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MECHAUZ

MechaUZ Work Package 1 – Tasks 1.1 & 1.2

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Work Package 1 Tasks

- **Work Package 1 - Task 1.1 description**:
- Analysis and comparison of teaching systems and methods in HEIs of EU and Uzbekistan.

- **Work Package 1 - Task 1.2 description**:
- Studying experience of the EU partners in the implementation of standards, curriculum and teaching materials in the field of Mechatronics. Compiling a list of good practice examples.

Data collection preparation

- The MechaUZ - Working Template for WP1 was prepared In order to cover the objectives of WP1
- The MechaUZ partners were assigned to complete a report according to the format of the MechaUZ - Working Template for WP1.

Data collection preparation

- List of MechaUZ partners and countries of interest (EU, UK, Uzbekistan) assigned to each MechaUZ partner in order to collect data for the tasks of Work Package 1.

MechaUZ partner	Country of interest for data collection
International Hellenic University (IHU)	Greece, Cyprus, Austria, Malta
Polytechnic Institute of Viana do Castelo (IPVC)	Portugal, Spain, France
Liepāja University (LIEPU)	Germany, Poland, LATVIA
SEERC	UK, Bulgaria, Romania
Turin Polytechnic University in Tashkent (TTPU)	Uzbekistan (TTPU), Italy, Sweden, Ireland, Slovakia
Vidzeme University of Applied Sciences (ViA)	Netherland,Estonia
Vilnius Gediminas Technical University (VGTU)	Denmark, Norway, Hungary, Czech Republic
Andijan Machine-Building Institute (AndMI)	Finland, Belgium
Tashkent State Technical University (TSTU)	Uzbekistan (TSTU)
Tashkent University of Information Technology (TUIT)	Uzbekistan (TUIT)

Methodology

- The MechaUZ - Working Template for WP1 was introduced by IHU in order to ensure that all MechaUZ partners fill out the required information fields and the content is uniform.
- Discussion on the content (scientific and organisational) of the template took place during the 1st MechaUZ zoom meeting.

- Continuous communication and feedback was present especially during the data collection phase between partners and IHU (WP1 leader).
- Discussions on the progress of WP1 as well as progress on data collection and relevant inquiries took place during the 2nd and 3rd zoom meetings.

- The collected information has been included in appendix B of the WP1 report.

Methodology

- The template was divided into Part A and Part B.

- Part A involved information on task 1.1
- Part B involved information on task 1.2

Methodology

- Information in Part A (for each identified bachelor/master degree programme) included
- Programme title
- Department
- University
- Country
- URL
- Degree of Study Programme
- ECTS
- Duration (in years)
- Language

Methodology

- 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.
- Any further comments (Information may include reference to textbooks, assessment methods, collaboration with industry, etc.).

Methodology

- 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.
- If the partners wanted to list bachelor degrees in Mechatronics offered by their own University, they should fill out the information according to Part A, except if they had already done so in Part A.

Results

- WP1 results have been included in the report in a summary form per country.

- Complete results per country of interest in the MechaUZ - Working Template for WP1 have been included in Appendix B.

- Discussion of the results (included in the report).

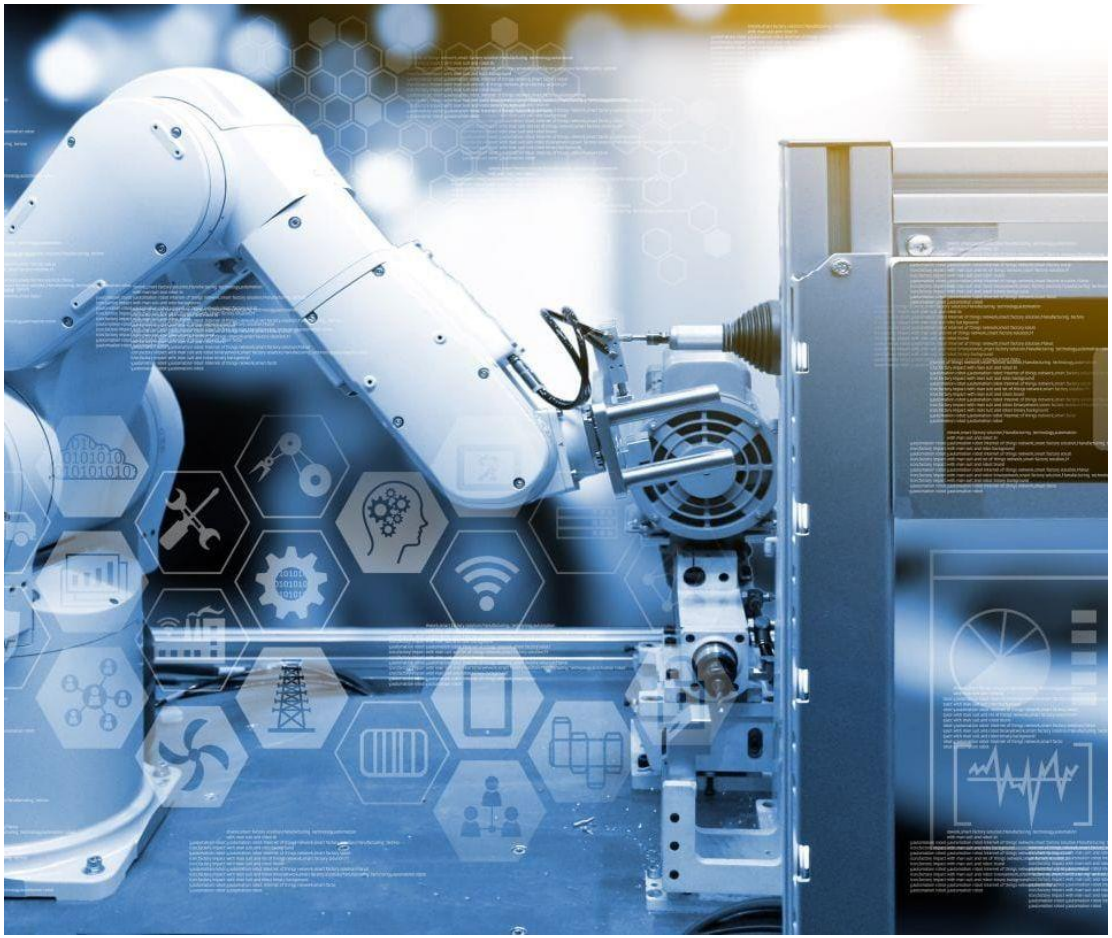
Results- Discussion

Mechatronics Definition -Based on the studied degree programmes

- There is no unique definition of Mechatronics.

- Different Mechatronics degree programmes, at both the bachelor and master degree level, present their own perspective of Mechatronics.

Mechatronics definitions presented by the EU and UK universities



BEng Mechatronics, School of Engineering, University of Glasgow (UK)

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.

Bachelor of Science Mechatronics, Department of Mechatronics, University of Innsbruck (joint programme with UMIT TIROL) (Austria)

Mechatronics includes all techniques to develop systems, processes, devices and products whose essential characteristics are created by the **integration and interaction of mechanical, electronic and information-processing components.**

This results in the development of systems that have a high degree of functionality, efficiency and capacity.

BEng Mechatronics, School of Engineering, University of Glasgow (UK)

Mechatronics is the marriage of mechanical engineering with smart electronics and is vital to subjects such as industrial automation and robotics.

To interact with an object, a mechatronic system must know where the object is, be able to move the object and place it in the required new position. The electronics require information from sensors that can detect position, orientation, and visual or audio signals. The electrical inputs from the sensors have to be interpreted and the appropriate signals sent out to the actuators to perform the required operation.

A good understanding of feedback control is also required to be able to make changes in the system from one steady position to another without oscillations or unpredictable movements.

MSc Mechatronic Engineering (Control Technologies for Industries 4.0), Department of Electronics and Telecommunication Politecnico di Torino (Italy)

A mechatronic system or device can be defined as one for the design of which you need a wealth of cross curricular knowledge, mainly, but not only, of electronics, mechanics, machinery and electrical drives, automatic control and information technology.

Graduates in Mechatronic Engineering gain a scientific and technical knowledge of mechatronic systems that is "transversal" by nature as it crosses over electronics, mechanics, electrical drives, automatic control and information technology. and equipment, and managing of laboratories and plants.

Bachelor Mechatronics Engineering, Faculty of Science and Technology, Vic University (Spain)

The degree in Mechatronics Engineering focuses on interdisciplinary techniques and knowledge of mechanics, electronics, control and computer science to conceive new ways or producing, developing new products and designing new machines.

You will be able to incorporate knowledge of these disciplines to provide solutions that go beyond those that could be obtained individually.

Bachelor Mechatronics Engineering, National Institute of Applied Sciences (France)

Mechatronics engineers are involved in the development of automated systems that use techniques from different disciplines: mechanics, electronics, computer science and automatic controls.

They are involved throughout the life cycle of industrial products: research and development, preliminary design, development, industrialization, operation.

Mechatronics is present in all sectors of industry: transport, consumer goods, capital goods… Robots, autonomous vehicles, active suspensions, etc. are examples of products resulting from mechatronic product development.

Bachelor Mechatronics Engineering, Polytechnic Institute of Viana do Castelo (Portugal)

The bachelor's degree in mechatronics engineering has a multidisciplinary character, incorporating areas such as computer science, electronics, mechanics, automation and control.

The bachelor's degree seeks to train professionals with a long-range profile, allowing them to find solid skills in industrial computing, electronics, mechanics, automation and control, allowing the integration of theoretical and practical knowledge essential to the exercise of project and industrial maintenance.

The bachelor degree programme titles offered in EU, UK and Uzbekistan, included in the MechaUZ WP1 analysis

In total, **50 bachelor degree programmes** from **24 countries** are shown in a Table, in EU and UK.
Regarding Uzbekistan, **2 bachelor degree programmes** have been included.

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**.

Bachelor degree	Programme title	University	Country
BEng	**Mechatronics**	University of Glasgow	United Kingdom
BEng	**Mechatronics Engineering**	University of Manchester	United Kingdom
BEng	**Mechatronics and Robotic Engineering**	University of Birmingham	United Kingdom
BSc	**Mechatronics**	Technical University of Sofia	Bulgaria
BSc	**Mechatronics**	Transilvania University of Brașov	Romania
BSc	**Mechatronic Engineering**	Universita degli Studi di Padova	Italy
BSc	**Mechatronic Engineering**	University of Bologna	Italy
BSc	**Automation and Control Engineering**	Politecnico di Milano	Italy
BSc	**Automation Engineering**	University of Bologna	Italy
BSc	**Automation Engineering**	University of Gävle	Sweden
BEng	**Automotive Mechatronics**	Slovak Technical University	Slovakia
BSc	**Robotics and Intelligent devices**	National University of Ireland Maynooth	Ireland
Bachelor	**Mechatronics Engineering**	Vic University	Spain
Bachelor	**Mechatronics**	La Almudia Polytechnic University School	Spain
Bachelor	**Electronics, Robotics and Mechatronics Engineering**	Málaga University	Spain

Bachelor	Electronic, Robotics and Mechatronics Engineering	Sevilla University	Spain
Bachelor	**Mechatronics Engineering**	National Institute of Applied Sciences	France
Bachelor	**Mechatronics Engineering**	EIGSI general engineering school in La Rochelle	France
Bachelor	**Mechatronics Engineering**	ISTY - INSTITUT DES SCIENCES ET TECHNIQUES DES YVELINES	France
Bachelor	**Mechatronics Engineering**	Ecole nationale superieure des mines d'Ales	France
Bachelor	**Mechatronics Engineering**	Polytechnic Institute of Viana do Castelo	Portugal
Bachelor	**Mechatronics Engineering**	University of Évora	Portugal
Bachelor	**Integrated Engineering**	Tallinn University of Technology	Estonia
Bachelor	**Mechatronics**	Fontys University of Applied Sciences	Netherlands
Professional bachelor	**Mechatronics**	Liepaja University	Latvia
Professional bachelor	**Mechatronics**	Vidzeme University of Applied Sciences	Latvia
Professional bachelor	**Mechatronics Engineering**	Riga Technical University	Latvia

Professional bachelor	**Mechatronics Engineering**	**Riga Technical University**	**Latvia**
Professional bachelor	**Mechanics and metalworking, heat energy, heat engineering and mechanical engineering**	Rezekne Academy of Technologies	Latvia
Bachelor	**Mechatronics**	Darmstadt TU	Germany
BSc	**Mechatronics Engineering**	German International University	Germany
Bachelor	**Mechatronics Engineering**	University of Science and Technology	Poland
Bachelor	**Mechatronics**	Warshaw University Of Technology	Poland
Bachelor	**Mechatronics**	Gdansk University of Technology	Poland
BSc	**Automotive Engineering**	Frederick University	Cyprus
BSc	**Mechanical and Manufacturing Engineering**	University of Cyprus	Cyprus
BEng (Hons)	**Mechanical Engineering (Manufacturing)**	Malta College of Arts, Science & Technology	Malta
BSc in Engineering (Hons)	**Mechatronics and Business Management**	University of Applied Sciences Upper Austria	Austria
BSc	**Mechatronics**	University of Innsbruck - Joint Study Programme of the University of Innsbruck and the Private University for Health Sciences, Medical Informatics and Technology	Austria

BEng	**Production Engineering and Management**	**Democritus University of Thrace**	**Greece**
BSc	Industrial Engineering and Management	International Hellenic University	Greece
Bachelor	Mechatronics Engineering	University of South Bohemia in České Budějovice	Czech Republic
BSc	Mechatronics Engineering	University of Debrecen	Hungary
Bachelor	Mechatronics Engineering	Óbuda University	Hungary
Bachelor	Informatics: Robotics and Intelligent Systems	Oslo University	Norway
BEng	Mechatronics (Engineering)	University of Southern Denmark	Denmark
BSc in Engineering	Mechatronics	University of Southern Denmark	Denmark
Bachelor	Mechatronics and Robotics	Vilnius Gediminas Technical University	Lithuania
Bachelor	Mechatronics	Kaunas Technology University	Lithuania

BSc	**Mechatronics and Robotics**	**Tashkent State Technical university**	**Uzbekistan**
BSc	**Computer Engineering**	Tashkent university of information technologies	Uzbekistan

The master degree programme titles offered in EU, UK and Uzbekistan, included in the MechaUZ WP1 analysis

29 master degree programmes from 14 countries are shown in a Table, in EU and UK. Regarding Uzbekistan, 1 master degree programme has been included.

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)**.

Master degree	Programme title	University	Country
MEng	**Mechatronics**	University of Glasgow	United Kingdom
MEng	**Mechatronics Engineering**	University of Manchester	United Kingdom
MEng	**Mechatronics and Robotic Engineering**	University of Birmingham	United Kingdom
MSc	**Mechatronic systems for Industry and Medicine**	Transilvania University of Brașov	Romania
MSc	**Mechatronic Engineering (Control Technologies for Industries 4.0)**	Politecnico di Torino	Italy
MSc	**Automation and Control Engineering**	Politecnico di Milano	Italy
Master	**Robotics and Automation Engineering**	Sevilla University	Spain
Master	**Mechatronics**	University of Vigo	Spain
Master	**Mechatronics**	Polytechnic University of Valencia	Spain
Master	**Mechatronics**	Oviedo University (joint master degree with other universities from France, Russia, Netherlands, Germany and Egypt))	Spain

Master	Advanced Mechatronics	Université Savoie-Mont Blanc	France
MSc	Control for Green Mechatronics	University Bourgogne Franche-Comté	France
MSc	Mechatronic systems and advanced mechanics	Université de Technologie Compiègne	France
Master	Mechatronics Engineering	University of Minho	Portugal
Master	Mechatronics	TTK University of Applied Sciences	Estonia
MSc	Mechatronics	Poznan University of Technology	Poland
MSc	Mechanical and Manufacturing Engineering	University of Cyprus	Cyprus
MSc	Manufacturing and Welding Engineering Design	Frederick University	Cyprus
MSc	Mechatronics	Malta College of Arts, Science & Technology	Malta
Master (Diplom-Ingenieur/Diplom-Ingenieurin für technisch-wissenschaftliche Berufe (DI oder Dipl.-Ing.)	Mechatronics and Business Management	University of Applied Sciences Upper Austria	Austria

Master (Diplom-Ingenieurin/Diplom-Ingenieu) (Dipl.-Ing. or DI)	Mechatronics	University of Innsbruck - Joint Study Programme of the University of Innsbruck and the Private University for Health Sciences, Medical Informatics and Technology (UMIT TIROL)	Austria
MSc	Mechatronics	University of Western Macedonia	Greece
MSc	Strategic Product Design	International Hellenic University	Greece
MSc	Automation Systems	National Technical University of Athens	Greece
Master	Informatics: Robotics and Intelligent Systems	Oslo University	Norway
Master	Mechatronics	University of Agder	Norway
Master	Mechatronics Systems	Vilnius Gediminas Technical University	Lithuania
Master	dual degree program “Mechatronics”	Vilnius Gediminas Technical University	Lithuania
MSc	Mechatronic Engineering (Control Technologies for Industries 4.0)	TTPU	Uzbekistan

Bachelor thesis

Bachelor thesis is an integral part of more than 95% of the bachelor degree programmes

Department/School of the Degree Programmes

Bachelor degree programmes

Relevant information was not available for all studied bachelor/master degree programmes (for instance, France and Portugal?).

Based on available information shown in a Table **, for 34 bachelor degree programmes, Faculty of Engineering, School of Engineering, Faculty of Science and Technology was shown in 7 bachelor degree programmes (20,6%)**.

Department (or Faculty) of Electrical and Electronic Engineering, as well as **Department of Electrical and Electronic Engineering combined with other disciplines (such as with systems engineering) was shown in 5 bachelor degree programmes (14.7%)**.

Department (or Faculty) of Mechanical Engineering, as well as **Department (or Faculty) of Mechanical Engineering combined with other disciplines (such as safety engineering) was shown in 5 bachelor degree programmes (14.7%).**

Department (or Faculty) of Industrial and Management Engineering, as well as **related Departments (such as Department of Management Engineering) was listed in 5 bachelor degree programmes (20.6%)**.

Department (or Faculty) of Mechatronics/Mechatronics Engineering, as well as **Department (or Faculty) of Mechatronics/Mechatronics Engineering combined with other disciplines was shown in 6 bachelor degree programmes (17.6%).**

Master degree programmes

Based on available information shown in a Table, **for 19 master degree programmes, Faculty of Engineering, School of Engineering, Faculty of Science and Technology was shown in 4 master degree programmes (21.1%).**

Department (or Faculty) of Electrical and Electronic Engineering, as well as Department of Electrical and Electronic Engineering combined with other disciplines (such as with systems engineering) was shown in 6 master degree programmes (31.6%).

Department (or Faculty) of Mechanical Engineering, as well as Department (or Faculty) of Mechanical Engineering combined with other disciplines was shown in 3 master degree programmes (15.6%).

School of Industrial and Information Engineering was shown in 1 master degree programme (5.3%).

Department (or Faculty) of Mechatronics/Mechatronics Engineering, as well as Department (or Faculty) of Mechatronics/Mechatronics Engineering combined with other disciplines was shown in 5 master degree programmes (26.3%).

Programme duration

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%).

Teaching methodology

Teaching methodology includes **different combinations of lectures, laboratory classes, individual and group projects, connection with industry, seminars, internships and tutorials**.

Laboratory work is integrated in all bachelor degree programmes.

High tech laboratories are highlighted in some degree programmes.

Language

Based on information **for 50 bachelor degree programmes in Mechatronics or related to Mechatronics bachelor degree programmes, 10 bachelor degree programmes are taught in English (20%)**.

7 bachelor degree programmes are taught both in English and the corresponding national language (14%), and **2 bachelor degree programmes are taught in the corresponding national language and Russian (4%)**.

62% of the bachelor degree programmes are taught in the corresponding national language.

Based on information **for 29 master degree programmes in Mechatronics or related to Mechatronics degree programmes, 11 master degree programmes are taught exclusively in English (37.9%)**.

5 master degree programmes are taught both in English and the corresponding national language (26.3%), and **1 master degree programme is taught in the corresponding national language and Russian (3.4%)**.

32.4% of the master degree programmes are taught exclusively in the corresponding national language.

The course profiles by subjects

For each identified course at a bachelor degree programme, **the course profile was described in a Table**, shown below, which includes the main fields of study.

Subject	Percentage of the total course modules
Mechanical Engineering	
Electrical/Electronic Engineering	
Computer Science/ ICT	
Mechatronics	
Fundamental subjects	

United Kingdom

BEng/MEng Mechatronics, School of Engineering, University of Glasgow

BEng/MEng Mechatronics Engineering, Department of Electrical and Electronic Engineering, University of Manchester (3/4 year degree)

BEng/MEng Mechatronics and Robotic Engineering, Department of Electronic, Electrical and Systems Engineering, University of Birmingham

Subject	Percentage of the total course modules
Mechanical Engineering	8-25%
Electrical/Electronic Engineering	27-45%
Computer Science/ ICT	6-13%
Mechatronics	15-18%
Fundamental subjects	11-20%

Bulgaria

- **BSc Mechatronics**, **Faculty of Mechanical Engineering, Technical University of Sofia** (4 year degree)

"The curriculum is …to a great extent similar to the curricula of the leading universities from Europe and primarily from Germany."

Romania

- **BSc Mechatronics, Faculty of Product Design and Environment, Transilvania University of Brașov** (4 year degree)

- **MSc Mechatronic systems for Industry and Medicine, , Faculty of Product Design and Environment, Transilvania University of Brașov** (2 year degree)

Subject	Percentage of the total course modules
Mechanical Engineering	18%
Electrical/Electronic Engineering	22%
Computer Science/ ICT	28%
Mechatronics	12%
Fundamental subjects	20%

Italy

BSc Mechatronic Engineering, Department of Management and Engineering, Universita degli Studi di Padova
BSc Mechatronic Engineering, Department of Electrical Energy and Information Engineering "Guiglielmo Marconi", University of Bologna

Subject	Percentage of the total course modules
Mechanical Engineering	29.8-30.3
Electrical/Electronic Engineering	16.8-20.5
Computer Science/ ICT	5-14.8%
Control Engineering	11.2-13.1%
Fundamental subjects	21.3-34%
Mechatronics	0-3.2%

Italy

BSc Automation Engineering, Department of Electrical Energy and Information Engineering "Guiglielmo Marconi", University of Bologna
BSc Automation and Control Engineering, School of Industrial and Information Engineering, Politecnico di Milano

Subject	Percentage of the total course modules
Mechanical Engineering	21.3-29.8%
Electrical/Electronic Engineering	19.7-20%
Computer Science/ ICT	5-12.5%
Control Engineering	11.3-12.5%
Fundamental subjects	33.9-34%
Mechatronics	0

Italy

MSc Mechatronic Engineering (Control Technologies for Industries 4.0), Department of Electronics and Telecommunication Politecnico di Torino

Subject	Percentage of the total course modules	
	BSc in IT	BSc in ME
Mechanical Engineering	16,67	10
Electrical/Electronic Engineering	8,33	8.33
Computer Science/ ICT	10	10
Control Engineering	25	31.67
Mechatronics & Robotics	15	15
Fundamental subjects	0	0
Thesis	25	25

Sweden

BSc Automation Engineering, University of Gävle

Subject	Percentage of the total course modules
Mechanical Engineering	18.75
Electrical/Electronic Engineering	18.75
Computer Science/ ICT	12.5
Control Engineering	16.66
Fundamental subjects	25
Mechatronics	0
Thesis	8.33

Slovakia

Bachelor Automotive Mechatronics, Faculty of Electrical Engineering and Information Technology, Slovak Technical University

Subject	Percentage of the total course modules
Mechanical Engineering	11.67
Electrical/Electronic Engineering	20.81
Control systems	6.1
Computer Science/ ICT	9.14
Mechatronics	9.14
Fundamental subjects	22.84
Others(projects,languages,thesis,humanitarian subjects)	20.3

Ireland

BSc Robotics and Intelligent devices, Department of Electronic Engineering, National University of Ireland Maynooth

Subject	Percentage of the total course modules
Mechanical Engineering	0
Electrical/Electronic Engineering	9.4
Computer Science/ ICT	42.75
Control Engineering	6.25
Mechatronics & Robotics	9.37
Fundamental subjects	11.5
Thesis,industrial work experience	20.8

Spain

Bachelor Mechatronics Engineering, Faculty of Science and Technology, Vic University
Bachelor Mechatronics, La Almudia Polytechnic University School

Subject	Percentage of the total course modules
Mechanical Engineering	15-20%
Electrical/Electronic Engineering	23-33%
Computer Science/ ICT	10-13%
Mechatronics	18-23%
Fundamental subjects	18-30%

Spain

Bachelor Electronics, Robotics and Mechatronics Engineering, Escuela de Ingenierías Industriales, Málaga University
Bachelor Electronic, Robotics and Mechatronics Engineering, Escuela Tecnica Superior de Ingenierías, Sevilla University

Subject	Percentage of the total course modules
Mechanical Engineering	8-12%
Electrical/Electronic Engineering	32-45%
Computer Science/ ICT	10-14%
Mechatronics	5-25%
Fundamental subjects	25%

France

Bachelor Mechatronics Engineering, National Institute of Applied Sciences
Bachelor Mechatronics Engineer, EIGSI general engineering school in La Rochelle
Bachelor Mechatronics Engineering, ISTY - INSTITUT DES SCIENCES ET TECHNIQUES DES YVELINES
Bachelor Mechatronics Engineer, Ecole nationale superieure des mines d'Ales

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

Bachelor Mechatronics Engineering, Polytechnic Institute of Viana do Castelo
Bachelor Mechatronics Engineering, University of Évora

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%

Estonia

Bachelor Integrated Engineering, School of Engineering, Tallinn University of Technology

Subject	Percentage of the total course modules
Mechanical Engineering	10%
Electrical/Electronic Engineering	17%
Computer Science/ ICT	13%
Mechatronics	23%
Fundamental subjects	33%

Netherlands

Bachelor Mechatronics, Fontys University of Applied Sciences

Subject	Percentage of the total course modules
Mechanical Engineering	20
Electrical/Electronic Engineering	20
Computer Science/ ICT	20
Mechatronics	20
Fundamental subjects	20

Latvia

Professional bachelor Mechatronics, Faculty of Science and Engineering, Liepaja University.
Professional bachelor Mechatronics, Faculty of Engineering, Vidzeme University of Applied Sciences

Subject	
Mechanical Engineering	6-10%
Electrical/Electronic Engineering	15-32%
Computer Science/ ICT	6-15%
Mechatronics	20-32%
Fundamental subjects	13.5-24%
Internships	12.5-16%

Germany

Bachelor Mechatronics, Faculty of Engineering, Darmstadt TU.
Bachelor of Science in Mechatronics Engineering, German International University

Subject	
Mechanical Engineering	4.4-12%
Electrical/Electronic Engineering	4.4-28%
Computer Science/ ICT	7.8-13%
Mechatronics	8.3-16%
Fundamental subjects	22.2-31%
Internships	Dual studies - internship is integrated in the study process and is not separated.

Poland

Bachelor Mechatronics Engineering, Department of Robotics and Mechatronics, AGH University of Science and Technology.
Bachelor Mechatronics, Faculty of Mechatronics, Warshaw University Of Technology
Bachelor Mechatronics, Department of Mechanical Engineering, Gdansk University of Technology

Subject	Percentage of the total course modules
Mechanical Engineering	15-25%
Electrical/Electronic Engineering	12-22%
Computer Science/ ICT	10-12%
Mechatronics	10-17%
Fundamental subjects	23-35%

Cyprus

Bachelor of Science Automotive Engineering, Department of Mechanical Engineering, Frederick University.
Bachelor of Science Mechanical and Manufacturing Engineering, Department of Mechanical and Manufacturing Engineering, University of Cyprus

Subject	
Mechanical Engineering	50-56%
Electrical/Electronic Engineering	2.3-9,1%
Computer Science/ ICT	6.8-15,9%
Mechatronics	6,8-9.1%
Fundamental subjects	18,2-25%

Malta

Bachelor of Engineering (Hons) Mechanical Engineering (Manufacturing), Malta College of Arts, Science & Technology.

Subject	
Mechanical Engineering	39.5%
Electrical/Electronic Engineering	4.7%
Computer Science/ ICT	14%
Mechatronics	7%
Fundamental subjects	20.9%

Austria

Bachelor of Science Mechatronics, University of Innsbruck - Joint Study Programme of the University of Innsbruck and the Private University for Health Sciences, Medical Informatics and Technology (UMIT TIROL).

Subject	Percentage of the total course modules
Mechanical Engineering	29.6%
Electrical/Electronic Engineering	14.8%
Computer Science/ ICT	18.5%
Mechatronics	18.5%
Fundamental subjects	14.8%

Greece

Bachelor of Science Industrial Engineering and Management, International Hellenic University.
Bachelor of Engineering Production Engineering and Management, Democritus University of Thrace.

Subject	
Mechanical Engineering	30,2-31.7%
Electrical/Electronic Engineering	7,5-23.8%
Computer Science/ ICT	9,4-17.5%
Mechatronics	1.6-1,9%
Fundamental subjects	15.9-18,9%

Uzbekistan

BSc Mechatronics and Robotics, Department of Mechatronics and Robotics, Tashkent State Technical university (TSTU).

Subject	Percentage of the total course modules
Mechanical Engineering	16%
Electrical/Electronic Engineering	16%
Computer Science/ ICT	18%
Mechatronics	33%
Fundamental subjects	17%

Uzbekistan

MSc Mechatronic Engineering (Control Technologies for Industries 4.0), Department of Electronics and Telecommunication, TTPU

Subject	Percentage of the total course modules	
	BSc in IT	BSc in ME
Mechanical Engineering	16,67	10
Electrical/Electronic Engineering	8,33	8.33
Computer Science/ ICT	10	10
Control Engineering	25	31.67
Mechatronics & Robotics	15	15
Fundamental subjects	0	0
Thesis	25	25

Uzbekistan

BSc Computer Engineering, Department of Computer Systems , Tashkent university of information technologies (TSTU).

Subject	Percentage of the total course modules
Mechanical Engineering	0
Electrical/Electronic Engineering	7
Computer Science/ ICT	57
Mechatronics	9
Fundamental subjects	27

Finland

NOT AVAILABLE

Belgium

NOT AVAILABLE

Czech Republic

Bachelor degree Mechatronics Engineering, University of South Bohemia in České Budějovice

NOT AVAILABLE

Hungary

Bachelor degree Mechatronics Engineering, Department of Bánki Donát Faculty of Mechanical and Safety Engineering, Óbuda University

NOT AVAILABLE

Norway

Bachelor degree Informatics: Robotics and Intelligent Systems, Department of Informatics, Faculty of Mathematics and Natural Sciences, Oslo University

NOT AVAILABLE

Denmark

Bachelor of Engineering Mechatronics (Engineering), University of Southern Denmark
Bachelor of Science in Engineering Mechatronics , University of Southern Denmark

NOT AVAILABLE

Lithuania

Bachelor degree in Mechatronics and Robotics, Department of Mechatronics, Robotics and Digital Manufacturing, Vilnius Gediminas Technical University, VGTU

NOT AVAILABLE

ECTS units

Bachelor and master degree programmes follow the standard ECTS standards **(60 ECTS per semester) (in EU and UK).**

List of good practices- Bachelor degree programmes.

Mechatronics Engineering	Mechatronics include projects, external intership and industrial management. http://www.ipvc.pt/engenharia-mecatronica	Polytechnic Institute of Viana do Castelo	Portugal

BACHELOR - MECHATRONIC ENGINEERING
http://www.ipvc.pt/engenharia-mecatronica-plano

1st Year / 1st Semester

Course Unit	Scientific area	Duration	Hours Work	Contact Hours	ECTS	PUC
Math analysis	CE	Semester	162	TP-40; PL-24	6	to see
linear algebra and analytic geometry	CE	Semester	135	TP-40; PL-16	5	to see
Fundamentals of Engineering	CE	Semester	162	TP-32; PL-32	6	to see
Mechatronic Systems Design	CET	Semester	162	TP-24; PL-40	6	to see
Material Sciences	CC	Semester	189	TP-48; PL-16	7	to see

1st Year / 2nd Semester

Course Unit	Scientific area	Duration	Hours Work	Contact Hours	ECTS	PUC
Electronics	CET	Semester	162	TP-32; PL-32	6	to see
Programming	CET	Semester	162	TP-32; PL-32	6	to see
Mathematics Add-ons	CE	Semester	135	TP-40; PL-16	5	to see
Probability and Statistics	CE	Semester	108	TP-36; PL-12	4	to see
Electricity Theory	CET	Semester	243	TP-32; PL-56	9	to see

2nd Year / 1st Semester

Course Unit	Scientific area	Duration	Hours Work	Contact Hours	ECTS	PUC
Digital Systems and Microcontrollers	CET	Semester	189	TP-32; PL-40	7	to see
Sign Theory	CET	Semester	162	TP-32; PL-32	6	to see
Object Oriented Programming	CET	Semester	162	TP-32; PL-32	6	to see
Operational investigation	CE	Semester	135	TP-24; PL-32	5	to see
Applied mechanics	CET	Semester	162	TP-32; PL-32	6	to see

2nd Year / 2nd Semester

Course Unit	Scientific area	Duration	Hours Work	Contact Hours	ECTS	PUC
Power Electronics	CET	Semester	162	TP-32; PL-32	6	to see
Industrial automation	CET	Semester	162	TP-32; PL-32	6	to see
Mechanics and Strength of Materials	CET	Semester	162	TP-32; PL-32	6	to see
Control Theory	CET	Semester	162	TP-32; PL-32	6	to see
Sensors and Actuators	CET	Semester	162	TP-32; PL-32	6	to see

3rd Year / 1st Semester

Course Unit	Scientific area	Duration	Hours Work	Contact Hours	ECTS	PUC
Mechatronic Systems Design	CET	Semester	162	TP-32; PL-32	6	to see
Digital Control	CET	Semester	162	TP-32; PL-32	6	to see
Embedded Systems	CET	Semester	162	TP-32; PL-32	6	to see
Industrial machines	CET	Semester	162	TP-32; PL-32	6	to see
Computer Aided Design and Manufacturing	CET	Semester	162	TP-32; PL-32	6	to see

3rd Year / 2nd Semester

Course Unit	Scientific area	Duration	Hours Work	Contact Hours	ECTS	PUC
Distributed systems	CET	Semester	162	TP-32; PL-32	6	to see
Industrial management	CC	Semester	108	TP-24; PL-24	4	to see
Industrial Networks	CET	Semester	162	TP-32; PL-32	6	to see
Final Project or Internship	CET	Semester	378	TP-16; OT-126;	14	to see

Mechatronics	Dual studies - study time in lectures is combined with work in a branch company. Studies at the University include the acquisition of theory, laboratory work, seminars, project work. Students do internships in a company. https://www.liepu.lv/en/120/faculty-of-science-and-engineering	Liepaja University	Latvia

Mechatronics Engineering	The study programme provides deep understanding of Fundamentals of Mechanics. Moreover, it places a strong emphasis on analytical engineering science and technicals fundamentals. Acquired skills of theoretical calculations and computer and computer applications help to solve problems in mechanics and lab experiments creating a solid basis for a further career in industry or further studies in a master programme.	Riga Technical University	Latvia

	Graduates can pursue a mechanical engineer career in both local and international projects as well as in various companies – automobile, shipyards, railway transport, etc., where there is a requirement for expertise in combustion, noise and vibration process control, robotics, quality management, biological engineering, space research, liquid mechanics, water supply, planning machine and mechanism maintenance, consumer goods design, pollution control and mechanical synthesis of new materials. In addition, designers and mechanical engineers can work		

Mechatronics	www.va.lv	Vidzeme University of Applied Sciences	Latvia

Industrial Engineering and Management	The degree programme emerged from a merger of two previous bachelor degree progammes: Automation Engineering and Automotive Engineering. http://www.iem.ihu.gr/	International Hellenic University	Greece

Mechatronics and Robotics	Bachelor degree in Mechatronics and Robotics, Department of Mechatronics, Robotics and Digital Manufacturing, Vilnius Gediminas Technical University, VGTU VGTU Bachelor of Mechatronics and Robotics study programme has been awarded the Investor's Spotlight mark of quality, certifying that the study programme meets the needs of foreign investors and is a leader in fostering the competences essential for modern business.	Vilnius Gediminas Technical University	Lithuania

Mechatronics	Main competences – Adapt systems for machinery control in various companies operating in the fields from production to designing; – To control production processes and understand needs and possibilities for their robotisation; – To analyse problematic areas of facilities management and adapt modern robotic systems for increase of efficiency; – To design and realise modern robotic systems according to the market needs.	Kaunas Technology University	Lithuania

	Interdisciplinarity of this study programme provides wide range of career possibilities for work in various industries, public sector, space or military industry. Students learn at the most modern laboratories of the Baltic Region and after graduation they are able to: – Design, install and provide maintenance to stationary and mobile robots and their systems; – Realise modern algorithms for control of machinery and the ones based on artificial intellect;		

List of good practices- Master degree programmes.

Master degree programme title	Good practice example -Details	University	Country
Mechatronics	Master Mechatronics Oviedo University (joint master degree with other universities of France, Russia, Netherlands, Germany and Egypt) The Joint Master Degree in Mechatronic Engineering, EU4M, welcomes all prospective students interested in becoming professionally qualified to work in the field of Mechatronics and Micro-mechatronics. If you want to be able to work in interdisciplinary and international teams to solve complex mechatronic tasks, if you want to attain the ability to adapt quickly and be flexible in dealing with a variety of tasks and problems from different fields, if you'd like to have a qualification in intercultural communication and to be able to communicate easily in different languages with people from different countries, then JMD EU4M is your master. Join us! All students joining EU4M are requested to sign a Student's Agreement stating all the conditions	Oviedo University (joint master degree with other universities from France, Russia, Netherlands, Germany and Egypt))	Spain

Strategic Product Design	Available at: https://www.ihu.gr/ucips/postgraduate-programmes/spd The newly equipped Digital Manufacturing and Materials Characterization Laboratory (DMMC Lab) is available for students of Strategic Product Design programme to use under the guidance of technically competent personnel. The Laboratory is also used for external collaborations with industry partners, funded research projects and other academic activities. Lab's equipment is summarized as follows: .	International Hellenic University	Greece

	Portable 3D scanner Artec Eva, with white light technology and 0,5mm precision with texture scanning capabilities Desktop 3D scanner NextEngine with Laser technology 0,1mm precision with texture scanning capabilities Portable Kinect sensor 3D printer FormLabs1+ stereolithography technology (SLA) with 25µm precision 3D printer 3DTouch Fused Deposition Modelling (FDM) technology with 125µm precision 3D printer BCN 3D Sigma Fused Deposition Modelling (FDM) technology with 50µm precision 3D printer Markforged MarkTwo Composite Filament Fabrication Technology with 100µm		

Mechatronics Systems	-	Vilnius Gediminas Technical University	Lithuania

dual degree program “Mechatronics”	-	Vilnius Gediminas Technical University	Lithuania

Remarks-Missing information

(Part B –list of good practices was not completed by most of the partners)
(for instance I added Professional bachelor Mechatronics, Faculty of Engineering, Vidzeme University of Applied Sciences (4 year degree)

AndMI- missing Finland, Belgium

Slovakia
BEng/MEng Mechatronics, Faculty of Electrical Engineering and Information Technology, Slovak Technical University
Not confirmed

Estonia
bachelor degree –teaching methodology not correct)

Czech Republic , Hungary, Norway, Denmark, Lithuania

Missing course profile of each programme follows (distribution of the course subjects).

Norway, Lithuania

teaching methodology missing

Good practice examples details missing:

- Professional bachelor Mechatronics, Faculty of Engineering, Vidzeme University of Applied Sciences (4 year degree)
- All programmes LIEPU

TTPU details for the list of good practice examples Politecnico di Torino.

Good practice example details if any :
Master degree in Mechatronics Systems, Department of Mechatronics, Robotics and Digital Manufacturing, Vilnius Gediminas Technical University, VGTU

Master degree dual degree program “Mechatronics”, Department of Mechatronics, Robotics and Digital Manufacturing, Vilnius Gediminas Technical University, VGTU.