. Degree programmes in EU and UK include Mechatronics, Mechatronics Engineering and combined degrees such as Mechatronics and Robotic Engineering, Mechatronic systems for Industry and Medicine, Control for Green Mechatronics, Mechatronic systems and advanced mechanics and Mechatronics and Business Management.

Other degree programmes include Informatics: Robotics and Intelligent Systems, Automation and Control Engineering, Automation Systems, Robotics and Automation Engineering, Strategic Product Design, Manufacturing and Welding Engineering Design and Mechanical and Manufacturing Engineering.

In Uzbekistan, master degree programmes include Mechatronic Engineering (Control Technologies for Industries 4.0) and Mechatronics and Robotics.

3.3 Programme duration

The duration of the bachelor degree programmes in Mechatronics or related degrees in EU, UK and Uzbekistan varies between 3-5 years. Specifically, 16 bachelor degree programmes have a duration of 4 years (34.8%), 22 programmes

have a duration of 3 years (47.8%), 4 programmes have a duration of 3.5 years (8.7%) and 4 programmes have a duration of 5 years (8.7%).

3.4 Teaching methodology

Teaching methodology includes different combinations of lectures, laboratory classes, individual and group projects, connection with industry, internships and tutorials. Laboratory work is integrated in all bachelor degree programmes. High tech laboratories are highlighted in some degree programmes.

3.5 The course profiles by subjects

For each identified course at a bachelor degree programme, the course profile was described in a Table which included the main fields of study. The results varied among different countries. Detailed results have been included in the WP1 report of the MechaUz project. Indicative results from bachelor degree programs in France and Portugal follow.

France

Subject	**Percentage of the total course modules**
Mechanical Engineering	9-19%
Electrical/Electronic Engineering	9-15%
Computer Science/ ICT	0-7%
Mechatronics	22-49%
Fundamental subjects	21-51%

Portugal

Subject	**Percentage of the total course modules**
Mechanical Engineering	17-20%
Electrical/Electronic Engineering	30-32%
Computer Science/ ICT	10-19%
Mechatronics	8-17%
Fundamental subjects	14-32%

References

Craig K, Stolfi F. (2002). “Teaching control system design through mechatronics: Academic and industrial perspective”, Mechatronics, 12(2), pp. 371–81.

Liliana D., Florina P.S. (2015). Education, Knowledge and Innovation from a Mechatronics Perspective, Procedia – Social and Behavioral Sciences, vol. 203, p. 205.

Maki, K., Habib and J. Paulo Davim (2013). Interdisciplinary Mechatronics: Engineering Science and Research Development, Wiley-ISTE.

THE ROLE OF TRIGGER PROJECT IN THE EMPLOYMENT OF UNIVERSITY GRADUATES IN UZBEKISTAN

Ulugbek Tulakov, Termez State University, tulakov77@mail.ru
Omon Mahmudov, Termez State University, omon77@mail.ru
Gafur Togaev, Termez State University, scream-jgb@mail.ru

Abstract: One of the most important priorities today is the employment of graduates of higher education institutions and the formation of entrepreneurial skills in them. It is no secret that the quality of education and the conditions created for our young people to get higher education or to graduate as qualified professionals depend on the conditions created. The fact that the theoretical knowledge currently provided by higher education institutions must be implemented in consultation with employers is very important in a developing market environment. This article describes the ongoing deeds and expected results under the EU Erasmus+ project "Triggering innovative approaches, entrepreneurial skills and attitudes in HEI learners through creating the favourable conditions for graduate's employability in Central Asia - TRIGGER".

Introduction.

It should be noted that due to the attention paid to young people in our country and the creation of a modern education system for them, today youth issues have risen to the level of state policy. On July 16, 2021, at a video conference chaired by President Shavkat Mirziyoyev on the priorities of the higher education system, consistent development of the education system in order to provide young people decent education, to train specialists in line with world standards has become a topic of discussion. Based on these requirements, the main goal of the policy of our country is to provide students with a thorough knowledge and attention to their future independent life. In addition, the authorities of higher education institutions in the country is constantly cooperating with employers on increasing employment rate of graduates.