

Improving Malaysian HE Knowledge Towards a Wood and Furniture Industry 4.0



Deliverable 2.2: Joint Curriculum

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P2	Warsaw University of Life Sciences	WULS	PL
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1. INTRODUCTION

This document reports the results performed in tasks “**T2.2: Design and organization of training paths: Joint Curriculum**” and “**T2.3: Methodological aspects**” in the framework of the WP2 “**Training path, learning content structure and methodological aspects**”.

The aim of this task, leaded by KIT, is to design and organize the training path: Joint Curriculum (subject-centered), approaching the Malaysian Qualification Framework (MQF) requirements. The results of the report D2.1 "Definition of the Learning Outcomes" were used as a basis for the development of this task.

After the analysis of the results of the WP1 “Analysis and comparison of the current HE training offer and furniture and woodworking industry”, the learning outcomes were defined for each of the identified topics.

The definition of learning outcomes was made considering the Recommendations of the European Qualifications Framework - EQF, and subsequently harmonized with the Programme Learning Outcomes defined in the Malaysian Qualification Framework 2nd edition (MQF2.0) for a Master’s Degree Level 7.

The identified learning outcomes have been grouped into 4 modules:

1. Processes and Production of Furniture.
2. Intelligent and Sustainable design.
3. Wood and New Materials.
4. Innovation Management.

For each module, a number of courses have been identified and defined, organised in a coherent way and considering the requirements indicated in the Education Program Standard (EPS).

As an annex to this report, is the **Deliverable 2.3 "Methodological Aspects"**, which describes the main methodological aspects of the Master Degree, adapted to those currently in use in Malaysian universities.

The Joint Curriculum was validated by experts from the furniture and wood industry, as well as by teachers and students. The result of this Validation is included in **Deliverable 2.4 "Joint Curriculum Validation"**.

With the completion of this work we have achieved **Milestone 2**: “Define and describe learning outcomes”, and **Milestone 3**: “Determine the best training methodology and path”. Moreover, this work is also linked to specific project objective **SO2**: “Create an innovative learning pathway able to provide HE students the most important competences and skills related with Industry4.0.

This new learning pathway will aim to improve the level of specific and transversal competences and skills, with particular regard to those relevant for the labour market in the furniture sector, such as management, entrepreneurship, language competences and leadership”.

The results of this report are an essential point for the correct development of the WP3: “Develop of Training Materials and guides for trainers”, as will set the basis for the development of the necessary training materials that will made up the Making 4.0 Master degree.

2. PROGRAMME AIMS AND OBJECTIVES.

An education programme at the master's level aims to provide graduates with advanced knowledge in specialized areas of education, with clear directions and pathways to acquire, generate, enhance, hone knowledge and skills, whilst making cross-linkages with other knowledge disciplines such as the humanities, the social sciences and the physical sciences.

The programme objective at the master's level is specifically to educate and train learners to become graduate scholar-teachers who are able to:

1. make judgments of relevant theories and practices and demonstrate capability of producing new and creative knowledge in order to be effective and inspiring professionals;
2. critically analyse, and synthesize the understanding of their own sources of mature professional knowledge and professional practices to solve significant problems;
3. plan and execute innovative projects, research initiatives and write dissertations, theses and reports for the purpose of building and applying knowledge for the benefit of the profession and society as a whole;
4. demonstrate capabilities in generating and communicating knowledge effectively through the practice of life-long learning and life-long contribution;

5. lead and participate in knowledge generation and in championing intellectual property rights and acknowledgments of original works by others, guarding against plagiarism and other academic improprieties; and
6. acquire general knowledge and develop specializations, individual talents and potentialities. [1]

MAKING4.0 is in line with the actions pointed in the Malaysia Education Blueprint (2015-2025) and the objectives of the Ministry of International Trade and Industry in developing the National Industry 4.0 policy framework in order to ensure adequate supply of human capital and skills. MAKING4.0 aims to develop an innovative Master Degree to modernize the current training offer in wood and furniture technology processes and design around Industry 4.0 in Malaysia.

For the selection of training contents, feedback obtained through surveys and face-to-face meetings has been considered, both from university students of various profiles and from stakeholders in the furniture and wood sector. The experience of the companies and universities that make up the MAKING 4.0 consortium has also been taken into account, as well as the contents previously described in the project proposal.

The contents have been organized in such a way that the student acquires the knowledge gradually and over two academic semesters. In the first semester they will achieve the objectives and outcomes more related to the new technologies and sustainable design and in the second those related to the new business models, production processes and new materials. In addition, they will carry out Internships to put into practice what they have learned and to feed on the experience of working in different sectors. In order to pass the Master, the student must complete the Master Thesis, to consolidate all the knowledge acquired.

2.1. Access requirements.

Access requirements for the master's degree "Master of Advanced Technologies and Innovation for Wood-based Industry".

Both national and international students must have a bachelor's degree to be eligible for the master's degree. Each university in Malaysia has a Cumulative Grade Point Average (CGPA) established for access to a Master's degree. Universities such as UiTM and UKM have established that to access a Master's degree a student must have at least 2.75 CGPA.

CGPA stands for Cumulative Grade Point Average. A CGPA is the average of the cumulative marks for all semesters taken. The amount of pointers from the first semester will be added with the total marks of each semester right up to the final semester. Students can increase their CGPA by increasing their GPAs for each semester.

$$CGPA = \frac{\text{Total Grade Point for all semesters}}{\text{Total Credit Hours for all course codes}}$$

Depending on the university's regulations, CGPA calculations for each university in Malaysia may differ from one another.

GPA stands for Grade Point Average. A GPA is a student's mark and grade for each semester. It is calculated based on marks for each subject taken for a semester. Marks from each subject will be multiplied and divided with the number of credit hours taken.
[2]

$$GPA = \frac{\text{Total Grade Point (Grade point x Credit)}}{\text{Total Credit Hours}}$$

For more information it is advisable to contact the university where the application will be made.

3. TRAINING PATH. MAKING 4.0 MASTER'S STRUCTURE

The name of the Master developed under the MAKING 4.0 project has been assigned considering the opinion of experts in higher education and in coherence with the objectives of the programme.

MASTER OF ADVANCED TECHNOLOGIES AND INNOVATION FOR WOOD-BASED INDUSTRY.

The Program Educational Objectives for this master's programme aim to provide students with theoretical and applied knowledge of new technologies in industry 4.0 and the latest trends in materials and processes in the wood sector. Students will be able to apply the key enabling technologies in the wood industry while being aware of and committed to a more productive and sustainable society.

The Program Educational Objectives (PEO) of this program are to produce graduates that:

- PEO 1.** Knowledgeable in the field of Key Enabling Technologies (KET) of the Industry 4.0 and current trends of wood materials and processes with appropriate skills and attitude to work in wood-based industry sector.
- PEO 2.** Capable to apply the Key Enabling Technologies (KET) and the sustainable innovation within the production processes of the wood-based industry.
- PEO 3.** Innovative and creative, as well as aware and committed with a more sustainable and technological productive society.

The program's learning outcomes (PLO) reflect the 7 MQF domains and are consistent with and support the HEP vision and mission.

At the end of this program, students are able to:

- PEO 1.** Demonstrate mastery of KETs knowledge in the wood and furniture industry.
- PEO 2.** Apply practical skills about digital transformation in the wood and furniture industry.
- PEO 3.** Relate ideas to societal issues in wood and furniture industry.
- PEO 4.** Conduct research with minimal supervision and adhere to legal, ethical and professional codes of practice.
- PEO 5.** Demonstrate leadership qualities through communicating and working effectively with peers and stakeholders.
- PEO 6.** Generate solutions to problems in wood and furniture industry using scientific and critical thinking skills.
- PEO 7.** Manage information for lifelong learning.

The program is designed to prepare students for the world of work and the new changes that are taking place due to the digital transformation in the industry and especially in the wood-based industry, as well as for active citizenship. It is aligned with and supports the vision, mission and objectives of higher education providers (HEPs) through:

- Providing knowledge and practical skills based on scientific principles.
- Inculcation of attitudes, ethics, sense of professionalism and leadership skills for the advancement of society within the framework of national aspiration.

- Building the capacity to analyse and solve problems, as well as to critically and creatively assess and make decisions based on evidence and experience.
- The development of the quest for knowledge and the capacity for lifelong learning that are essential for the continuous development of knowledge and skills that are parallel to the rapid advancement of global knowledge.
- The consideration of other imperatives that are necessary for society and those of the markets, as well as those that are relevant to the local, national and international market context. [1]

The validation of this alignment is reflected in the mapping of the above statements to the specific Programmes Learning Outcomes of this program.

Program Educational Objective (PEO)				
Objectives of Higher Education Providers	Master of Advanced Technology and Innovation for Wood-Based Industry	Knowledgeable in the field of Key Enabling Technologies (KET) of the Industry 4.0 and current trends of wood materials and processes with appropriate skills and attitude to work in wood-based industry.	Capable to apply the Key Enabling Technologies (KET) and the sustainable innovation within the production processes of the wood-based industry.	Innovative and creative, as well as aware and committed with a more sustainable and technological productive society.
	Providing knowledge and practical skills based on scientific principles.	√	√	
	Inculcation of attitudes, ethics, sense of professionalism and leadership skills for the advancement of society within the framework of national aspiration.			√
	Building the capacity to analyse and solve problems, as well as to critically and creatively assess and make decisions based on evidence and experience.		√	√
	The development of the quest for knowledge and the capacity for lifelong learning that are essential for the continuous development of knowledge and skills that are parallel to the rapid advancement of global knowledge.	√	√	
	The consideration of other imperatives that are necessary for society and those of the markets, as well as those that are relevant to the local, national and international market context.	√		√

Table 1. Mapping Objective of HEP with PEO.

Making4.0 Programme Learning Outcomes (PLOs) and Programme Educational objectives have been mapped, in order to ensure that all PEOs are addressed through the defined PLOs. See table 2.

Matrix of programs learning outcomes against the program educational objectives:

MAPPING PEOs WITH PLOs	No.	Program Educational Objective (PEO) Master of Advanced Technology and Innovation for Wood-Based Industry	Program Learning Outcome (PLO)						
			demonstrate mastery of KETs knowledge in the wood and furniture industry	apply practical skills about digital transformation in the wood and furniture industry	relate ideas to societal issues in wood and furniture industry	conduct research with minimal supervision and adhere to legal, ethical and professional codes of practice	demonstrate leadership qualities through communicating and working effectively with peers and stakeholders	generate solutions to problems in wood and furniture industry using scientific and critical thinking skills	manage information for lifelong learning
			C	P	A	A	A	C	A
			PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
	1.	knowledgeable in the field of Key Enabling Technologies (KET) of the Industry 4.0 and current trends of wood materials and processes with appropriate skills and attitude to work in wood-based industry.	√	√					√
	2.	capable to apply the Key Enabling Technologies (KET) and the sustainable innovation within the production processes of the wood based industry.		√				√	√
	3.	Innovative and creative, as well as aware and committed with a more sustainable and technological productive society.			√	√	√		

Table 2. Mapping PEOs with PLOs.

The following table shows the mapping between MQF domain of learning outcome, bloom taxonomy and soft skills:

BLOOM TAXONOMY	LEVEL OF BLOOM TAXONOMY DOMAIN	PROGRAM LEARNING OUTCOME (PLO)	SOFT SKILL*	MQF DOMAIN OF LEARNING OUTCOME	INTENDED PLO STATEMENT FOR MASTER PROGRAM
COGNITIVE	C1 – C6	PLO1	-	Knowledge of Discipline Area	<i>demonstrate mastery of knowledge of KETs in the wood and furniture industry</i>
(C)	C1 – C6	PLO6	CTPS	Problem Solving and Scientific Skills	<i>generate solutions to problems using scientific and critical thinking skills</i>
PSYCHOMOTOR (P)	P1 – P7	PLO2	-	Practical Skills	<i>apply practical skills about digital transformation in the wood and furniture industry</i>
AFFECTIVE	A1 – A5	PLO3	TS	Social Skills and Responsibilities	<i>relate ideas to societal issues in wood production processes</i>
(A)	A1 – A5	PLO4	EM	Values, Attitudes and Professionalism	<i>conduct research with minimal supervision and adhere to legal, ethical and professional codes of practice</i>
	A1 – A5	PLO5	CS, LS	Communication, Leadership and Team Skills	<i>demonstrate leadership qualities through communicating and working effectively with peers and stakeholders</i>
	A1 – A5	PLO7	LL	Information Management and Lifelong Learning Skills	<i>manage information for lifelong learning</i>

Table 3. Mapping between MQF domain of learning outcome, bloom taxonomy and soft skills.

<p>*Soft skills abbreviation:</p> <p>CTPS : critical thinking and problem solving</p> <p>TS : social skills</p> <p>EM : Ethics, morale, values, and professionalism</p> <p>CS : communication skills</p> <p>LS : leadership skills</p>	<p>Level of Cognitive (C) domain:</p> <p>C6 – Creating</p> <p>C5 – Evaluating</p> <p>C4 – Analyzing</p> <p>C3 – Applying</p> <p>C2 – Understanding</p> <p>C1 – Remembering</p>	<p>Level of Psychomotor (P) domain:</p> <p>P7 – Origination</p> <p>P6 – Adaptation</p> <p>P5 – Complex overt response</p> <p>P4 – Mechanism</p> <p>P3 – Guided response</p> <p>P2 – Set</p> <p>P1 – Perception</p>	<p>Level of Affective (A) domain:</p> <p>A5 – Internalizing Values</p> <p>A4 – Organization</p> <p>A3 – Valuing</p> <p>A2 – Responding</p> <p>A1 – Receiving</p>
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Constructive alignment between learning outcomes, teaching and learning activities, and assessment activities:

BLOOM TAXONOMY	LEVEL OF BLOOM TAXONOMY DOMAIN	PROGRAM LEARNING OUTCOME (PLO)	SOFT SKILL*	MQF DOMAIN OF LEARNING OUTCOME	Teaching and Learning Activities	Assessment Activities
COGNITIVE	C1 – C6	PLO1	-	Knowledge of Discipline Area	Lecture, Tutorial, Self-directed Learning, SCL type like PBL, POBPL, etc.	Oral or written examination, viva, report, log book, project paper etc.
(C)	C1 – C6	PLO6	CTPS	Problem Solving and Scientific Skills	Lecture, practical, tutorial, self-directed learning, experiential learning, SCL type like PBL, POPBL, etc.	Exam, assignment, project report, case study, role-play, final year project, etc.
PSYCHOMOTOR (P)	P1 – P7	PLO2	-	Practical Skills	Practical work, laboratory experiment, demonstrations, etc.	Observation through practical work (rubric)
AFFECTIVE	A1 – A5	PLO3	TS	Social Skills and Responsibilities	SCL activities like group discussion, role play, case study, PBL, POPBL, field work, etc	Observation rubric, peer assessment, etc.
(A)	A1 – A5	PLO4	EM	Values, Attitudes and Professionalism	SCL activities like group discussion, role play, case study, PBL, POPBL, field work, etc	Observation rubric, supervisory report, peer assessment, etc.
	A1 – A5	PLO5	CS, LS	Communication, Leadership and Team Skills	SCL activities like group discussion, role play, case study, PBL, POPBL, field work, etc	Observation rubric, assignment, essay, case study report, presentation, scenario-based debate, etc.
	A1 – A5	PLO7	LL	Information Management and Lifelong Learning Skills	SCL activities like group discussion, case study, PBL, POPBL, etc	Literature review, assignment, case study report, final year project, etc.

Table 4. Constructive alignment between learning outcomes, teaching and learning activities, and assessment activities

The master's program will last one academic year, and the modules to be taught will be divided between the two semesters. After the analysis of the different topics and learning outcomes identified in the first tasks developed during the first months of the project and considering the current situation in Europe regarding Masters related to both industry 4.0 and wood technology and science, the following modules and consequent courses have been identified:

Modules

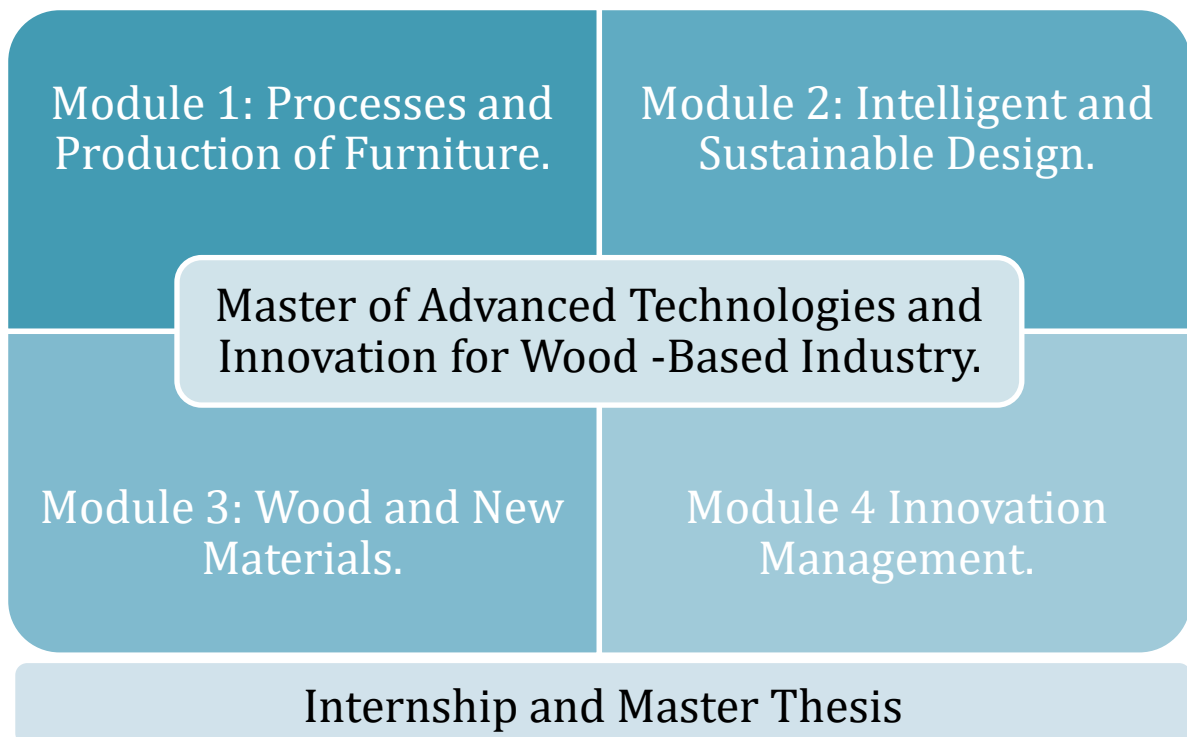


Table 5: Modules Making 4.0 Master's Degree.

Courses identified for each of the modules:

MODULE 1: PROCESSES AND PRODUCTION OF FURNITURE.

- Digital Transformation in the Industry 4.0
- Production processes in the furniture sector.
- Automation and mechanization. Low Cost Automation.
- Additive manufacturing
- Internet of Things (IoT) applied to wood-based industry
- Wireless technologies for logistic and manufacturing
- Network communications in the industry
- Robotics applied to the wood-based industry
- Augmented reality
- Simulation and 3D Scanning
- Cloud Computing and Big Data applied to wood-based industry

MODULE 2: INTELLIGENT AND SUSTAINABLE DESIGN.

- Eco and sustainable design.
- Product design and digitalization.
- Circular Economy in the wood and Furniture Sector.

MODULE 3: WOOD AND NEW MATERIALS.

- Wood science.
- Materials for furniture manufacturing.
- Material processing.

MODULE 4: INNOVATION MANAGEMENT.

- Innovation management systems.
- Technological surveillance and competitive intelligence.
- Management Systems. Lean Manufacturing

OTHER COMPONENTS

- Internship/Practicum
- Master Thesis

The minimum number of ECTS credits (Credit hours) for a Master's degree in Malaysia is 40. A Malaysian credit corresponds to 1.5 credits in the European framework¹.

Based on the basic requirements for the master's degrees by coursebook defined in the Education Program Standard – EPS, the structure of the Master Making 4.0 has been defined as follows:

Modules of the Master	ECTS
Processes and Production of Furniture.	16
Intelligent and Sustainable design.	4
Wood and New Materials.	6
Innovation Management.	4
Practicum / Internship	5
Master Thesis	5
Total Malaysian Credits	40

Table 6: Modules of the Master and ECTS credits.

Course Clasification	Credit Value ECTS	Percentage %
Compulsory	28	70,0%
Elective (Optional Subjects)	12	30,0%
Total Credit Value	40	100,00%

Table 7. Percentage of ECTS by Master components.

As can be seen in table 7, the percentage of credits according to the different components of the Master meets the pre-established requirements of the MQF.

Of the four modules defined, two of them, those that make up the body of knowledge of the master's degree, contain the compulsory courses. In the following table, the general structure of the Master can be seen. It shows the name of the modules and their courses, the number of ECTS credits per course and the typology (C= Compulsory, E= Elective).

¹ Henceforth when it is expressed credits in this document it is referenced to Malaysian credits

MASTER OF ADVANCED TECHNOLOGIES AND INNOVATION FOR WOOD-BASED INDUSTRY				
MASTER'S STRUCTURE				
	COURSES	ECTS	TYPE	Total ECTS
MODULE 1	Processes and Production of Furniture. Elective subjects. Choose two			16
	Digital Transformation in the Industry 4.0	2	C	
	Production processes in the furniture sector.	2	C	
	Automation and mechanization. Low Cost Automation.	2	C	
	Additive manufacturing	2	C	
	Internet of Things (IoT) applied to wood-based industry	2	C	
	Wireless technologies for logistic and manufacturing	2	C	
	Network communications in the industry	2	E	
	Robotics applied to the wood-based industry	2	E	
	Augmented reality	2	E	
	Simulation and 3D Scanning	2	E	
	Cloud Computing and Big Data applied to wood-based industry	2	E	
MODULE 2	Intelligent and Sustainable design. Elective subjects. Choose two			4
	Eco and sustainable design	2	E	
	Product design and digitalization.	2	E	
	Circular Economy in the wood and Furniture Sector	2	E	
MODULE 3	Wood and New Materials. Compulsory subjects.			6
	Wood science	2	C	
	Materials for furniture manufacturing.	2	C	
	Material Processing	2	C	
MODULE 4	Innovation Management. Elective subjects. Choose two			4
	Innovation management systems	2	E	
	Technological surveillance and competitive intelligence.	2	E	
	Management Systems. Lean manufacturing	2	E	
Internship & Dissertation	Internship			5
	Internship/Practicum	5	c	
	Master Thesis			5
	Master Thesis	5	c	
TOTAL ECTS:				40

Table 8. Master's Structure. MAKING 4.0

The number of credits to be taken in each of the modules is indicated. In order to pass the Master, the student must take a total of 15 courses, 6 of which are elective. It is necessary to carry out internships with a total of 5 ECTS credits and the Master thesis to which 5 ECTS credits have been assigned.

Distribution of work between semesters

For a homogeneous and balanced distribution of the workload between the two academic semesters, the modules and other components have been divided as follows.

MASTER OF ADVANCED TECHNOLOGIES AND INNOVATION FOR WOOD-BASED INDUSTRY					
FIRST SEMESTER			SECOND SEMESTER		
COURSES	TYPE	ECTS	COURSES	TYPE	ECTS
Processes and Production of Furniture. Elective subjects. Choose two		16	Wood and New Materials. Compulsory subjects.		6
Digital Transformation in the Industry 4.0	C	2	Wood science	C	2
Production processes in the furniture sector.	C	2	Materials for furniture manufacturing.	C	2
Automation and mechanization. Low Cost Automation.	C	2	Material Processing	C	2
Additive manufacturing	C	2	Innovation Management. Elective subjects. Choose two		4
Internet of Things (IoT) applied to wood-based industry	C	2	Innovation management systems	E	2
Wireless technologies for logistic and manufacturing	C	2	Technological surveillance and competitive intelligence.	E	2
Network communications in the industry	E	2	Management Systems. Lean manufacturing	E	2
Robotics applied to the wood-based industry	E	2	Practicum / Internship	C	5
Augmented reality	E	2	Master Thesis	C	5
Simulation and 3D Scanning	E	2	Total ECTS 2nd semester		20
Cloud Computing and Big Data applied to wood-based industry	E	2			
Intelligent and Sustainable design. Elective subjects. Choose two		4			
Eco and sustainable design	E	2			
Product design and digitalization.	E	2			
Circular Economy in the wood and Furniture Sector	E	2			
Total ECTS 1st semester		20			

Table 9. Distribution of courses between semesters.

Courses Information

no.	Name and Code of the Course	Classification (Compulsory/ Major/Minor /Elective)	Credit Value	Programme Learning Outcomes (PLO)							Pre- requisite/Co- requisite
				PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	
1	Digital Transformation in the Industry 4.0	Compulsory	2	✓		✓				✓	N
2	Production processes in the furniture sector.	Compulsory	2	✓	✓				✓	✓	N
3	Automation and mechanization. Low Cost Automation.	Compulsory	2	✓	✓	✓			✓		N
4	Additive manufacturing	Compulsory	2	✓	✓	✓			✓		N
5	Internet of Things (IoT) applied to wood-based industry	Compulsory	2	✓			✓		✓		N
6	Wireless technologies for logistic and manufacturing	Compulsory	2	✓					✓	✓	N
7	Network communications in the industry	Elective	2	✓			✓		✓		N
8	Robotics applied to the wood-based industry	Elective	2	✓			✓			✓	N
9	Augmented reality	Elective	2	✓		✓			✓		N
10	Simulation and 3D Scanning	Elective	2	✓	✓	✓			✓		N
11	Cloud Computing and Big Data applied to wood-based industry	Elective	2	✓			✓		✓		N
12	Eco and sustainable design	Elective	2	✓		✓	✓		✓		N
13	Product design and digitalization.	Elective	2	✓	✓	✓					N
14	Circular Economy in the wood and Furniture Sector	Elective	2	✓		✓	✓		✓		N
15	Wood science	Compulsory	2	✓	✓				✓	✓	N
16	Materials for furniture manufacturing.	Compulsory	2	✓	✓				✓	✓	N
17	Material Processing	Compulsory	2	✓	✓	✓			✓		N
18	Innovation management systems	Elective	2	✓	✓			✓	✓		N
19	Technological surveillance and competitive intelligence.	Elective	2	✓	✓	✓			✓	✓	N
20	Management Systems. Lean manufacturing	Elective	2	✓	✓			✓	✓		N

Table 10: Brief description of courses offered in the programme and PLOs covered by each of them.

Description of the courses offered in the program.

The following pages describe the 20 courses² (Compulsories and Electives) that make up the Master Making 4.0 degree, as well as the other components of the training itinerary, the Master Thesis and the Internship.

Two tables are introduced for each of the courses. The first table defines the CLOs and their alignment with the PLOs and the Bloom Taxonomy, as well as showing the teaching and learning activities, and the activities to evaluate each of the CLOs together with the assessment weighting.

The second refers to the "Course Information" table in the "Code of Practices for Program Accreditation" document, which shows more detailed information about each course.

² Access link to the course descriptions: <https://drive.google.com/drive/folders/14srirzeFL2NRRM-e0-6ExpPL1T4-NAmX?usp=sharing>

Course: Digital transformation in Industry 4.0. Compulsory.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)							
		Cognitive (C)	Affective (A)	Affective (A)					
		PLO 1	PLO 3	PLO 7					
1	Evaluate the possibilities of Industry 4.0 and digital transformation in the wood and furniture sector. (C5 = PLO1)	√							
2	Integrate the benefits of digital transformation in the timber industry. (A4, TS = PLO3)		√						
3	Integrate knowledge of digital transformation into personal, civic, social and employability skills. (A4= PLO4 & PLO7) (EM= PLO4) (LL= PLO7)			√					
TOTAL (%)		60	40						

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment	Observation rubric. Group discussion.	Case study report.	Final	
1	Evaluate the possibilities of Industry 4.0 and digital transformation in the wood and furniture sector. (C5 = PLO1)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Assignment (SCL): Case Study (SCL): Problem-Based Learning (PBL). 	10	10	10	30	60
2	Integrate the benefits of digital transformation in the timber industry. (A4, TS = PLO3)	PLO3	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Problem-Based Learning (PBL). (SCL): Assignment. 		10	5		15
3	Integrate knowledge of digital transformation into personal, civic, social and employability skills. (A4, LL= PLO7)	PLO7	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. 	10	10	5		25
TOTAL (%)				20	30	20	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Digital Transformation in Industry 4.0											
	Course Code :												
2.	Synopsis :	This course is focused on understanding the concept of Industry 4.0 and the changes it will cause in traditional industry. This new concept will transform industrial and manufacturing companies. Knowledge is provided to understand the current state of the furniture sector with respect to the new Industry 4.0 paradigm.											
3.	Name(s) of academic staff :												
4.	Semester and Year offered :	Semester	1	Year	1								
5.	Credit Value :	2											
6.	Prerequisite/co-requisite: (if any)	No											
7.	Course Learning Outcomes (CLO) : At the end of the course the students will be able to:												
	CLO1	Evaluate the possibilities of Industry 4.0 and digital transformation in the wood and furniture sector. (C5 = PLO1)											
	CLO2	Integrate the benefits of digital transformation in the timber industry. (A4, TS = PLO3)											
	CLO3	Integrate knowledge of digital transformation into personal, civic, social and employability skills.(A4, LL= PLO7)											
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it.												
	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)										Learning and Teaching Method	Assessment Method
		Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills					
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7					
	CLO1	√										Lecture, self-Learning, Student-Center Learning.	Continuous assignment. Final exam.
	CLO2			√								Lecture, self-Learning, Student-Center Learning.	Continuous assignment.
	CLO3							√				Lecture, self-Learning, Student-Center Learning.	Continuous assignment
Indicate the relevancy between the CLO and PLO by ticking "√" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)													
9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Be able to be part of a team that leads the digital transformation of a company.										
		2	Know how to identify the new key technologies of digital transformation.										
		3	Transmit the importance of digital transformation for a furniture company.										
		4	Gain knowledge about digital transformation.										
10.	Distribution of Student Learning Time (SLT)												
	Course Content Outline	CLO*	Teaching and Learning Activities					SLT					
			Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning		Independent Learning (NF2F)				
			L	T	P	O							
	1.- Introduction to I4.0. What is I4.0?	CLO1, CLO3	2					4	6				
	2.- History of Industry 4.0.	CLO3	2					4	6				
	3.- Society 5.0.	CLO3	3					6	9				
	4.- Digital transformation in the wood-based industry.	CLO1, CLO2	4					9	13				
	5.- Application of some Key Enabling Technologies in the production process.	CLO1, CLO2	5					10	15				
	6.- Benefits of Digital transformation within the Industry	CLO1, CLO2, CLO3	3					6	9				
	7.- Machinery of the Industry 4.0 in the wood-based industry.	CLO1, CLO2	4					8	12				
	8.- Case studies.	CLO2, CLO2, CLO3	3					6	9				
								Total	79				
	Continuous Assessment	Percentage (%)	F2F				NF2F		SLT				
	1 Assignments.	20							0				
	2 Observation rubric. Group discussion.	30							0				
	3 Case study report.	20							0				
								Total	0				
	Final Assessment	Percentage (%)	F2F				NF2F		SLT				
	1 Final Exam	30	2						2				
								Total	2				
								GRAND TOTAL SLT	81				
**Please tick (√) if this course is Latihan Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time(ELT) of 50% L = Lecture, T= Tutorial, P= Practical, O= Others, F2F=Face to Face, NF2F=Non Face to Face *Indicate the CLO based on the CLO's numbering in Item 8.													
11.	Identify special requirement to												
12.	References (include required and further readings, and should be the most current)												
13.	Other additional information :												



Course: Production processes in the furniture sector. Compulsory.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)						
		Cognitive (C)	Cognitive (C)	Psychomotor (P)	Affective (A)			
		PLO 1	PLO 6	PLO 2	PLO 7			
1	Assess the knowledge of solid and panel furniture technology C5	√						
2	Adapts furniture production CTPS P6		√	√				
3	Technologically integrates designed furniture and production A4 LL				√			
TOTAL (%)		15	30	50	5			
No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment	Case study	Practical	Final	
1	Assess the knowledge of solid and panel furniture technology (C5= PLO1)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study 	5	5		5	15
2	Adapts furniture production (CTPS = PLO6) (P6 = PLO2)	PLO6	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. 	5	5		20	30
		PLO2	<ul style="list-style-type: none"> (POBL): Testing Practical. Prototype (virt) and Technical Report. 	5	5	40		50
3	Technologically integrates designed furniture and production (A4, LL = PLO7)	PLO7	<ul style="list-style-type: none"> (SCL): Case Study Prototype (virt) and Technical Report. 	5				5
TOTAL (%)				20	15	40	25	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Production processes in the furniture sector.												
	Course Code :													
2.	Synopsis :	Course focuses of basic knowledge of wood and wood-based furniture production, covering basic production technologies. Course secures ability to implement needed technology for the specific product required.												
3.	Name(s) of academic staff :													
4.	Semester and Year offered :	Semester	1	Year	1									
5.	Credit Value :	2												
6.	Prerequisite/co-requisite: (if any)	No												
7.	Course Learning Outcomes (CLO) : At the end of the course the students will be able to:													
	CLO1	Assess the knowledge of solid and panel furniture technology CS												
	CLO2	Adapts furniture production CTPS P6												
	CLO3	Technologically integrates designed furniture and production A4 LL												
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it. E.g. PLO1 - Knowledge, PLO2 - Cognitive, PLO3 - Practical Skills													
		Programme Learning Outcomes (PLO)												
	Course Learning Outcomes (CLO)	Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills					Learning and Teaching Method	Assessment Method
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7						
	CLO1	√											Lecture, self-Learning, Student-Center Learning.	Continuous assignment. Final exam.
	CLO2		√				√						Lecture, self-Learning, Student-Center Learning.	Continuous assignment. Project report. Final exam.
	CLO3							√					Lecture, self-Learning, Student-Center Learning.	Scenario based discuss and casestudy, Project report
	Indicate the relevancy between the CLO and PLO by ticking "√" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)													
9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Understanding specifics of furniture production											
		2	Knowledge of application of specific material to tasks required											
		3	Knowledge of application of specific tool to procedure required											
		4	Knowledge on putting specific furniture piece to production											
10.	Distribution of Student Learning Time (SLT)													
	Course Content Outline	CLO*	Teaching and Learning Activities				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)	SLT					
			L	T	P	O								
	1 - Solid wood furniture production	CLO1	1					4	5					
	2 - Panel furniture production	CLO1	1					4	5					
	3 - Machining of wood and panel products	CLO2, CLO3	2		8			3	13					
	4 - Veneers and laminates in furniture production	CLO2, CLO3	2		6			3	11					
	5 - Finishing technology of furniture production	CLO2, CLO3	2		8			3	13					
	6 - Fittings in furniture	CLO2, CLO3	2		8			2	12					
	7 - Assembly and packaging	CLO2, CLO3	2		6			2	10					
	8 - Safe-handling, storage and transportation	CLO2, CLO3	2		6			3	11					
	Total		14	0	42	0	0	24	80					
	Continuous Assessment	Percentage (%)	F2F				NF2F		SLT					
	1 Assignment	20							0					
	2 Case Study	15							0					
	3 Practical	40							0					
	Total								0					
	Final Assessment	Percentage (%)	F2F				NF2F		SLT					
	1 Written examination	25	2						2					
	Total								2					
	**Please tick (√) if this course is Lathan Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time (ELT) of 50% L = Lecture, T = Tutorial, P = Practical, O = Others, F2F=Face to Face, NF2F=Non Face to Face *Indicate the CLO based on the CLO's numbering in Item 8.								GRAND TOTAL SLT	82				
11.	Identify special requirement to													
12.	References (include required and further readings, and should be the most current)													
13.	Other additional information :													



Course: Automation and mechanization. Low cost automation. Compulsory.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)						
		Cognitive (C)	Cognitive (C)	Psychomotor (P)	Affective (A)			
		PLO 1	PLO 6	PLO 2	PLO 3			
1	Devise the production system in reference of production organization forms development (C6)	√						
2	Composing the new supporting solutions of production processes (P7, CTPS)		√	√				
3	Proposes ideas to societal issues according to applied organizational forms in production systems (A5, TS)				√			
TOTAL (%)		50		40	10			

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment	Practical Work (Prototype)	Reports	Final	
1	Devise the production system in reference of production organization forms development (C6 = PLO1)	PLO1	• Lecture, tutorial & self-Learning • (SCL): Assignment • (SCL): Problem-Based Learning (PBL).	10			15	25
2	Composing the new supporting solutions of production processes (CTPS = PLO6) (P7 = PLO2)	PLO6	• Lecture & self-Learning • (SCL): Discussion •(SCL): Assignment • (SCL): Case Study • (SCL): Problem-Based Learning (PBL).			10	15	25
		PLO2	• Practical. Prototype and Technical Report.		40			40
3	Proposes ideas to societal issues according to applied organizational forms in production systems (A5, TS = PLO3)	PLO3	• Lecture & self-Learning • (SCL): Discussion • (SCL): Case Studyg •(SCL): Assignment • (SCL): Problem-Based Learning (PBL).	10				10
TOTAL (%)				20	40	10	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Automation and mechanization. Low Cost Automation.														
	Course Code :															
2.	Synopsis :	This course encompasses the introduction to the organizing and managing production systems with automation and mechanization usage. Emphasis is placed on the production with an low cost automation. The description of modern solutions supporting the organization of production processes will be taking into account.														
3.	Name(s) of academic staff :															
4.	Semester and Year offered :	Semester	1	Year	1											
5.	Credit Value :	2														
6.	Prerequisite/co-requisite: (if any)	No														
7.	Course Learning Outcomes (CLO) :	At the end of the course the students will be able to:														
	CLO1	Devise the production system in reference of production organization forms development (C6)														
	CLO2	Composing the new supporting solutions of production processes (P7, CTPS)														
	CLO3	Proposes ideas to societal issues according to applied organizational forms in production systems (A5, TS)														
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment :	Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it. E.g. PLO1 - Knowledge, PLO2 - Cognitive, PLO3 - Practical Skills														
	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)														
		Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills							Learning and Teaching Method	Assessment Method
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12			
	CLO1	✓												Lecture, self-Learning, Student-Center Learning.	Continuous assignment. Final exam.	
	CLO2		✓				✓							Lecture, self-Learning, Student-Center Learning.	Continuous assignment.	
	CLO3			✓										Lecture, self-Learning, Student-Center Learning.	Continuous assignment.	
Indicate the relevancy between the CLO and PLO by ticking "✓" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)																
9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Understanding the terms and aspects of automation and mechanization, system production in references of low cost													
		2	Knowledge of available low cost automation technology and how great it has an impact on the first and second environment, and organization forms of production system													
		3	Development of skills of design and prototyping the low cost automatization prototypes and control systems in furniture industry													
		4	Low cost automation manufacturing in Industry 4.0													
10.	Distribution of Student Learning Time (SLT)															
	Course Content Outline	CLO*	Teaching and Learning Activities										SLT			
			Guided Learning (F2F)				Guided Learning (NF2F)	Independent Learning (NF2F)								
			L	T	P	O										
	1-The concept of automation and mechanization	CLO1	1		2				2	5						
	2-Characteristics of the production system environment (first and second)	CLO1	1		2				2	5						
	3-The description of available technology in the field of low cost automation	CLO1	2		4				3	9						
	4-Production in the field of low cost automation	CLO1, CLO2	3		10				5	18						
	5-Application of low cost automation in the furniture sector. Design and Prototyping.	CLO2, CLO3	3		6				5	14						
	6-Prototypes and control systems	CLO2	1		6				2	9						
	7-Final projects.	CLO2, CLO3	2		10				3	15						
	8-Commercialization aspects of the system and its role in industry 4.0	CLO2, CLO3	1		2				2	5						
			Total								80					
	Continuous Assessment	Percentage (%)	F2F				NF2F				SLT					
	1 Assignment	20									0					
	2 Practical Work	40									0					
	3 Reports	10									0					
			Total								0					
	Final Assessment	Percentage (%)	F2F				NF2F				SLT					
	1 Final Exam	30	2								2					
	2										0					
			Total								2					
**Please tick (✓) if this course is Lathan Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time(ELT) of 50% L = Lecture, T = Tutorial, P = Practical, O = Others, F2F=Face to Face, NF2F=Non Face to Face *Indicate the CLO based on the CLO's numbering in Item 8.											GRAND TOTAL SLT	82				
11.	Identify special requirement to deliver the															
12.	References (include required and further readings, and should be the most current)															
13.	Other additional information :															

Course: Additive Manufacturing. Compulsory.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)						
		Cognitive (C)	Cognitive (C)	Psychomotor (P)	Affective (A)			
		PLO 1	PLO 6	PLO 2	PLO 3			
1	Assess the different production process in additive manufacturing (C5, CTPS)	√	√					
2	Construct a furniture design based on production processes in additive manufacturing (P5, CTPS)		√	√				
3	Relate ideas and new designs to social issues in furniture production processes. (A4, TS)				√			
TOTAL (%)		50		40	10			

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment	Project oriented problem based learning.	Reports	Final	
1	Assess the different production process in additive manufacturing. (C5 = PLO1) (CTPS = PLO6)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Assignment (SCL): Case Study (SCL): Problem-Based Learning (PBL). 	10			15	25
2	Construct a furniture design based on production processes in additive manufacturing (CTPS = PLO6) (P5 = PLO2)	PLO6	<ul style="list-style-type: none"> Practical. Prototype and Technical Report. 			10	15	25
		PLO2	<ul style="list-style-type: none"> (SCL): Assignment Practical. Modular Project. 		40			40
3	Relate ideas and new designs to social issues in furniture production processes. (A4, TS = PLO3)	PLO3	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. 	10				10
TOTAL (%)				20	40	10	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Additive Manufacturing											
	Course Code :												
2.	Synopsis :	This course encompasses the introduction to additive manufacturing and the different manufacturing technologies. Emphasis is placed on the production process from design to the 3D printed part. The main applications of this technology in the furniture and wood sector are exposed, as well as the influence of 3D printing in both the commercial sector and industry 4.0.											
3.	Name(s) of academic staff :												
4.	Semester and Year offered :	Semester	1	Year	1								
5.	Credit Value :	2											
6.	Prerequisite/co-requisite: (if any)	No											
7.	Course Learning Outcomes (CLO) : At the end of the course the students will be able to:												
	CLO1	Assess the different production process in additive manufacturing (C5, CTPS)											
	CLO2	Construct a furniture design based on production processes in additive manufacturing (P5, CTPS)											
	CLO3	Relate ideas and new designs to social issues in furniture production processes. (A4, TS)											
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it.												
	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)										Learning and Teaching Method	Assessment Method
		Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills					
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7					
	CLO1	√					√					Lecture, self-Learning, Student-Center Learning.	Continuous assignment. Final exam.
	CLO2		√				√					Lecture, self-Learning, Student-Center Learning.	Continuous assignment. Final exam.
	CLO3			√								Lecture, self-Learning, Student-Center Learning.	Continuous assignment.
Indicate the relevancy between the CLO and PLO by ticking "√" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)													
9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Understanding of the production process in 3D printing and gaining knowledge and competencies about how to print and what it is needed to print a 3D model.										
		2	Development of skills for applying 3D printing in the furniture industry.										
		3	Knowledge of how 3D printing is getting closer to the market, not only because of the printing of prototypes and final products, but also because it is creating new demands and market strategies.										
		4	Roll of Additive Manufacturing in Industry 4.0										
10.	Distribution of Student Learning Time (SLT)												
	Course Content Outline	CLO*	Teaching and Learning Activities					SLT					
			Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning		Independent Learning (NF2F)				
			L	T	P	O							
	1 - Introduction to Additive Manufacturing	CLO1	1		2			2	5				
	2 - Workflow: How does 3D printing works?	CLO1	1		2			2	5				
	3 - 3D Printing Technologies	CLO1	2		3			4	9				
	4 - Production Process in 3D Printing	CLO1, CLO2	3		11			6	20				
	5 - Application of 3D Printing in the furniture sector. Design and Prototyping.	CLO2, CLO3	3		3			6	12				
	6 - Molds for Prototyping and Final Products. Rapid Tooling.	CLO2	1		4			2	7				
	7 - Final Products.	CLO2, CLO3	2		12			4	18				
	8 - Commercial Aspects and roll of AM within Industry 4.0	CLO2, CLO3	1		2			2	5				
	Total								81				
	Continuous Assessment		Percentage (%)	F2F		NF2F		SLT					
	1	Assignment	20					0					
	2	Practical work	40					0					
	3	Reports	10					0					
	Total								0				
	Final Assessment		Percentage (%)	F2F		NF2F		SLT					
	1	Final Exam	30	2				2					
	Total								2				
	**Please tick (√) if this course is Lethan Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time(ELT) of 50% L = Lecture, T = Tutorial, P = Practical, O = Others, F2F=Face to Face, NF2F=Non Face to Face *Indicate the CLO based on the CLO's numbering in item 8.												
	GRAND TOTAL SLT								83				
11.	Identify special requirement to												
12.	References (include required and further readings, and should be the most current)												
13.	Other additional information :												



Course: Internet of Things (IoT) applied to wood-based industry. Compulsory.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)						
		Cognitive (C)	Cognitive (C)	Affective (A)				
		PLO 1	PLO 6	PLO 4				
1	Synthesize main concepts and elements in a Internet of Thing environment (C6, CTPS)	√	√					
2	Develop some different Internet of Things scenarios (C6, CTPS)	√	√					
3	Revise literature and new trends of Internet of Things in the Wood and Furniture Industry. (A5, EM)			√				
TOTAL (%)		80		20				

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment (Exercises)	NF2F Practical Work (Follow IoT system deployment tutorials)	Reports (research and paper readings)	Final	
1	Synthesize main concepts and elements in a Internet of Thing environment (C6 = PLO1) (CTPS = PLO6)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Assignment (SCL): Case Study (SCL): Problem-Based Learning (PBL). 	10			15	25
2	Develop some different Internet of Things scenarios (C6 = PLO1) (CTPS = PLO6)	PLO6	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). 	10	20		15	55
		PLO1	<ul style="list-style-type: none"> (SCL): Assignment. Deploy a Internet of Things network prototype 		10			
3	Revise literature and new trends of Internet of Things in the Wood and Furniture Industry (A5, EM = PLO4)	PLO4	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Problem-Based Learning (PBL). Research of papers about Internet of Things applied to Industry Synthesize new ideas acquired Report 			20		20
TOTAL (%)				20	30	20	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Internet of Things (IoT) applied to wood-based industry.													
	Course Code :														
2.	Synopsis :	This course encompasses the introduction to Internet of Things, the different applications of this technology in the Wood and Furniture Industry as well as some of the current challenges that Internet of Things is currently facing. Finally, it gives the opportunity to discover a general IoT architecture and to carry out the deployment of an IoT network.													
3.	Name(s) of academic staff :														
4.	Semester and Year offered :	Semester	1	Year	1										
5.	Credit Value :	2													
6.	Prerequisite/co-requisite: (if any)	No													
7.	Course Learning Outcomes (CLO) : At the end of the course the students will be able to:														
	CLO1	Synthesize main concepts and elements in a Internet of Thing environment (C6, CTPS)													
	CLO2	Develop some different Internet of Things scenarios (C6, CTPS)													
	CLO3	Revise literature and new trends of Internet of Things in the Wood and Furniture Industry. (A5, EM)													
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it.														
	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)										Learning and Teaching Method	Assessment Method		
		Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills							
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7							
	CLO1	√					√						Lecture, self Learning, Student-Center Learning.	Continuous assignment. Final exam.	
	CLO2	√					√						Lecture, self Learning, Student-Center Learning.	Continuous assignment.	
	CLO3				√								Lecture, self Learning, Student-Center Learning.	Continuous assignment.	
Indicate the relevancy between the CLO and PLO by ticking "√" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)															
9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Competencies in the identification and development of Internet of Things solutions in the Industry 4.0.												
		2	Development of skills for applying Internet of Things in the furniture industry.												
		3	Roll of Internet of Things in Industry 4.0												
		4													
10.	Distribution of Student Learning Time (SLT)														
	Course Content Outline	CLO*	Teaching and Learning Activities						Independent Learning (NF2F)	SLT					
			Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning								
			L	T	P	O									
	1 - Introduction to Internet of Things and main characteristics	CLO1	2						4	6					
	2 - Internet of Things Network Architecture	CLO1	5						7	12					
	3 - Internet of Things communication protocols	CLO1	4						7	11					
	4 - Internet of Things Challenges	CLO2	3						6	9					
	5 - Application of Internet of Things	CLO1, CLO2	5						10	15					
	6 - Deployment of an Internet of Things Network	CLO2	5						10	15					
	7 - Use cases of Internet of Things in the Wood and Furniture Industry	CLO1, CLO2, CLO3	2						4	6					
	8 - Relevance of Internet of Things for the future	CLO1, CLO3	2						4	6					
	Total									80					
	Continuous Assessment		Percentage (%)		F2F		NF2F		SLT						
	1	Assignment (Exercises)	20						0						
	2	NF2F work (Follow IoT system deployment tutorials)	30						0						
	3	Reports (research and paper readings)	20						0						
	Total									0					
	Final Assessment		Percentage (%)		F2F		NF2F		SLT						
	1	Written examination	30		2				2						
	Total									2					
	**Please tick (√) if this course is Lathian Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time(ELT) of 50%														
	L = Lecture, T = Tutorial, P = Practical, O = Others, F2F=Face to Face, NF2F=Non Face to Face														
	*Indicate the CLO based on the CLO's numbering in item 8.														
	GRAND TOTAL SLT									82					
11.	Identify special requirement to deliver														
12.	References (include required and further readings, and should be the most current)														
13.	Other additional information :														



Course: Wireless technologies for logistic and manufacturing. Compulsory.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)					
		Cognitive (C)	Cognitive (C)	Affective (A)			
		PLO 1	PLO 6	PLO 7			
1	Discuss the concepts around wireless technologies and their context in factories and manufacturing/logistic processes (C5 = PLO1)	√					
2	Discriminate among the most popular wireless technologies in factories and manufacturing/logistic processes (CTPS, C5 = PLO6)		√				
3	Identify the wireless technologies solutions to current and incoming issues in the logistic and manufacturing processes in industry (A4, LL = PLO7)			√			
TOTAL (%)		85		15			

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities				Total (%)
				Assignment	Case study Report&Discussion	Final	
1	Discuss the concepts around wireless technologies and their context in factories and manufacturing/logistic processes (C5 = PLO1)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Assignment (SCL): Case Study 	25		15	40
2	Discriminate among the most popular wireless technologies in factories and manufacturing/logistic processes (CTPS, C5 = PLO6)	PLO6	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Assignment (SCL): Case Study 	30		15	45
3	Identify the wireless technologies solutions to current and incoming issues in the logistic and manufacturing processes in industry (A4, LL = PLO7)	PLO7	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Assignment. 		15		15
TOTAL (%)				55	15	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Wireless Technologies for logistic and manufacturing																																																																																																																														
	Course Code :																																																																																																																															
2.	Synopsis :	This course gives the student a full overview of the present and future wireless technologies to be used in factories: RFID, NFC, Zigbee, Bluetooth, BLE, Wi-Fi, Sigfox, Lora, NB-IoT, 4G and 5G. Communication standards, operation modes, privacy and security issues, use cases and future trends are addressed for each technology.																																																																																																																														
3.	Name(s) of academic staff :																																																																																																																															
4.	Semester and Year offered :	Semester	1	Year	1																																																																																																																											
5.	Credit Value :	2																																																																																																																														
6.	Prerequisite/co-requisite: (if any)	No																																																																																																																														
7.	Course Learning Outcomes (CLO) : At the end of the course the students will be able to:																																																																																																																															
	CLO1	Discuss the concepts around wireless technologies and their context in factories and manufacturing/logistic processes (C5 = PLO1)																																																																																																																														
	CLO2	Discriminate among the most popular wireless technologies in factories and manufacturing/logistic processes (C5, CTP5 = PLO6)																																																																																																																														
	CLO3	Identify the wireless technologies solutions to current and incoming issues in the logistic and manufacturing processes in industry (A4, LL = PLO7)																																																																																																																														
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it.																																																																																																																															
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9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Ability to take decisions about the use of wireless technologies in logistic/manufacturing processes.																																																																																																																													
		2	Synthesize main concepts and elements taking part in the deployment of wireless technologies in factories.																																																																																																																													
		3	Ability to suggest new technologies or improvements in wireless technologies operating in factories/logistic/manufacturing.																																																																																																																													
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12.	References (include required and further readings, and should be the most current)	5G Wireless Technologies, IET telecommunications series. Ed. Institution of Engineering and Technology, by Angeliki Alexiou, 2017 Wireless Automation as an Enabler for the Next Industrial Revolution, Muhammad A. Imran, Sajjad Hussain, Qammer H. Abbas. Ed. Wiley, 2020																																																																																																																														
13.	Other additional information :																																																																																																																															



Course: Network communications in the industry. Elective.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)							
		Cognitive (C)	Cognitive (C)	Affective (A)					
		PLO 1	PLO 6	PLO 4					
1	Synthesize main concepts and elements in an Industrial Communication Network (C6, CTPS)	√	√						
2	Suggest tools and improvements of Communication Networks in an Industrial environment (C6, CTPS)	√	√						
3	Revise literature and new trends of Communication Networks in the Wood and Furniture Industry (A5, EM)			√					
TOTAL (%)		70		30					

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment (Exercises)	NF2F Practical Work	Reports (research and paper readings)	Final	
1	Synthesize main concepts and elements in an Industrial Communication Network. (C6 = PLO1) (CTPS = PLO6)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Assignment (SCL): Case Study (SCL): Problem-Based Learning (PBL). 	10	10		15	35
2	Suggest tools and improvements of Communication Networks in an Industrial environment (C6 = PLO1) (CTPS = PLO6)	PLO6	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. Practical. Analysis of an Industrial Communication Network 	10	10		15	35
3	Revise literature and new trends of Communication Networks in the Wood and Furniture Industry. (A5, EM = PLO4)	PLO4	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. Research of papers about Communication Networks in Industry 4.0 Synthesize and acquire knowledge Report 			30		30
TOTAL (%)				20	20	30	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Network Communications in the industry									
	Course Code :										
2.	Synopsis :	This course gives a general overview of communication networks in the context of Industry 4.0. Some of the most important communication standards, the different types of communication networks in terms of range, as well as an explanation of its architecture are explained. Finally, the clearest example of Communication Network is presented: The Internet.									
3.	Name(s) of academic staff :										
4.	Semester and Year offered :	Semester	1	Year	1						
5.	Credit Value :	2									
6.	Prerequisite/co-requisite: (if any)	No									
7.	Course Learning Outcomes (CLO) : At the end of the course the students will be able to:										
	CLO1	Synthesize main concepts and elements in an Industrial Communication Network (C6, CTPS)									
	CLO2	Suggest tools and improvements of Communication Networks in an Industrial environment (C6, CTPS)									
	CLO3	Revise literature and new trends of Communication Networks in the Wood and Furniture Industry. (A5, EM)									
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment :	Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it. E.g. PLO1 - Knowledge, PLO2 - Cognitive, PLO3 - Practical Skills									
	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)							Learning and Teaching Method	Assessment Method	
		Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills			
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7			
	CLO1	√					√		Lecture, self-Learning, Student-Center Learning.	Continuous assignment. Final exam.	
	CLO2	√					√		Lecture, self-Learning, Student-Center Learning.	Continuous assignment.	
	CLO3				√				Lecture, self-Learning, Student-Center Learning.	Continuous assignment.	
Indicate the relevancy between the CLO and PLO by ticking "√" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)											
9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Competencies in the identification and deployment of Communication Networks.								
		2	Problem solving in Industrial Networks.								
		3	Basic knowledge in the wide technology spectrum related to Communication Networks.								
		4									
10.	Distribution of Student Learning Time (SLT)										
	Course Content Outline	CLO*	Teaching and Learning Activities				SLT				
			Guided Learning (F2F)								
			L	T	P	O	Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)			
	1 - Introduction to Network Communications in the Industry	CLO1	2					4			
	2 - Digital Communication Basics	CLO1	4					6			
	3 - Main characteristics of Network Communications	CLO1	2					4			
	4 - Evolution of Communication Networks	CLO1, CLO2, CLO3	2					4			
	5 - Industrial Communication Networks	CLO1, CLO2, CLO3	6					12			
	6 - Industrial Communication Standards	CLO1, CLO2, CLO3	6					12			
	7 - Layered Architectures	CLO1, CLO2	4					6			
	8 - The Internet	CLO1, CLO2	2					4			
								0			
								80			
	Continuous Assessment	Percentage (%)	F2F				NF2F				
	1 Assignment (Exercises)	20					0				
	2 NF2F work	20					0				
	3 Reports (research and paper readings)	30					0				
							Total 0				
	Final Assessment	Percentage (%)	F2F				NF2F				
	1 Written examination	30	2				2				
							Total 2				
	**Please tick (√) if this course is Latham Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time (ELT) of 50% L = Lecture, T = Tutorial, P = Practical, O = Others, F2F=Face to Face, NF2F=Non Face to Face *Indicate the CLO based on the CLO's numbering in Item 8.							GRAND TOTAL SLT			
							82				
11.	Identify special requirement to										
12.	References (include required and further readings, and should be the most current)										
13.	Other additional information :										



Course: Robotics applied to the wood-based industry. Elective.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)					
		Cognitive (C)	Affective (A)				
			PLO 1	PLO 4			
1	Discuss the concepts of industrial robotic and their context in the wood-based industry (C5)	√					
2	Identify among types of robots and their use in different process in the wood-based industry (A4, EM)		√				
3	Defend an industrial robotic solution to current and incoming issues in the logistic and manufacturing wood-based industry (A4, LL)			√			
TOTAL (%)		30	70				

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)			Total (%)
				Assignment / Peer assignment	Case study Report&Discussion	Final	
1	Discuss the concepts of industrial robotic and their context in the wood-based industry (C5 = PLO1)	PLO1	• Lecture & self-Learning • (SCL): Assignment			30	30
2	Identify among types of robots and their use in different process in the wood-based industry (A4, EM = PLO4)	PLO4	• Lecture & self-Learning • (SCL): Assignment • (SCL): Case Study	20			20
3	Defend an industrial robotic solution to current and incoming issues in the logistic and manufacturing wood-based industry (A4, LL = PLO7)	PLO7	• Lecture & self-Learning • (SCL): Assignment • (SCL): Case Study	20	30		50
TOTAL (%)				40	30	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :		Robotic applied to the wood-based industry									
	Course Code :											
2.	Synopsis :		This course gives the student a full overview of robotic, mainly focused on its use in the wood-based industry. The contents include, basic concepts of industrial robotic, goals in the current industry and use cases in wood-based industry.									
3.	Name(s) of academic staff :											
4.	Semester and Year offered :		Semester	1	Year	1						
5.	Credit Value :		2									
6.	Prerequisite/co-requisite: (if any)		No									
7.	Course Learning Outcomes (CLO) : At the end of the course the students will be able to:											
	CLO1		Discuss the concepts of industrial robotic and their context in the wood-based industry (CS=PLO1)									
	CLO2		Identify among types of robots and their use in different process in the wood-based industry (A4, EM = PLO4)									
	CLO3		Defend an industrial robotic solution to current and incoming issues in the logistic and manufacturing wood-based industry (A4, LL = PLO7)									
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it.											
	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)								Learning and Teaching Method	Assessment Method	
Knowledge of Discipline Area		Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills					
PLO1		PLO2	PLO3	PLO4	PLO5	PLO6	PLO7					
	CLO1	√								Lecture, self-Learning, Student-Center Learning.	Continuous assignment, Final exam.	
	CLO2			√						Lecture, self-Learning, Student-Center Learning.	Continuous assignment.	
	CLO3						√			Lecture, self-Learning, Student-Center Learning.	Continuous assignment, Case study.	
Indicate the relevancy between the CLO and PLO by ticking "√" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)												
9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)		1	Ability to take decisions about the use of robots in wood-based industry.								
			2	Synthesize main concepts and elements taking part in the industrial robotic.								
			3	Ability to improve wood-based industry through industrial robotic and robots.								
10.	Distribution of Student Learning Time (SLT)											
	Course Content Outline		CLO*	Teaching and Learning Activities					Independent Learning (NF2F)	SLT		
				Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning				
	Introduction to Industrial Robotic		CLO1	L	T	P	O		3	5		
	Main concepts of industrial robotic		CLO1	6					8	14		
	Technical issues in robotic and robots: sensors, actuators, manipulators, gears and other mechanical systems		CLO1	6					8	14		
	Micro, nano and mobile robots		CLO1, CLO2	2					4	6		
	Robots in small and medium enterprises		CLO2, CLO3	2					4	6		
	Guidelines for implementing robotic systems in small and medium enterprises		CLO2, CLO3	4					6	6		
	Use cases in the wood-based industry		CLO2, CLO3	4					6	10		
	Future trends of robotic in industry		CLO3	2					3	5		
									Total	66		
	Continuous Assessment		Percentage (%)	F2F				NF2F		SLT		
	1	Continuous assignment	20	1						1		
	2	Continuous assignment	20	1						1		
	3	Case study report	30					12		12		
								Total		14		
	Final Assessment		Percentage (%)	F2F				NF2F		SLT		
	1	Final exam	30	2						2		
								Total		2		
								GRAND TOTAL SLT		82		
**Please tick (√) if this course is Lathan Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time(ELT) of 50%												
L = Lecture, T = Tutorial, P = Practical, O = Others, F2F=Face to Face, NF2F=Non Face to Face												
*Indicate the CLO based on the CLO's numbering in Item 8.												
11	Identify special requirement to											
12	References (include required and further readings, and should be the most current)		http://robots.stanford.edu/videos.html World robotics 2014, statistics, Market Analysis, Forecasts, case studies and robot investment. IFR. Robotic Visions, "to 2020 and Beyond", the strategic research Agenda for robotics in europe, europ, 2009 https://www.eu-robotics.net/ https://goldberg.berkeley.edu/pubs/T-ASE-Cloud-RA-Survey-Paper-Final-2015.pdf									
13	Other additional information :											



Course: Augmented reality. Elective.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)						
		Cognitive (C)	Cognitive (C)	Affective (A)				
		PLO 1	PLO 6	PLO 3				
1	Evaluate the use and benefits of Augmented Reality technology. (C5)	√						
2	Design theoretical augmented reality solutions for the furniture sector. (C6, CTPS = PLO6)		√					
3	Explain the possibilities of Augmented Reality within the wood-based industry. (A4, TS)			√				
TOTAL (%)		70		30				

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment	Project report. Case study	Scenario-based debate	Final	
1	Evaluate the use and benefits of Augmented Reality technology. (C5= PLO1)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Assignment (SCL): Case Study (SCL): Problem-Based Learning (PBL). 	5	10	5	15	35
2	Design theoretical augmented reality solutions for the furniture sector. (C6, CTPS = PLO6)	PLO6	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. Practical. Modular Project. 	5	10	5	15	35
3	Explain the possibilities of Augmented Reality within the wood-based industry. (A4, TS = PLO3)	PLO3	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. Practical. Modular Project. 	10	10	10		30
TOTAL (%)				20	30	20	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Augmented Reality																																																																																																																																																																																																																																																																			
	Course Code :																																																																																																																																																																																																																																																																				
2.	Synopsis :	This course introduces Augmented Reality, giving an overview of what Augmented Reality is and how it works. It details how to use this technology in the wood and furniture sector, explaining some of its most relevant uses in this field. It also refers to the commercial benefits that the furniture sector can obtain thanks to this technology.																																																																																																																																																																																																																																																																			
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	CLO2	Design theoretical augmented reality solutions for the furniture sector. (C6, CTP5 = PLO6)																																																																																																																																																																																																																																																																			
	CLO3	Explain the possibilities of Augmented Reality within the wood-based industry. (A4, TS)																																																																																																																																																																																																																																																																			
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it. E.g. PLO1 - Knowledge, PLO2 - Cognitive, PLO3 - Practical Skills																																																																																																																																																																																																																																																																				
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9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Uses of Augmented Reality throughout the production chain of furniture, from the design to the final piece.																																																																																																																																																																																																																																																																		
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Introduction to Augmented Reality	CLO1	1		2			3	6	2. Augmented Reality vs Virtual Reality	CLO1	1		1			1	3	3. AR: How it works?	CLO1	1		2			2	5	4. Types of Augmented Reality	CLO1, CLO3	1		2			2	5	5. Brief description of some software used in AR	CLO1	1		2			2	5	6. Application of AR in the furniture sector. Design and Prototyping.	CLO2, CLO3	1		6			2	9	7. Application of AR in the furniture sector. Production Process.	CLO2, CLO3	1		5			2	8	8. Application of AR in the furniture sector. Supply chain.	CLO2, CLO3	2		4			2	8	9. Application of AR in the furniture sector. Maintenance.	CLO2, CLO3	1		2			2	5	10. Application of AR in the furniture sector. Training.	CLO2, CLO3	1		2			2	5	11. Resources for AR.	CLO2	2		11			2	15	12. Augmented Reality in the commercial Market.	CLO3	1		3			2	6								Total	80	Continuous Assessment		Percentage (%)	F2F		NF2F		SLT		1	Assignment	15					0		2	Project report. Case study	40					0		3	Scenario-based debate	15					0									Total	0	Final Assessment		Percentage (%)	F2F		NF2F		SLT		1	Final Exam	30	2				2									Total	2	**Please tick (✓) if this course is Lathian Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time (ELT) of 50% L = Lecture, T = Tutorial, P = Practical, O = Others, F2F = Face to Face, NF2F = Non Face to Face *Indicate the CLO based on the CLO's numbering in Item 8.							GRAND TOTAL SLT 82		11.	Identify special requirement to										12.	References (include required and further readings, and should be the most current)										13.	Other additional information :									
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10. Application of AR in the furniture sector. Training.	CLO2, CLO3	1		2			2	5																																																																																																																																																																																																																																																													
11. Resources for AR.	CLO2	2		11			2	15																																																																																																																																																																																																																																																													
12. Augmented Reality in the commercial Market.	CLO3	1		3			2	6																																																																																																																																																																																																																																																													
							Total	80																																																																																																																																																																																																																																																													
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2	Project report. Case study	40					0																																																																																																																																																																																																																																																														
3	Scenario-based debate	15					0																																																																																																																																																																																																																																																														
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Course: Simulation and 3D Scanning. Elective.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)						
		Cognitive (C)	Cognitive (C)	Psychomotor (P)	Affective (A)			
		PLO 1	PLO 6	PLO 2	PLO 3			
1	Assess the uses of 3D scanning and simulation within the wood-based industry. (C5= PLO1, CTPS =PLO6)	√	√					
2	Display an operation or product through 3D scanning and simulation technologies. (P5= PLO2)			√				
3	Identify 3D scanning and simulation solutions for current and future issues in the wood and furniture industry. (A4, TS = PLO3)				√			
TOTAL (%)		45		40	15			

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment	Project oriented problem based learning.	Reports	Final	
1	Assess the uses of 3D scanning and simulation within the wood-based industry. (C5= PLO1, CTPS =PLO6)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Assignment (SCL): Case Study (SCL): Problem-Based Learning (PBL). 	15			15	30
2	Display an operation or product through 3D scanning and simulation technologies. (P5= PLO2)	PLO6	<ul style="list-style-type: none"> Practical. Prototype and Technical Report. 				15	15
		PLO2	<ul style="list-style-type: none"> (SCL): Assignment Practical. Modular Project. 		40			40
3	Identify 3D scanning and simulation solutions for current and future issues in the wood and furniture industry. (A4, TS = PLO3)	PLO3	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. 			15		15
TOTAL (%)				15	40	15	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Simulation and 3D Scanning									
	Course Code :										
2.	Synopsis :	This course aims to transmit knowledge about digital simulation and its applications in the furniture industry. In addition, concepts about the 3D scanning process and rapid prototyping will be discussed, as well as how it can be used in the furniture and wood sector.									
3.	Name(s) of academic staff :										
4.	Semester and Year offered :	Semester	1	Year	1						
5.	Credit Value :	2									
6.	Prerequisite/co-requisite: (if any)	No									
7.	Course Learning Outcomes (CLO) : At the end of the course the students will be able to:										
	CLO1	Assess the uses of 3D scanning and simulation within the wood-based industry. (C5= PLO1, CTP5 =PLO6)									
	CLO2	Display an operation or product through 3D scanning and simulation technologies. (P5= PLO2)									
	CLO3	Identify 3D scanning and simulation solutions for current and future issues in the wood and furniture industry. (A4, TS = PLO3)									
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it.										
	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)							Learning and Teaching Method	Assessment Method	
		Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills			
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7			
	CLO1	√					√			Lecture, self-Learning, Student-Center Learning.	Continuous assignment. Final exam.
	CLO2		√				√			Lecture, self-Learning, Student-Center Learning.	Continuous assignment. Final exam.
	CLO3			√						Lecture, self-Learning, Student-Center Learning.	Continuous assignment.
Indicate the relevancy between the CLO and PLO by ticking "√" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)											
9.	Transferable Skills (If applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Know what simulation is, its most used techniques and software.								
		2	Know what 3D scanning is and how it works. Applications in the furniture and wood sector.								
		3	Identify the phases for a simulation study.								
		4									
10.	Distribution of Student Learning Time (SLT)										
	Course Content Outline	CLO*	Teaching and Learning Activities				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)	SLT		
			Guided Learning (F2F)								
			L	T	P	O					
	1.- Introduction to Simulation and 3D Scanning.	CLO1	2		3			2	7		
	2.- Fundamental Simulation concepts.	CLO1	2		3			3	8		
	3.- Application of Simulation in the Industry.	CLO1, CLO3	2		3			3	8		
	4.- Application of 3D Scanning within the wood-based industry.	CLO1, CLO3	2		3			3	8		
	5.- 3D product modeling: 3D Scanning and Rapid Prototyping.	CLO2	2		9			3	14		
	6.- Introduction to FlexSim.	CLO2	1		9			4	14		
	7.- Practical Simulation example.	CLO2	1		9			4	14		
	8.- Roll of 3D simulation and scanning in industry 4.0.	CLO3	2		3			2	7		
	Total								80		
	Continuous Assessment	Percentage (%)	F2F				NF2F		SLT		
	1 Assignment	20							0		
	2 Practical work	40							0		
	3 Reports	10							0		
	Total								0		
	Final Assessment	Percentage (%)	F2F				NF2F		SLT		
	1 Final Exam	30	2						2		
	Total								2		
	***Please tick (√) if this course is Lathan Industr/ Clinical Placement/ Practicum/ WBL using Effective Learning Time(ELT) of 50% L = Lecture, T = Tutorial, P = Practical, O = Others, F2F=Face to Face, NF2F=Non Face to Face *Indicate the CLO based on the CLO's numbering in Item 8.										
	GRAND TOTAL SLT								82		
11.	Identify special requirement to										
12.	References (include required and further readings, and should be the most current)										
13.	Other additional information :										



Course: Cloud Computing and Big Data applied to wood-based industry. Elective.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)						
		Cognitive (C)	Cognitive (C)	Affective (A)				
		PLO 1	PLO 6	PLO 4				
1	Determining gaps or failures in a Cloud Computing and Big Data scenarios (C5, CTPS)	√	√					
2	Providing options to build a Cloud Computing Environment and Big Data analysis ecosystems. (C6, CTPS)		√					
3	Revise literature and new trends of Cloud Computing in the Wood and Furniture Industry (A5, TS)			√				
TOTAL (%)		80		20				

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment (Exercises)	NF2F Practical Work	Reports (research and paper readings)	Final	
1	Determining gaps in Cloud Computing and Big Data scenarios (C5 = PLO1) (CTPS = PLO6)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Assignment (SCL): Case Study (SCL): Problem-Based Learning (PBL). 	10	10		15	35
2	Providing options to build a Cloud Computing Environment and Big Data analysis ecosystems. (C6, CTPS = PLO6)	PLO6	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. Data Analysis and Hadoop exercises 	10	20		15	45
3	Revise literature and new trends of Cloud Computing in the Wood and Furniture Industry (A5, EM = PLO4)	PLO4	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Problem-Based Learning (PBL). Research of papers about Internet of Things applied to Industry Synthesize new ideas acquired Report 			20		20
TOTAL (%)				20	30	20	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Cloud Computing and Big Data applied to wood-based industry																																																																																																																																																																						
	Course Code :																																																																																																																																																																							
2.	Synopsis :	This course introduces the concepts of Cloud Computing and Big Data and gives which are the main features of them. In addition, the models and methods of deployment of Cloud Computing are explained, as well as the process of data analysis collected by data management tools. Furthermore, it is presented what is the most used technology in Big Data and some guidelines and basic concepts of use are given, together with real applications in the Industry.																																																																																																																																																																						
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7.	Course Learning Outcomes (CLO) :	At the end of the course the students will be able to:																																																																																																																																																																						
	CLO1	Determining gaps or failures in a Cloud Computing and Big Data scenarios. (C5, CTPS)																																																																																																																																																																						
	CLO2	Providing solutions in Cloud Computing Environment and Big Data analysis ecosystems. (C6, CTPS)																																																																																																																																																																						
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9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Recognition of cloud-based and Big Data technologies in industrial environments.																																																																																																																																																																					
		2	Ability to apply the knowledge acquired in Cloud Computing and Big Data in industrial environments based on furniture and wood.																																																																																																																																																																					
		3	To know future trends in the Cloud Computing paradigm.																																																																																																																																																																					
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Course: Eco and sustainable design. Elective.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)			
		Cognitive (C)	Cognitive (C)	Affective (A)	
		PLO 1	PLO 6	PLO 4	PLO 3
1	Assess environmental aspects of ecological and sustainable design in the industry (C5, CTPS)	√	√		
2	Identify action plans to mitigate the environmental impact on the industry (A4, EM)			√	
3	Relate ideas and new designs to social issues in furniture production processes. (A4, TS)				√
TOTAL (%)		53		21	26

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)		Total (%)
				Assignment	Final	
1	Assess the different production process in additive manufacturing. (C5 = PLO1) (CTPS = PLO6)	PLO1	• Lecture & self-Learning • (SCL): Assignment • (SCL): Case Study • (SCL): Problem-Based Learning (PBL).	11	15	53
		PLO6		12	15	
2	Identify action plans to mitigate the environmental impact on the industry (A4, EM = PLO4)	PLO4	• Lecture & self-Learning • (SCL): Discussion • (SCL): Case Study • (SCL): Problem-Based Learning (PBL). • (SCL): Assignment.	21		21
3	Relate ideas and new designs to social issues in furniture production processes. (A4, TS = PLO3)	PLO3	• Lecture & self-Learning • (SCL): Discussion • (SCL): Case Study • (SCL): Problem-Based Learning (PBL). • (SCL): Assignment.	26		26
TOTAL (%)				70	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Eco and sustainable design													
	Course Code :														
2.	Synopsis :	This course covers the introduction to ecological and sustainable design for application in furniture companies. Its concept is analyzed in depth the benefits and improvements it brings with respect to traditional design, as well as the legal framework that regulates it. The concept of life cycle analysis, sustainable design strategies and everything that has to do with environmental aspects to be taken into account are introduced.													
3.	Name(s) of academic staff :														
4.	Semester and Year offered :	Semester	1	Year	1										
5.	Credit Value :	2													
6.	Prerequisite/co-requisite: (if any)	No													
7.	Course Learning Outcomes (CLO) : At the end of the course the students will be able to:														
	CLO1	Assess environmental aspects of ecological and sustainable design in the industry (C5, CTPS)													
	CLO2	Identify action plans to mitigate the environmental impact on the industry (A4, EM)													
	CLO3	Relate ideas and new products with social problems in furniture design processes (A4, TS)													
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it.														
	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)										Learning and Teaching Method	Assessment Method		
		Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills							
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7							
	CLO1	√					√						Lecture, self-Learning, Student-Center Learning.	Continuous assignment. Final exam.	
	CLO2				√								Lecture, self-Learning, Student-Center Learning.	Continuous assignment.	
	CLO3			√									Lecture, self-Learning, Student-Center Learning.	Continuous assignment.	
Indicate the relevancy between the CLO and PLO by ticking "√" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)															
9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Recognize environmental aspects and methodologies for evaluating environmental impact.												
		2	Evaluate the environmental impact of production and the product itself.												
		3	Coordinate the management of the communication and document registration processes												
		4	Management of environmental incidents and mitigation plans												
10.	Distribution of Student Learning Time (SLT)														
	Course Content Outline	CLO*	Teaching and Learning Activities							SLT					
			Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)							
			L	T	P	O									
	1 - Introduction to eco and sustainable design	CLO1	3					5	8						
	2 - Traditional design versus eco and sustainable design	CLO1	3					5	8						
	3 - EU Legal and environmental framework	CLO1, CLO2	4					8	12						
	4 - Cost and life cycle analysis	CLO1, CLO2	3					6	9						
	5 - Principles and strategies	CLO2	3					6	9						
	6 - Applying eco and sustainable design	CLO2, CLO3	3					6	9						
	7 - Environmental aspects of the company	CLO3	6					10	16						
	8 - Environmental product declaration	CLO3	3					6	9						
	Total								80						
	Continuous Assessment		Percentage (%)	F2F				NF2F		SLT					
	1	Assignment	70							0					
	2									0					
	3									0					
	Total								0						
	Final Assessment		Percentage (%)	F2F				NF2F		SLT					
	1	Written examination	30	2						2					
	Total								2						
**Please tick (√) if this course is Latihan Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time(ELT) of 50% L = Lecture, T = Tutorial, P = Practical, O = Others, F2F=Face to Face, NF2F=Non Face to Face *Indicate the CLO based on the CLO's numbering in Item 8.										GRAND TOTAL SLT	82				
11.	Identify special requirement to														
12.	References (include required and further readings, and should be the most current)														
13.	Other additional information :														



Course: Product design and digitalization. Elective.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)					
		Cognitive (C)	Psychomotor (P)	Affective (A)			
		PLO 1	PLO 2	PLO 3			
1	Test different advanced digital tools applicable to furniture design (C5)	√					
2	Build solutions to new products design through advanced digital design tools (P5)		√				
3	Identify social needs through design methods and processes.. (A4, TS)			√			
TOTAL (%)		35	55	10			

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)			Total (%)
				Assignment	Practical Work (Digital Prototype and Progressive exercises)	Final	
1	Test different advanced digital tools applicable to furniture design (C5 = PLO1)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Assignment (SCL): Case Study (SCL): Problem-Based Learning (PBL). 	5		30	35
2	Build solutions to new products design through advanced digital design tools (P5 = PLO2)	PLO2	<ul style="list-style-type: none"> (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. Practical. Progressive exercises and Digital Prototype 	10	45		55
3	Identify social needs through design methods and processes. (A4, TS = PLO3)	PLO3	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. 	10			10
TOTAL (%)				25	45	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Product Design and Digitalization																																																																																																																						
	Course Code :																																																																																																																							
2.	Synopsis :	This course ranges from concept generation to final detailed design through advanced digital design tools. First, it puts in the foreground the importance of working within a design method to obtain a good concept, and then, to develop products in the digital thread aiming at the transformation of the furniture industry 4.0																																																																																																																						
3.	Name(s) of academic staff :																																																																																																																							
4.	Semester and Year offered :	Semester	1	Year	1																																																																																																																			
5.	Credit Value :	2																																																																																																																						
6.	Prerequisite/co-requisite: (if any)	No																																																																																																																						
7.	Course Learning Outcomes (CLO) : At the end of the course the students will be able to:																																																																																																																							
	CLO1	Test different advanced digital tools applicable to furniture design. (C5)																																																																																																																						
	CLO2	Build solutions for new products design through advanced digital design tools. (P5)																																																																																																																						
	CLO3	Identify social needs through design methods and processes. (A4, T5)																																																																																																																						
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it. E.g. PLO1 - Knowledge, PLO2 - Cognitive, PLO3 - Practical Skills																																																																																																																							
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9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Design process and the issues that arise in the progression from conceptual to detailed design.																																																																																																																					
		2	Develop skills in use of advanced digital design tools																																																																																																																					
		3	Understand the role that technology is playing in the transition through a digital manufacturing and design and implement a correct information flow's strategy in a company for industry 4.0																																																																																																																					
		4	Role of designer within the furniture industry 4.0.																																																																																																																					
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Course Content Outline	CLO*	Teaching and Learning Activities						SLT																																																																																																																
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Course: Circular Economy in the wood and Furniture Sector. Elective.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)					
		Cognitive (C)	Cognitive (C)	Affective (A)			
		PLO 1	PLO 6	PLO 4	PLO 3		
1	Assess environmental aspects of Circular Economy in industry (C5, CTPS)	√	√				
2	Integrate the circular economy as a key aspect in the business model of the sector (A4, EM)			√			
3	Relate the various dimensions of customer value creation in a circular economy environment (A4, TS)				√		
TOTAL (%)		48		20	32		
No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)			Total (%)
				Assignment	Project oriented problem based learning.	Final	
1	Assess environmental aspects of Circular Economy in industry (C5 = PLO1) (CTPS = PLO6)	PLO1	• Lecture & self-Learning • (SCL): Assignment • (SCL): Case Study • (SCL): Problem-Based Learning (PBL).	9		15	48
		PLO6		9		15	
2	Integrate the circular economy as a key aspect in the business model of the sector (A4, EM = PLO4)	PLO4	• Lecture & self-Learning • (SCL): Discussion • (SCL): Case Study • (SCL): Problem-Based Learning (PBL). • (SCL): Assignment.	20			20
3	Relate the various dimensions of customer value creation in a circular economy environment (A4, TS = PLO3)	PLO3	• Lecture & self-Learning • (SCL): Discussion • (SCL): Case Study • (SCL): Problem-Based Learning (PBL). • (SCL): Assignment.	32			32
TOTAL (%)				70	0	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Circular Economy in the wood and Furniture Sector										
	Course Code :											
2.	Synopsis :	This course covers the introduction to the circular economy in the wood and furniture sector. The relationship between the circular economy and sustainability is analyzed, deepening the keys to this new concept, its current status in the sector, as well as the legal and regulatory framework that regulates it. It also deepens the inclusion of the new strategy within the business model of the company, advancing results in its commercialization, both from the point of view of the potential market to the real value that is provided to the client.										
3.	Name(s) of academic staff :											
4.	Semester and Year offered :	Semester	1	Year	1							
5.	Credit Value :	2										
6.	Prerequisite/co-requisite: (if any)	No										
7.	Course Learning Outcomes (CLO) : At the end of the course the students will be able to:											
	CLO1	Assess environmental aspects of Circular Economy in industry (CS, CTPS)										
	CLO2	Integrate the circular economy as a key aspect in the business model of the sector (A4, EM)										
	CLO3	Relate the various dimensions of customer value creation in a circular economy environment (A4, TS)										
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it.											
	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)							Learning and Teaching Method	Assessment Method		
		Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills				
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7				
	CLO1	√					√			Lecture, self-learning, Student-Center Learning.	Continuous assignment. Final exam.	
	CLO2				√					Lecture, self-learning, Student-Center Learning.	Continuous assignment.	
	CLO3			√						Lecture, self-learning, Student-Center Learning.	Continuous assignment.	
	Indicate the relevancy between the CLO and PLO by ticking "√" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)											
9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Knowledge about the identification of suitable ecological suppliers for the substitution of materials.									
		2	Co-creation with customers									
		3	Knowledge about reasons and behaviors of organic consumption									
		4	Innovation in the use of untapped materials									
10.	Distribution of Student Learning Time (SLT)											
	Course Content Outline	CLO*	Teaching and Learning Activities					Independent Learning (NF2F)	SLT			
			Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning					
			L	T	P	O						
	1 - Introduction to the circular economy	CLO1	2					3	5			
	2 - Keys of the Circular Economy	CLO1	3					5	8			
	3 - The sector and its state with respect to the circular economy	CLO1, CLO2	3					5	8			
	4 - Regulations and legislation	CLO1, CLO2	3					5	8			
	5 - Inclusion of the circular economy in the business model of the sector	CLO2	4					6	10			
	6 - Marketing of products in the circular economy	CLO2, CLO3	3					6	9			
	7 - Value creation through the circular economy	CLO3	5					10	15			
	8 - Supporting by Key Enabling Technologies	CLO3	5					12	17			
									0			
								Total	80			
	Continuous Assessment		Percentage (%)	F2F		NF2F		SLT				
	1	Assignment	70					0				
	2							0				
	3							0				
								Total	0			
	Final Assessment		Percentage (%)	F2F		NF2F		SLT				
	1	Written examination	30	2				2				
								Total	2			
	**Please tick (√) if this course is Lathan Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time(ELT) of 50% L = Lecture, T = Tutorial, P = Practical, O = Others, F2F=Face to Face, NF2F=Non Face to Face *Indicate the CLO based on the CLO's numbering in Item 8.								<div style="border: 1px solid black; width: 50px; height: 20px; display: inline-block;"></div> GRAND TOTAL SLT	82		
11.	Identify special requirement to											
12.	References (include required and further readings, and should be the most current)											
13.	Other additional information :											



Course: Wood science. Compulsory.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)						
		Cognitive (C)	Cognitive (C)	Psychomotor (P)	Affective (A)			
		PLO 1	PLO 6	PLO 2	PLO 7			
1	Assess the knowledge of plant growth and wood morphology (C5)	√						
2	Determine of wood species and adapt testing procedures (CTPS, P6)		√	√				
3	Synthesizes knowledge of properties of wood, qualifies applicability in the industry (A4, LL)				√			
TOTAL (%)		35	25	30	10			
No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment	Case study	Practical	Final	
1	Assess the knowledge of plant growth and wood morphology (C5= PLO1)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study 	10	10		15	35
2	Adapt testing procedures of recognized wood species (CTPS= PLO6, P6=PLO2)	PLO6	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. 		10		15	25
		PLO2	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). Practical: Samples recognition, Equipment training, testing. 		10	20		30
3	Synthesizes knowledge of properties of wood, qualifies applicability in the industry (A4, LL=PLO7)	PLO7	<ul style="list-style-type: none"> (SCL): Case Study Applicability Report. 	5	5			10
Total %				15	35	20	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Wood Science									
	Course Code :										
2.	Synopsis :	Course focuses on basic wood science knowledge with application to furniture industry. Course covers various aspects beginning from plant growth, wood morphology, thru recognition of wood species and their applicability in the industry, to more practical knowledge of mechanical and physical properties of wood as a structural material.									
3.	Name(s) of academic staff :										
4.	Semester and Year offered :	Semester	1	Year	1						
5.	Credit Value :	2									
6.	Prerequisite/co-requisite: (if any)	No									
7.	Course Learning Outcomes (CLO) :	At the end of the course the students will be able to:									
	CLO1	Assess the knowledge of plant growth and wood morphology (C5)									
	CLO2	Adapt testing procedures of recognized wood species (CTPS, P6)									
	CLO3	Synthesizes knowledge of properties of wood, qualifies applicability in the industry (A4, LL)									
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment :	Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it. E.g. PLO1 - Knowledge, PLO2 - Cognitive, PLO3 - Practical Skills									
	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)							Learning and Teaching Method	Assessment Method	
		Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills			
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7			
	CLO1	√							Lecture, self-Learning, Student-Center Learning.	Continuous assignment. Final exam.	
	CLO2		√				√		Lecture, practical, tutorial, self-directed learning. Practical work and demonstrations.	Continuous assignment. Final exam.	
	CLO3							√	(SCL): Case Study Practical. Applicability Report.	Scenario based discuss and case study. Report	
Indicate the relevancy between the CLO and PLO by ticking "√" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)											
9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Understanding of the plant growth and wood morphology								
		2	Development of skills for wood species recognition								
		3	Knowledge of physical and mechanical wood testing								
		4	Knowledge of application of specific material to tasks required								
10.	Distribution of Student Learning Time (SLT)										
	Course Content Outline	CLO*	Teaching and Learning Activities					SLT			
			Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)			
			L	T	P	O					
	1 - Wood as a plant and tree growth	CLO1	1					2	3		
	2 - Structure of hardwoods and softwoods	CLO1, CLO2	1		8			4	13		
	3 - Natural and machining wood defects,	CLO1, CLO2	2		4			2	8		
	4 - Wood deterioration	CLO1, CLO2	2		4			2	8		
	5 - Physical properties of wood	CLO2, CLO3	2		5			5	12		
	6 - Mechanical properties of wood.	CLO2, CLO3	2		5			3	10		
	7 - Testing and evaluation of physical properties of wood	CLO2, CLO3	2		8			3	13		
	8 - Testing and evaluation of mechanical properties of wood	CLO2, CLO3	2		8			3	13		
	Total		14	0	42	0	0	24	80		
	Continuous Assessment	Percentage (%)	F2F				NF2F		SLT		
	1 Assignment	15							0		
	2 Case Study	35							0		
	3 Practical	20							0		
	Total								0		
	Final Assessment	Percentage (%)	F2F				NF2F		SLT		
	1 Written examination	30	2						2		
	Total								2		
	**Please tick (√) if this course is Lathian Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time(ELT) of 50% L = Lecture, T = Tutorial, P = Practical, O = Others, F2F=Face to Face, NF2F=Non Face to Face *Indicate the CLO based on the CLO's numbering in Item 8.								GRAND TOTAL SLT	82	
11.	Identify special requirement to										
12.	References (include required and further readings, and should be the most current)										
13.	Other additional information :										



Course: Materials for furniture manufacturing. Compulsory.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)						
		Cognitive (C)	Cognitive (C)	Psychomotor (P)	Affective (A)			
		PLO 1	PLO 6	PLO 2	PLO 7			
1	Assess (rating and valuation) typology of wood-based materials (C5 = PLO1)	√						
2	Changes technologies in the field of using wood-based materials in new construction solutions (P6=PLO2) (CTPS=PLO6)		√	√				
3	Synthesizes acquired knowledge for further self-education (A4, LL = PLO7)				√			
TOTAL (%)			50	40	10			

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment	Practical Work (Prototype)	Reports	Final	
1	Assess (rating and valuation) typology of wood-based materials (C5 = PLO1)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Assignment (SCL): Problem-Based Learning (PBL). 	10			10	20
2	Changes technologies in the field of using wood-based materials in new construction solutions (P6=PLO2) (CTPS=PLO6)	PLO6	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. 			10	20	30
		PLO2	Practical work, laboratory experiment, demonstrations.		40			40
3	Synthesizes acquired knowledge for further self-education (A4, LL = PLO7)	PLO7	SCL activities like group discussion, role play, case study, PBL, POPBL, field work	10				10
TOTAL (%)				20	40	10	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Materials for furniture manufacturing														
	Course Code :															
2.	Synopsis :	The subject covers the basics of material science in the field of wood-based materials and knowledge of the properties and technology for producing basic groups of wood-based materials, what allowing to their identification and qualitative assessment and indication of the possibilities of their use in new furniture constructions.														
3.	Name(s) of academic staff :															
4.	Semester and Year offered :	Semester		Year												
5.	Credit Value :	2														
6.	Prerequisite/co-requisite: (if any)	No														
7.	Course Learning Outcomes (CLO) : At the end of the course the students will be able to:															
	CLO1	Assess (rating and valuation) typology of wood-based materials (CS)														
	CLO2	Changes technologies in the field of using wood-based materials in new construction solutions (P6, CTPS)														
	CLO3	Synthesizes acquired knowledge for further self-education (A4, LL)														
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it. E.g. PLO1 - Knowledge, PLO2 - Cognitive, PLO3 - Practical Skills															
	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)														
		Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills							Learning and Teaching Method	Assessment Method
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12			
	CLO1	✓												Lecture, self-learning, Student-Center Learning.	Oral or written examination	
	CLO2		✓				✓							Lecture, practical, tutorial, self-directed learning. Practical work and demonstrations.	Project report and observation through practical work (rubric)	
	CLO3							✓						SCL activities like group discussion and case study	Scenario based discuss and case study	
Indicate the relevancy between the CLO and PLO by ticking "✓" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)																
9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1														
		2														
		3														
		4														
		5														
10.	Distribution of Student Learning Time (SLT)															
	Course Content Outline	CLO*	Teaching and Learning Activities										SLT			
			Guided Learning (F2F)				Guided Learning (NF2F)	Independent Learning (NF2F)								
			L	T	P	O										
	1-Perspectives and development directions of wood-based materials industry.	CLO1	1		2				2	5						
	2-Wood-based materials from fibers (LDF, ULDF, fiber insulation boards, fiber mats etc.). Wood-based materials from chips (light chipboard, extruded boards, etc.).	CLO1	1		2				2	5						
	3-Multilayer wood-based materials (typical plywood, bent plywood, composite multilayer materials).	CLO1	2		5				3	10						
	4-Modification of parameters of technological processes and its influence on the parameters of produced wood-based materials.	CLO1, CLO2	3		5				4	12						
	5-Testing the strength properties of wood-based materials (modulus of rupture, modulus of elasticity, internal bond, determination of resistance at axial removal of screws).	CLO2	3		10				6	19						
	6-Testing the physical properties of wood-based materials (swelling, water absorption, surface absorption, wettability, free surface energy, density and density profile).	CLO2	1		10				4	15						
	7-Alternative wood-based materials in constructions.	CLO2, CLO3	2		6				2	10						
	8-New technologies in the design of wood-based materials.	CLO2, CLO3	1		2				1	4						
			Total										80			
	Continuous Assessment	Percentage (%)	F2F				NF2F				SLT					
	1 Assignment	20									0					
	2 Practical Work	40									0					
	3 Reports	10									0					
			Total										0			
	Final Assessment	Percentage (%)	F2F				NF2F				SLT					
	1 Final Exam	30	3								3					
			Total										3			
	**Please tick (✓) if this course is Lathan Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time(ELT) of 50%															
	L = Lecture, T = Tutorial, P = Practical, O = Others, F2F=Face to Face, NF2F=Non Face to Face															
	*Indicate the CLO based on the CLO's numbering in Item 8.															
11.	Identify special requirement to deliver the															
12.	References (include required and further readings, and should be the most current)	Thoemen H., Irie M., Sernek M., 2010: Wood-Based Panels, An Introduction for Specialists. Brunel University Press														
13.	Other additional information :															



Course: Material Processing. Compulsory.

No.	Course Leaning Outcome (CLO)	Assessment Weightage (%)						
		Cognitive (C)	Cognitive (C)	Psychomotor (P)	Affective (A)			
		PLO 1	PLO 6	PLO 2	PLO 3			
1	Determine cutting properties of materials (C5, CTPS)	√	√					
2	Demonstrates the machine preparation for processing (P5, CTPS)		√	√				
3	Combines the machine and tool for processing (A4, TS)				√			
TOTAL (%)		55		30	15			

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment	Case study	Practical	Final	
1	Determine cutting properties of materials (C5 = PLO1 , CTPS = PLO6)	PLO1	• Lecture & self-Learning • (SCL): Assignment • (SCL): Problem-Based Learning (PBL).	5			15	35
		PLO6			10		5	
2	Demonstrates the machine preparation for processing (P5 = PLO2 , CTPS = PLO6)		PLO6	• Lecture & self-Learning • (SCL): Modularr project.			10	10
		PLO2	• (SCL): Assignment • Practical. Modular Project.			30		30
3	Combines the machine and tool for processing (A4, TS = PLO3)	PLO3	• Lecture & self-Learning • (SCL): Case Study	5	10			15
TOTAL (%)				10	20	40	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Materials Processing																																																																																																																																																																																												
	Course Code :																																																																																																																																																																																													
2.	Synopsis :	This course encompasses the introduction to mechanical processing of wood and wood-based materials. It emphasizes aspects between physics-mechanical properties of materials and methods of their processing. There are three sets to be distinguish and dependence between them: material with its properties, machine with tool, method of processing with parameters.																																																																																																																																																																																												
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	CLO1	Determine cutting properties of materials (CS, CTPS)																																																																																																																																																																																												
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		Guided Learning (F2F)				Independent Learning (NF2F)																																																																																																																																																																																								
		L	T	P	O																																																																																																																																																																																									
1. Cutting properties of solid wood	CLO1	2		5			4	11																																																																																																																																																																																						
2. Cutting properties of wood-based materials	CLO1	2		5			4	11																																																																																																																																																																																						
3. Static geometric accuracy of machine	CLO2, CLO3	2		16			2	20																																																																																																																																																																																						
4. Tools for solid wood processing	CLO1, CLO3	2		3			2	7																																																																																																																																																																																						
5. Tools for wood-based materials processing	CLO1, CLO3	2		3			2	7																																																																																																																																																																																						
6. Selection of machines and tools for the workpiece	CLO1, CLO2, CLO3	2		4			4	10																																																																																																																																																																																						
7. Workpiece setting in the machines	CLO1, CLO3	1		3			2	6																																																																																																																																																																																						
8. Final product of the process	CLO1, CLO3	1		3			4	8																																																																																																																																																																																						
							Total	80																																																																																																																																																																																						
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2	Practical	40					0																																																																																																																																																																																							
3	Case Study	20					0																																																																																																																																																																																							
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							GRAND TOTAL SLT	82																																																																																																																																																																																						
<p>**Please tick (✓) if this course is Lathan Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time(ELT) of 50% L = Lecture, T = Tutorial, P = Practical, O = Others, F2F=Face to Face, NF2F=Non Face to Face *Indicate the CLO based on the CLO's numbering in Item 8.</p>																																																																																																																																																																																														
11.	Identify special requirement to																																																																																																																																																																																													
12.	References (include required and further readings, and should be the most current)																																																																																																																																																																																													
13.	Other additional information :																																																																																																																																																																																													

Course: Innovation management systems. Elective.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)					
		Cognitive (C)	Cognitive (C)	Psychomotor (P)	Affective (A)		
		PLO 1	PLO 6	PLO 2	PLO 5		
1	Evaluate the operation of an Innovation Management System in an organization (C5)	√					
2	Integrate in a furniture company innovative ideas to achieve the success of its products (P6, CTPS)		√	√			
3	Arrange motivation the staff of the organization to generate creativity and innovation (A4, CS, LS)			√	√		
TOTAL (%)			45	40	15		

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)			Total (%)
				Assignment	Practical Work (Prototype)	Final	
1	Evaluate the operation of an Innovation Management System in an organization (C5= PLO1)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning Tutorial (SCL): Problem Oriented Project Based Learning (POPBL) (SCL): Problem-Based Learning (PBL). 	15		15	30
2	Integrate in a furniture company innovative ideas to achieve the success of its products (P6= PLO2) (CTPS= PLO6)	PLO6	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. 			15	15
		PLO2	<ul style="list-style-type: none"> Practical. Modular Project Practical work Case Study Demonstrations 		40		40
3	Arrange motivation the staff of the organization to generate creativity and innovation (A4, CS, LS= PLO5)	PLO5	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Group discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. 	15			15
TOTAL (%)				30	40	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Innovation management systems									
	Course Code :										
2.	Synopsis :	This course encompasses the introduction to Innovation Management Systems (IMS) emphasizing aspects such as the context of the organization, the roles and responsibilities in the innovation management systems, the management of intellectual property in organizations, the process of innovation and evaluation and improvements in an innovation management system									
3.	Name(s) of academic staff :										
4.	Semester and Year offered :	Semester	2	Year	1						
5.	Credit Value :	2									
6.	Prerequisite/co-requisite: (if any)	No									
7.	Course Learning Outcomes (CLO) :	At the end of the course the students will be able to:									
	CLO1	Evaluate the operation of an Innovation Management System in an organization (C5)									
	CLO2	Integrate in a furniture company innovative ideas to achieve the success of its products (P6, CTPS)									
	CLO3	Arrange motivation the staff of the organization to generate creativity and innovation (A4, CS, LS)									
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment :	Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it. E.g. PLO1 - Knowledge, PLO2 - Cognitive, PLO3 - Practical Skills									
	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)							Learning and Teaching Method	Assessment Method	
		Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills			
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7			
	CLO1	√							Lecture, self Learning, Student Center Learning.	Continuous assignment. Final exam.	
	CLO2		√				√		Lecture, self Learning, Student Center Learning.	Continuous assignment. Final exam.	
	CLO3		√			√			Lecture, self Learning, Student Center Learning.	Continuous assignment.	
Indicate the relevancy between the CLO and PLO by ticking "√" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)											
9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Know the operation of an innovation management system								
		2	Promote the innovation process in an organization								
		3	Management of intellectual property as an element of innovation in an organization								
		4									
		5									
10.	Distribution of Student Learning Time (SLT)										
	Course Content Outline	CLO*	Teaching and Learning Activities					Independent Learning (NF2F)	SLT		
			Guided Learning (F2F)								
			L	T	P	O	Guided Learning (NF2F)				
	1. Introduction to Innovation Management Systems	CLO1	2		3			4	9		
	2. Roles in the Innovation Management System	CLO1-CLO2	1		3			3	7		
	3. Design Thinking	CLO1-CLO2	3		14			3	20		
	4. Intellectual property management in an organization	CLO1-CLO2	3		10			6	19		
	5. Collaboration management	CLO3	4		6			5	15		
	6. Creativity management	CLO2-CLO3	1		6			3	10		
									0		
									0		
								Total	80		
	Continuous Assessment	Percentage (%)	F2F		NF2F		SLT				
	1 Assignment	30					0				
	2 Practical Work	40					0				
							Total 0				
	Final Assessment	Percentage (%)	F2F		NF2F		SLT				
	1 Final exam	30	2				2				
							Total 2				
	**Please tick (√) if this course is Lathan Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time(ELT) of 50% L = Lecture, T = Tutorial, P= Practical, O= Others, F2F=Face to Face, NF2F=Non Face to Face *Indicate the CLO based on the CLO's numbering in Item 8.										
	GRAND TOTAL SLT								82		
11.	Identify special requirement to deliver the										
12.	References (include required and further readings, and should be the most current)										
13.	Other additional information :										



Course: Technological surveillance and competitive intelligence. Elective.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)				
		Cognitive (C)	Cognitive (C)	Psychomotor (P)	Affective (A)	
		PLO 1	PLO 6	PLO 2	PLO 3	PLO 7
1	Testing a Technology Surveillance and Competitive Intelligence system in an organization (C5, LL)	√				√
2	Build a Technology Surveillance and Competitive Intelligence system for an organization of the furniture sector (P5, CTPS)		√	√		
3	Identify the information needs of an organization (A4, TS, CTPS)		√		√	
TOTAL (%)		45		40	15	

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment	Practical Work (Prototype)	Reports	Final	
1	Testing a Technology Surveillance and Competitive Intelligence system in an organization (C5= PLO1 , LL= PC07)	PLO1	• Lecture & self-Learning • (SCL): Assignment • (SCL): Case Study • (SCL): Problem-Based Learning (PBL).	10			15	30
		PLO 7	• Lecture & self-Learning • (SCL): Discussion • (SCL): Case Study • (SCL): Problem-Based Learning (PBL). • (SCL): Assignment.	5				
2	Build a Technology Surveillance and Competitive Intelligence system for an organization of the furniture sector (P5= PLO2 , CTPS= PLO6)	PLO2	• Practical. Modular Report.		30	10		40
		PLO 6	• Lecture & self-Learning • (SCL): Discussion • (SCL): Case Study • (SCL): Problem-Based Learning (PBL). • (SCL): Assignment. • Practical. Prototype and Technical Report.		5		15	20
3	Identify the information needs of an organization (A4, TS= PLO3 , CTPS= PLO6)	PLO3	• Lecture & self-Learning • (SCL): Discussion • (SCL): Case Study • (SCL): Problem-Based Learning (PBL). • (SCL): Assignment.	10				10
TOTAL (%)				25	35	10	30	100

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Course: Management Systems. Lean manufacturing. Elective.

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)						
		Cognitive (C)	Cognitive (C)	Psychomotor (P)	Affective (A)			
		PLO 1	PLO 6	PLO 2	PLO 5			
1	Assesses ways of characterizing modern enterprise management systems in the furniture industry (C5)	√						
2	Constructs solutions, processes and tools of management systems in accordance with the lean philosophy (P5, CTPS)		√	√				
3	Formulates socially responsible management systems in the spirit of lean philosophy (A4, CS, LS)				√			
TOTAL (%)		50		40	10			
No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)				Total (%)
				Assignment	Practical Work (Prototype)	Reports	Final	
1	Assesses ways of characterizing modern enterprise management systems in the furniture industry (C5 = PLO1)	PLO1	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Assignment (SCL): Problem-Based Learning (PBL). 	10			15	25
2	Constructs solutions, processes and tools of management systems in accordance with the lean philosophy (CTPS = PLO6) (P5 = PLO2)	PLO6	<ul style="list-style-type: none"> Lecture & self-Learning (SCL): Discussion (SCL): Case Study (SCL): Problem-Based Learning (PBL). (SCL): Assignment. 			10	15	25
		PLO2	Practical work, laboratory experiment, demonstrations.		40			40
3	Formulates socially responsible management systems in the spirit of lean philosophy (A4,CS,LS = PLO5)	PLO5	SCL activities like group discussion, role play, case study, PBL, POPBL, field work	10				10
TOTAL (%)				20	40	10	30	100

Deliverable 2.2: Joint Curriculum

1.	Name of Course :	Management systems. Lean manufacturing.														
	Course Code :															
2.	Synopsis :	The course aims to combine knowledge about the processes, procedures and practices of an organization to implement its policies that may be more effective in achieving policy goals than an approach through separate systems taking into account the lean philosophy														
3.	Name(s) of academic staff :															
4.	Semester and Year offered :	Semester	2	Year	1											
5.	Credit Value :	2														
6.	Prerequisite/co-requisite: (if any)	No														
7.	Course Learning Outcomes (CLO) : At the end of the course the students will be able to:															
	CLO1	Assesses ways of characterizing modern enterprise management systems in the furniture industry (CS)														
	CLO2	Constructs solutions, processes and tools of management systems in accordance with the lean philosophy (P5, CTP5)														
	CLO3	Formulates socially responsible management systems in the spirit of lean philosophy (A4, CS, LS)														
8.	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it. E.g. PLO1 - Knowledge, PLO2 - Cognitive, PLO3 - Practical Skills															
	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)												Learning and Teaching Method	Assessment Method	
		Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills								
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12			
	CLO1	✓												Lecture, self-Learning, Student-Center Learning.	Oral or written examination	
	CLO2		✓				✓							Lecture, practical, tutorial, self-directed learning, Practical work and demonstrations.	Project report and observation through practical work (rubric)	
	CLO3					✓								SCL activities like group discussion and case study	Scenario based discuss and case study	
	Indicate the relevancy between the CLO and PLO by ticking "✓" the appropriate relevant box. (This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)															
9.	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	1	Understanding the relationships between individual elements of management systems													
		2	Synergization of various tools to create innovative solutions in management systems													
		3	Ability to solve cross problems													
		4	Creating solutions based on lean and eco principles													
		5														
10.	Distribution of Student Learning Time (SLT)															
	Course Content Outline	CLO*	Teaching and Learning Activities				Guided Learning (NF2F)	Independent Learning (NF2F)	SLT							
			Guided Learning (F2F)													
			L	T	P	O										
	1-Concepts and basics of management in manufacturing enterprises	CLO1	1		2			2	5							
	2-Environmental Management System	CLO1	1		2			2	5							
	3-Business models of modern organizations	CLO1	2		5			3	10							
	4-Quality management system: organization context and leadership	CLO1, CLO2	3		10			6	19							
	5-Measurement and modeling in management and lean manufacturing	CLO2	3		5			4	12							
	6-Information and IT system in lean manufacturing	CLO2	1		6			2	9							
	7-Leadership, planning and effective process management	CLO2, CLO3	2		10			4	16							
	8-Man and organization - humanization of the work process. A learning enterprise in industry 4.0	CLO2, CLO3	1		2			1	4							
									0							
			Total						80							
	Continuous Assessment		Percentage (%)	F2F		NF2F		SLT								
	1	Assignment	20					0								
	2	Practical Work	40					0								
	3	Reports	10					0								
			Total						0							
	Final Assessment		Percentage (%)	F2F		NF2F		SLT								
	1	Final Exam	30	3				3								
			Total						3							
	**Please tick (✓) if this course is Lathian Industri/ Clinical Placement/ Practicum/ WBL using Effective Learning Time(ELT) of 50%															
	L = Lecture, T = Tutorial, P= Practical, O= Others, F2F=Face to Face, NF2F=Non Face to Face															
	*Indicate the CLO based on the CLO's numbering in Item 8.															
									GRAND TOTAL SLT							
									83							
11.	Identify special requirement to deliver the															
12.	References (include required and further readings, and should be the most current)	1. Creating an Effective Management System: Integrating Policy Deployment, TWI, and Kata - P. Graupp, S. Steward, B. Parsons, CRC Press, 2019; . 2. Lean Manufacturing Implementation, Opportunities and Challenges - Francisco J. G. Silva, Luis Carlos Pinto Ferreira, 2019.														
13.	Other additional information :															



Other Components

⇒ Master Thesis

The evaluation of the Master Thesis will take place when the student has passed all the compulsory courses and those electives courses selected by the student, within the periods authorized for this purpose in the academic calendar in force for these studies and according to the rules established by the University.

Description of Contents: Program

The End of Master work is organized around the treatment of a practical case of implementation of Industry 4.0.

Students are presented with possible areas in which to carry out this work, and guidance and monitoring is provided.

Among the tasks that it includes are contemplated:

- Presentation of work topics
- Compilation and analysis of information related to the Master's work
- Development of the Final Master's Work
- Elaboration of the final report and Master Thesis Defence

The Master Thesis will be evaluated by a specific committee in accordance with the procedures and requirements established by the University, in the periods fixed annually in the academic calendar.

Course Learning Outcomes (CLO) : At the end of the course the students will be able to:							
CLO1	Assess the techniques presented in the different subjects of the Master related to Industry 4.0 in the wood and furniture sector to a specific problem. (C5, CTPS)						
CLO2	Demonstrate from results, improvements in the activity of a process of the wood industry by applying the concepts seen in the Master. (P5, CTPS)						
CLO3	Explain its results and conclusions in a clear and effective way. (A4, CS, LS)						
CLO4	Defend the knowledge and competences acquired throughout the Master. (A4, LL)						
Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment : Please select the Learning Outcome Domain (LOD) for each PLO in the cells above it.							
Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)						
	Knowledge of Discipline Area	Practical Skills	Social Skills and Responsibilities	Values, Attitudes and Professionalism	Communication, Leadership and Team Skills	Problem Solving and Scientific Skills	Information Management and Lifelong Learning Skills
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO 1	√					√	
CLO 2		√				√	
CLO 3					√		
CLO 4							√

No.	Course Learning Outcome (CLO)	Assessment Weightage (%)				
		Cognitive (C)	Cognitive (C)	Psychomotor (P)	Affective (A)	Affective (A)
		PLO 1	PLO 6	PLO 2	PLO 5	PLO 7
1	Assess the techniques presented in the different subjects of the Master related to Industry 4.0 in the wood and furniture sector to a specific problem. (C5, CTPS)	√	√			
2	Demonstrate from results, improvements in the activity of a process of the wood industry by applying the concepts seen in the Master. (P5, CTPS)		√	√		
3	Explain its results and conclusions in a clear and effective way. (A4, CS, LS)				√	
4	Defend the knowledge and competences acquired throughout the Master. (A4, LL)					√
TOTAL (%)		30		40	15	15

No.	Course Learning Outcome (CLO)	PLO	Teaching & Learning Activities	Assessment Activities (%)			Total (%)
				Project oriented problem based learning.	Reports	Final	
1	Assess the techniques presented in the different subjects of the Master related to Industry 4.0 in the wood and furniture sector to a specific problem. (C5 = PLO1) (CTPS = PLO6)	PLO1	<ul style="list-style-type: none"> • self-Learning (SCL): Assignment • (SCL): Problem-Based Learning (PBL). 			10	20
		PLO6				10	
2	Demonstrate from results, improvements in the activity of a process of the wood industry by applying the concepts seen in the Master. (CTPS = PLO6) (P5 = PLO2)	PLO2	<ul style="list-style-type: none"> • Practical. Prototype and Technical Report. • (SCL): Assignment • Practical. Modular Project. 	40		10	40
3	Explain its results and conclusions in a clear and effective way. (A4, CS, LS = PLO5)	PLO3	Discussion Case Study		15		15
3	Defend the knowledge and competences acquired throughout the Master. (A4, LL = PLO7)	PLO7	Discussion Case Study		15		15
TOTAL (%)				40	30	30	100

⇒ Internship/Practicum

Curricular internships offer students the opportunity to immerse themselves in the professional world and, at the same time, to apply and consolidate in an integrated manner the set of skills and knowledge that they have worked on throughout the educational itinerary of this master's degree.

4. FINAL ASSESSMENT METHODOLOGY

In order to define the evaluation methodology, the following documents have been analyzed:

- ⇒ Code of practices for programme accreditation (2014). COPPA second edition.
- ⇒ Guidelines to good practices: assessment of students (2014). Malaysian Qualifications Agency 2014
- ⇒ D2.3.: Methodological aspects.

Assessment definition

A systematic and cyclical way to improve quality of students' performance and development by continuously collecting, analyzing and discussing direct and indirect data and evidences of students learning from multiple and diverse sources. Its purpose is to have deep understanding of what the students really know and can do, provide feedback to improve students learning, teachers teaching (feed forward), curriculum planning and overall programme's effectiveness. The data collected in assessment is used by students, teachers, curriculum planners, and administrators to promote students learning and is not meant to make judgment. [3]

Relationship between Assessment and Learning Outcomes.

- ⇒ Assessment principles, methods and practices must be aligned to the learning outcomes of the programme, consistent with the level 7 defined in the MQF.
- ⇒ The alignment between assessment and the learning outcomes in the programme must be systematically and regularly reviewed to ensure its effectiveness.

Assessment Methods

- ⇒ There must be a variety of methods and tools that are appropriate for the assessment of learning outcomes and competencies.
- ⇒ There must be mechanisms to ensure, and to periodically review, the validity, reliability, integrity, currency and fairness of the assessment methods.
- ⇒ The frequency, methods, and criteria of student assessment including the grading system and appeal policies - must be documented and communicated to students on the commencement of the programme.
- ⇒ Changes to student assessment methods must follow established procedures and regulations, and be communicated to students prior to their implementation. [4]

It is of utmost importance that assessment methods are aligned to both Learning outcomes and the instructional delivery. [5]

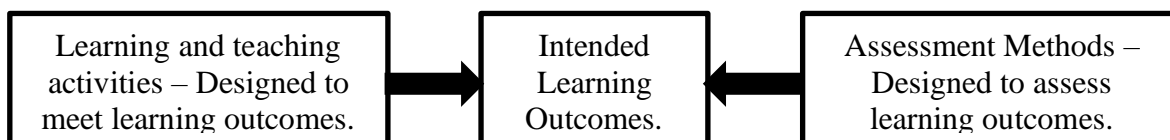


Figure 1: Aligning learning outcomes, learning and teaching activities and assessment. Adapted from Biggs (1999) p.27

Bearing all the above in mind, we conclude that the evaluation methodology must be well structured and varied in order to be able to evaluate all the course learning outcomes defined in the different courses of the Master Degree.

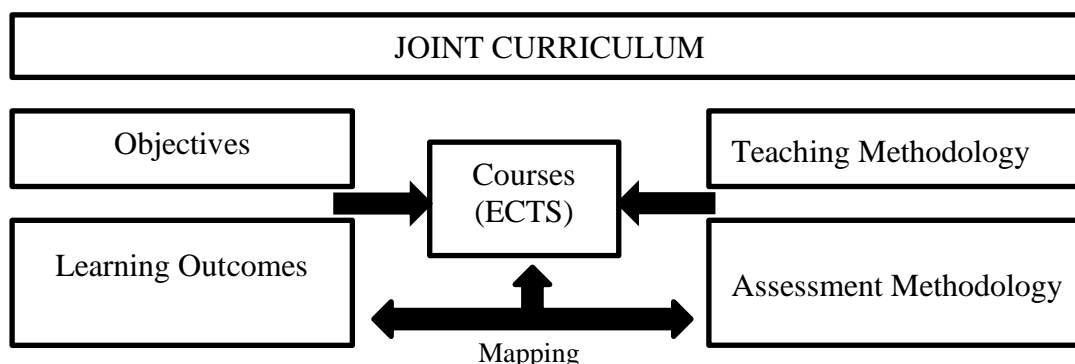


Figure 2: Assessment Methodology

From the results obtained through the Malaysian universities, we come to the conclusion that the evaluation methodology most commonly used in lectures is that of "continuous evaluation". In addition, other types of assessment are used such as exams, tutorials, quizzes and assignment.

For the Master Making 4.0 - *Master of Advanced Technologies and Innovation for Wood-Based Industry* - we intend to use all the mentioned evaluation methods. Having only one method to provide information about the program would only reflect a part of the students' achievements. In addition, the CLO can be difficult to evaluate using only one method.

In most of the Master's courses, continuous assessment has a weight of 70% as opposed to the final which has 30% and is aimed at evaluating cognitive domain by conducting a final exam.

BLOOM TAXONOMY	LEVEL OF BLOOM TAXONOMY DOMAIN	PROGRAM LEARNING OUTCOME (PLO)	SOFT SKILL*	Continuous Assessment Activities	Final Assessment
COGNITIVE (C)	C4 – C6	PLO1	-	Report, log book, project paper etc.	Oral or written examination
	C4 – C6	PLO6	CTPS	Assignment, project report, case study, role-play, final year project, etc.	Exam
PSYCHOMOTOR (P)	P4 – P7	PLO2	-	Observation through practical work (rubric)	
AFFECTIVE (A)	A3 – A5	PLO3	TS	Observation rubric, peer assessment, etc.	
	A3 – A5	PLO4	EM	Observation rubric, supervisory report, peer assessment, etc.	
	A3 – A5	PLO5	CS, LS	Observation rubric, assignment, essay, case study report, presentation, scenario-based debate, etc.	
	A3 – A5	PLO7	LL	Literature review, assignment, case study report, final year project, etc.	

5. ANNEX 1: D2.3.: METHODOLOGICAL ASPECTS.

Improving Malaysian HE Knowledge Towards a Wood and Furniture Industry 4.0



Deliverable 2.3: Methodological aspects

Prepared	Verified	Approved
KIT	All consortium	

Dissemination level: National, International

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Partners

P1	Universidad Politécnica de Cartagena	UPCT	SP
P2	Warsaw University of Life Sciences	WULS	PL
P3	Karlsruhe Institute of Technology	KIT	GE
P4	Centro Tecnológico del Mueble y la Madera	CETEM	SP
P5	Universiti Putra Malaysia	UPM	MY
P6	Universiti Teknologi MARA	UiTM	MY
P7	Universiti Kebangsaan Malaysia	UKM	MY
P8	Universiti Sains Malaysia	USM	MY
P9	Malaysian Timber Industry Board	MTIB	MY

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1. Introduction

This document reports the results performed in task “**T2.3: Methodological aspects**” in the framework of the **WP2 “Training path, learning content structure and methodological aspects”**.

The aim of this task, leaded by KIT, is to define the best training methodology for Making 4.0 Master, approaching the current teaching methodology in Malaysia. To carry out this task, the European partners prepared a survey to collect the necessary information. The survey was conducted on 4/7/2019 during the 2nd meeting at WULS. The four participating universities were USM, UKM, UiTM and UPM. USM was responsible for carrying out the analysis of the results, which are compiled in the report "Survey about the Malaysian Teaching Methodology" (Annex 1).

In addition to the above-mentioned survey, some documents from the Malaysian Qualifications Agency, specified in the references, have also been taken into account in the development of this document. This ensures that the methodology to be used is in line with the Malaysian education system.

With the completion of this work together with the **D2.2 “Joint Curriculum”**, we have achieved **Milestone 3**: “Determine the best training methodology and path”. Moreover, this work is also linked to specific project objective **SO2**: “Create an innovative learning pathway able to provide HE students the most important competences and skills related with Industry 4.0.

The results of this report act as a support point for the correct development of the WP3: “Develop of Training Materials and guides for trainers”, as will set the basis for the development of the necessary training materials that will made up the Making 4.0 Master Degree.

2. Learning Path and Training Methodology.

The learning path of the Master Degree is designed so that the students obtain the necessary knowledge in a progressive way, starting with courses on the technologies of the industry 4.0, deepening later with those more specific to the wood industry. The objective is to give the students the necessary tools to apply the benefits of the industry 4.0 in each of the processes of wood transformation until the final product is reached.

The Master Degree is structured to last one academic year (two semesters), and consists of four modules composed of 9 compulsory courses and 11 elective courses, 6 of the electives must be taken.

In addition, an internship and a master's thesis are required to complete the training program.

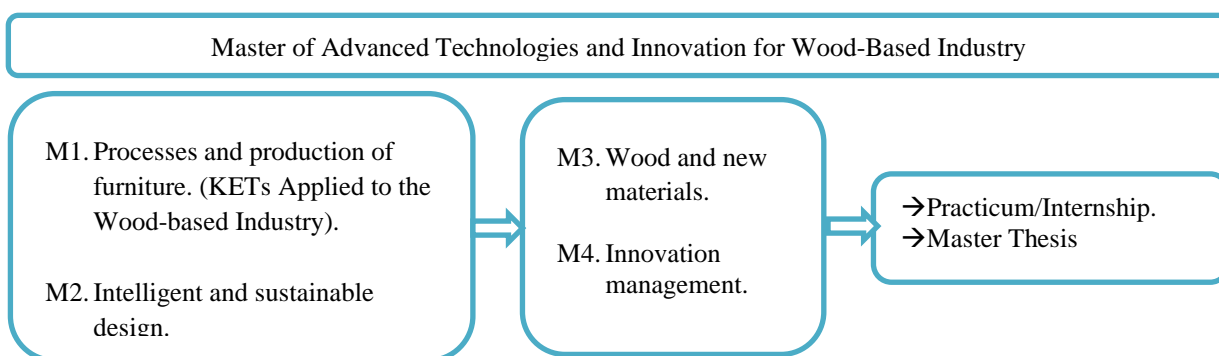


Figure 3. Structure of the Master MAKING 4.0 simplified.

For the assignment of Student Learning Time (SLT) in each of the courses, both the answers of the survey made to the Malaysian universities and the references of the Malaysian credit system have been considered. All courses are two Malaysian credits (3 European credits), and the entire master's degree has an allocation of 40 Malaysian credits (60 European credits)³.

In summary, the allocation of hours for all the courses of the Master's degree follow the table below.

Credit	Nature of the course	Total F2F hours (14 weeks)		*Total NF2F hours (14 weeks)	Total SLT
		Lecture	Practical		
2	Without Practical	28	0	52	80
2	With 3 hours Practical per week	14	42	24	80

Table 11: Student Learning Time by nature of the course. [6]

³ Henceforth when it is expressed credits in this document it is referenced to Malaysian credits

Total SLT is counted based on the assumption of learning hours by topic in a course, which includes the guided learning activities both face-to-face (F2F) and non-face-to-face (NF2F), independent learning, as well as assessment hours.

The following table shows some of the guidelines that have been considered for the assumption on the allocation of student learning times (SLT) in each of the courses:

Learning Activities	F2F Learning Hours	NF2F Learning Hours
Lecture	1 hour per topic (total lecture hours per topic is depending on the depth of topics, and based on credit values)	1~2 hour
Tutorial	1 hour	1 hour
Practical	3 hours per week	3 hours per week
Studio	2 hours per week	2 hours per week
SCL: Problem-Based Learning	2 hours per activity	4 hours per activity
Group Discussion	1~2 hours per activity	1 hour per activity
Presentation	1 hour per activity	3~4 hours per activity
Formal Continuous Assessment	2 hours per assessment (depend on the level of difficulties)	2 hours for preparation
Formal Final Assessment	2 hours per assessment	3 hours for preparation
Assignment	1 hour per task (for one type of assessment)	2 hours per task
Preparation for Formal Assessments		(2 hours x total continuous assessment) + (3 hours for preparation of final assessment)
Revision		1 hour x total lecture hours

Table 12: Guideline for the assumption on allocation of student learning times (SLT). [3]

Table below show the examples for each type of student learning (F2F – NF2F):

Types of learning	Examples
Guided Learning: Face-to-face (F2F)	Lecture, tutorial, practical, studio work, Student-Centered Learning (SCL) activities such as case study, problem-based learning, project oriented based learning, presentation, group discussion, etc.
Guided Learning: Non-face-to-face (NF2F)	E-learning, Completion of any given tasks, modular learning, etc.
Independent Learning (NF2F)	Revision, preparation for assessments

Table 13: Examples of teaching methods by type of learning. [3]

Based on the total hours of Guided F2F, Guided NF2F and Independent learning, below shows how credit is determined:

Total Student Learning Time (SLT) per Semester (Total SLT for 14 weeks of learning)	Credit
40~43 hours	1
80~83 hours	2

Table 14: Total Student Learning Time (SLT) per credit. [6]

In order to define the best methodological aspects for the MAKING 4.0 Master Degree, we have had as reference the answers of the survey made to the four Malaysian universities. Specifically, the answers to the questions: What type of methodology are you using in your Lectures (F2F)? What type of resources are you using in your lectures (F2F)? and What type of assessment methodology are you using in your lectures?

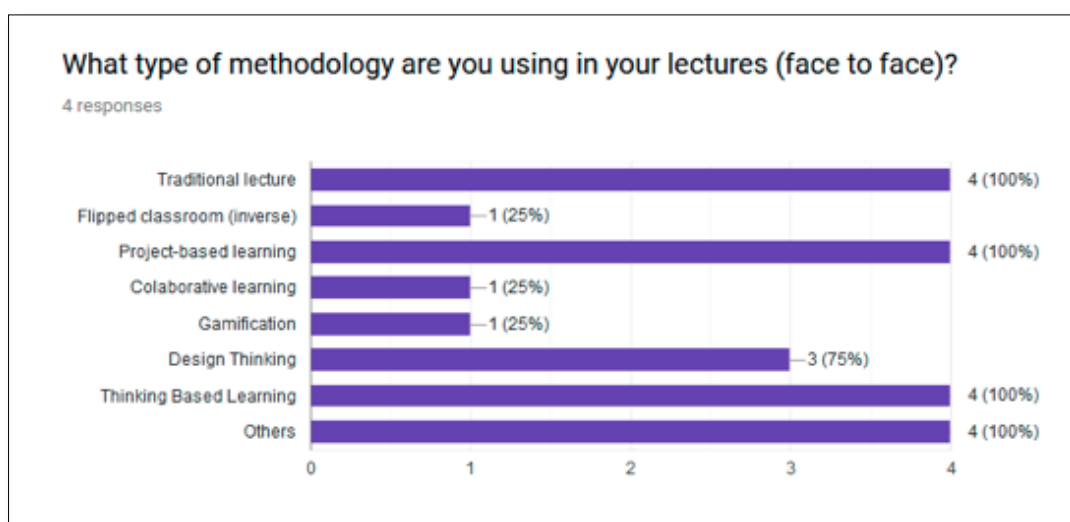


Figure 4: Types of methodology using in lectures.

Figure 2 shows Types of methodology using in lectures. Based on Figure 2, all institutions (100%) use traditional lecture, project-based learning and thinking based learning in their teaching methodologies. However, only 25% of them involved with flipped classroom, collaborative learning and gamification. At a moment, not all institutions have capabilities to facilitate and engage with new teaching methodologies. 75% of the institutions used design thinking method in teaching.

All the institutions also adapted others type of methodologies listed in Figure 3 such as case study, factory visits, online based learning, problems-based learning, skill-based learning and ICT.

If the answer above was "Others", please specify

4 responses

Case study, factory visits
Online based learning
Problem base learning, skill base learning, case study
ICT

Figure 5: Other types of methodology in lectures.

Figure 4 indicated types of assessment methodology using in lectures. The 75% of the Malaysian universities use continuous assessment and 25% (one response) choose others. By referring figure 5, some the lists of response for others can be included as continuous assessment as well. [7]

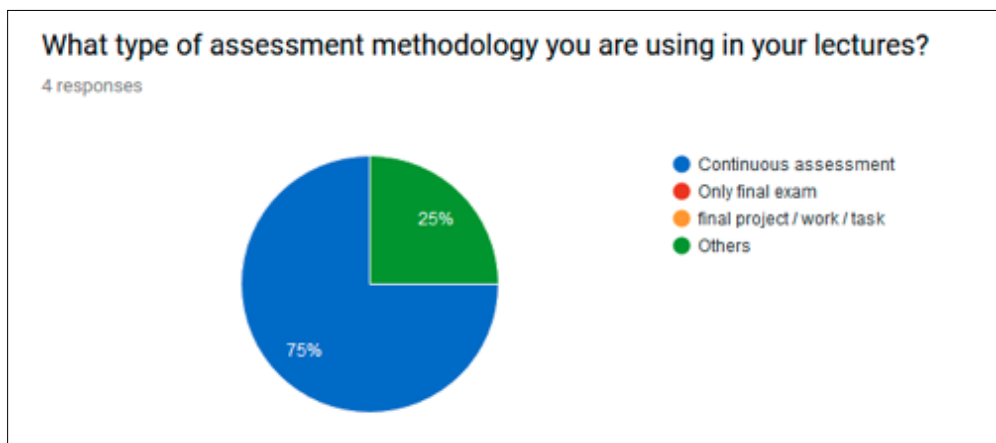


Figure 6: Types of assessment methodology.

If the answer above was "Others", please specify

1 response

Continuous assessment, exams, tutorial, quizzes, assignment, excursion mark, dissertation,
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Figure 7: Other types of assessment methodology.

In order to comply with the methodology currently in use in the respondent universities and considering the resources of each university, the consortium has defined the following methodology:

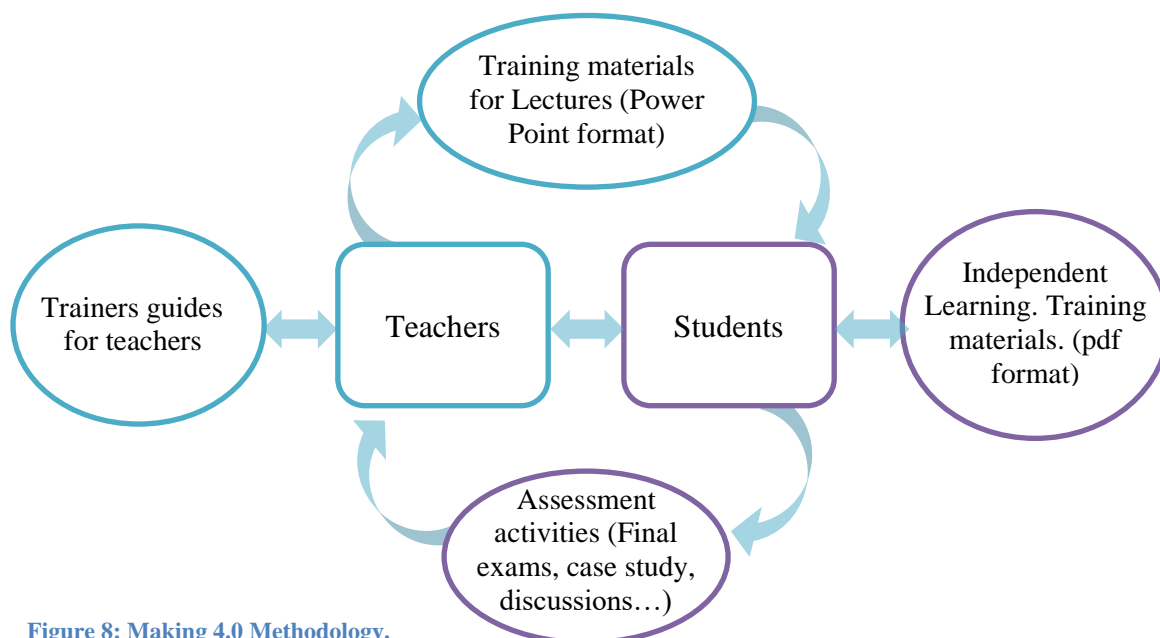


Figure 8: Making 4.0 Methodology.

⇒ Trainers guides.

Under WP3 Task 3.3 “Development of trainers guides”, a guide will be developed for each of the courses. These will be designed for instructors so that teachers in Malaysia will have a support tool to learn the basic concepts of each course and the best methodological aspects to apply in class. The guides will include some exercises and examples that can be used by the teacher.

The training contents to be developed in the task 3.1 “training content development” of the WP3, are divided into two formats:

⇒ Training materials for Lectures.

Generally, and according to the results of the survey carried out, at Malaysian universities a semester is divided into 14 weeks. All the courses to be developed for the master's degree have a duration of two Malaysian credits (between 80 and 83 SLT each course).

As we have seen in table 1, the theoretical-practical courses are composed of 14 hours of lectures (one hour per week), and the theoretical courses of 28 hours of lectures (2 hours

per week). With these data, the consortium will develop in Power Point format the didactic contents that the teacher will use for each one of the hours of Lecture in the different courses.

⇒ **Training materials for independent learning.**

For the independent learning of the student, a "Course Book" will be developed for each of the courses in pdf format. As we have seen in table 1, for our master, the SLT dedicated to NF2F vary between 24 and 52 according to the type of course (theoretical or theoretical-practical).

In addition to this course book, we will develop the necessary contents to carry out the practical parts such as group discussions, case studies, modular projects...

⇒ **Assessment activities.**

From the results obtained through the Malaysian universities, we concluded that the evaluation methodology most commonly used in lectures is that of "continuous assessment". In addition, other types of assessment are used such as exams, tutorials, quizzes and assignment.

In most of the courses of the Master that we are developing, continuous assessment has a weight of 70% as opposed to the final which has 30%, and is aimed at evaluating cognitive domain by conducting a final exam. Those evaluation activities that best suit the definition of each course will be developed.

In addition to the above, to pass the master's degree the student will have to do an internship and a Master Thesis.

The Master Thesis will be defined in the Joint Curriculum and will be developed in depth in **T3.2 "Development of the final assessment activity"** of WP3.

All training materials will be developed to achieve the course learning outcomes defined in each of the courses, and both the PLOs assigned to each CLO and the soft skills will be evaluated to ensure that the student acquires all predefined knowledge and competencies. Providing this alignment will encourage students to adopt learning approaches that will result in the achievement of the CLOs and therefore help in the achievement of the PLOs. [3] Show figure 7.

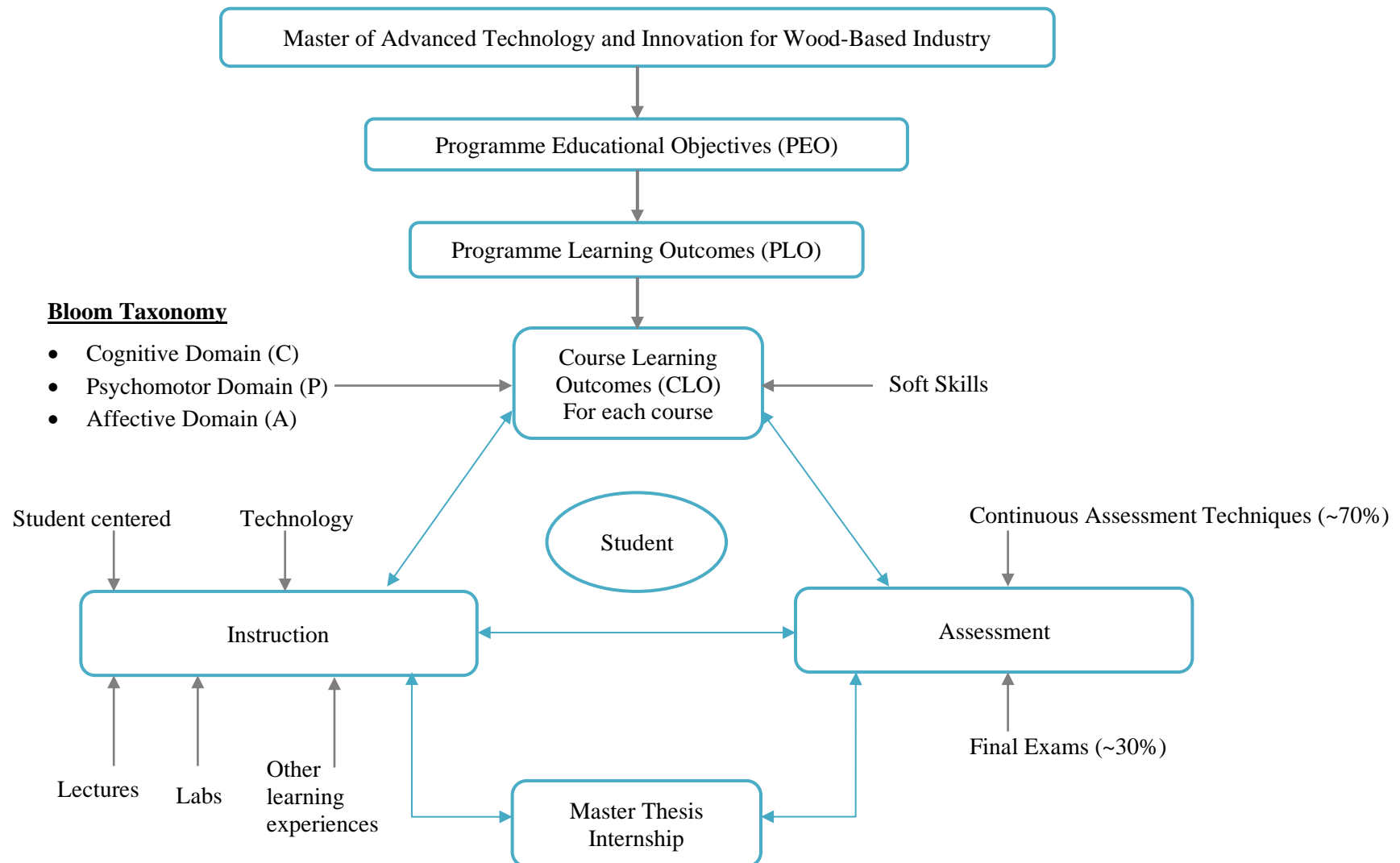


Figure 9: Relationship between assessment and learning and teaching activities in the achievement of results for the Making 4.0 master's degree. [3]

To reinforce the information in figure 7, the mapping of the PEOs with the PLOs is shown below (Table 5), in addition to its relationship with the bloom taxonomy and soft skills (Table 6), teaching and learning activities and evaluation activities (Table 7).

MAPPING PEOs WITH PLOs	No.	Program Educational Objective (PEO) Master of Advanced Technology and Innovation for Wood-Based Industry	Program Learning Outcome (PLO)						
			demonstrate mastery of KETs knowledge in the wood and furniture industry	apply practical skills about digital transformation in the wood and furniture industry	relate ideas to societal issues in wood and furniture industry	conduct research with minimal supervision and adhere to legal, ethical and professional codes of practice	demonstrate leadership qualities through communicating and working effectively with peers and stakeholders	generate solutions to problems in wood and furniture industry using scientific and critical thinking skills	manage information for lifelong learning
			C	P	A	A	A	C	A
			PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
	1.	knowledgeable in the field of Key Enabling Technologies (KET) of the Industry 4.0 and current trends of wood materials and processes with appropriate skills and attitude to work in wood-based industry.	√	√					√
	2.	capable to apply the Key Enabling Technologies (KET) and the sustainable innovation within the production processes of the wood based industry.		√				√	√
	3.	Innovative and creative, as well as aware and committed with a more sustainable and technological productive society.			√	√	√		

Table 15: Mapping PEOs with PLOs.

BLOOM TAXONOMY	LEVEL OF BLOOM TAXONOMY DOMAIN	PROGRAM LEARNING OUTCOME (PLO)	SOFT SKILL*	MQF DOMAIN OF LEARNING OUTCOME	INTENDED PLO STATEMENT FOR MASTER PROGRAM
COGNITIVE	C1 – C6	PLO1	-	Knowledge of Discipline Area	<i>demonstrate mastery of knowledge of KETs in the wood and furniture industry</i>
(C)	C1 – C6	PLO6	CTPS	Problem Solving and Scientific Skills	<i>generate solutions to problems using scientific and critical thinking skills</i>
PSYCHOMOTOR (P)	P1 – P7	PLO2	-	Practical Skills	<i>apply practical skills about digital transformation in the wood and furniture industry</i>
AFFECTIVE	A1 – A5	PLO3	TS	Social Skills and Responsibilities	<i>relate ideas to societal issues in wood production processes</i>
(A)	A1 – A5	PLO4	EM	Values, Attitudes and Professionalism	<i>conduct research with minimal supervision and adhere to legal, ethical and professional codes of practice</i>
	A1 – A5	PLO5	CS, LS	Communication, Leadership and Team Skills	<i>demonstrate leadership qualities through communicating and working effectively with peers and stakeholders</i>
	A1 – A5	PLO7	LL	Information Management and Lifelong Learning Skills	<i>manage information for lifelong learning</i>
<div> <div> <p>*Soft skills abbreviation: CTPS : critical thinking and problem solving TS : social skills EM : Ethics, morale, values, and professionalism CS : communication skills LS : leadership skills</p> </div> <div> <p>Level of Cognitive (C) domain:</p> <p>C6 – Creating C5 – Evaluating C4 – Analyzing C3 – Applying C2 – Understanding C1 – Remembering</p> </div> <div> <p>Level of Psychomotor (P) domain:</p> <p>P7 – Origination P6 – Adaptation P5 – Complex overt response P4 – Mechanism P3 – Guided response P2 – Set P1 – Perception</p> </div> <div> <p>Level of Affective (A) domain:</p> <p>A5 – Internalizing Values A4 – Organization A3 – Valuing A2 – Responding A1 – Receiving</p> </div> </div>					

Table 16: Mapping between MQF domain of learning outcome, bloom taxonomy and soft skills.

BLOOM TAXONOMY	LEVEL OF BLOOM TAXONOMY DOMAIN	PROGRAM LEARNING OUTCOME (PLO)	SOFT SKILL*	MQF DOMAIN OF LEARNING OUTCOME	Teaching and Learning Activities	Assessment Activities
COGNITIVE	C1 – C6	PLO1	-	Knowledge of Discipline Area	Lecture, Tutorial, Self-directed Learning, SCL type like PBL, POPBL, etc.	Oral or written examination, viva, report, log book, project paper etc.
(C)	C1 – C6	PLO6	CTPS	Problem Solving and Scientific Skills	Lecture, practical, tutorial, self-directed learning, experiential learning, SCL type like PBL, POPBL, etc.	Exam, assignment, project report, case study, role-play, final year project, etc.
PSYCHOMOTOR (P)	P1 – P7	PLO2	-	Practical Skills	Practical work, laboratory experiment, demonstrations, etc.	Observation through practical work (rubric)
AFFECTIVE	A1 – A5	PLO3	TS	Social Skills and Responsibilities	SCL activities like group discussion, role play, case study, PBL, POPBL, field work, etc	Observation rubric, peer assessment, etc.
(A)	A1 – A5	PLO4	EM	Values, Attitudes and Professionalism	SCL activities like group discussion, role play, case study, PBL, POPBL, field work, etc	Observation rubric, supervisory report, peer assessment, etc.
	A1 – A5	PLO5	CS, LS	Communication, Leadership and Team Skills	SCL activities like group discussion, role play, case study, PBL, POPBL, field work, etc	Observation rubric, assignment, essay, case study report, presentation, scenario-based debate, etc.
	A1 – A5	PLO7	LL	Information Management and Lifelong Learning Skills	SCL activities like group discussion, case study, PBL, POPBL, etc	Literature review, assignment, case study report, final year project, etc.

Table 17: Constructive alignment between learning outcomes, teaching and learning activities, and assessment activities.

Annex 2: T2.3 results of the survey about the malaysian teaching methodology.

Result.

Figure 1 shows hours of theory lessons (face to face lecture) comprised in one credit at each institution. Based on Figure 1, two institutions out of four institutions having similar 14 hours of theory lesson (face to face) which were comprised in one credit. One institution has 12 hours (face to face) for one credit. Another response showed 1 hour for 1 credit unit, perhaps it was referring as one-hour face to face lecture per week. Generally, Malaysian public university has 14 weeks of study in 1 semester [6].

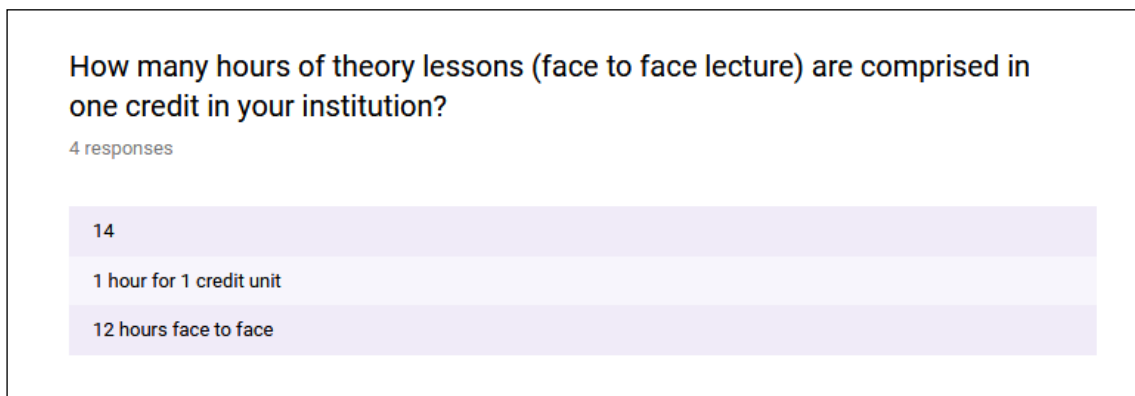


Figure 1. Hours of theory lessons (face to face) in one credit.

In the case of 14 weeks of study in 1 semester. By considering 1 hour per week for 1 credit, all four institutions are having almost same hours of theory lessons (face to face) for one credit within the range of 12 to 14 hours.

Figure 2 illustrates hours of practice lesson (laboratory) in one credit. There is no clear trend that could be seen from this figure. The result for this questionnaire was a mix.

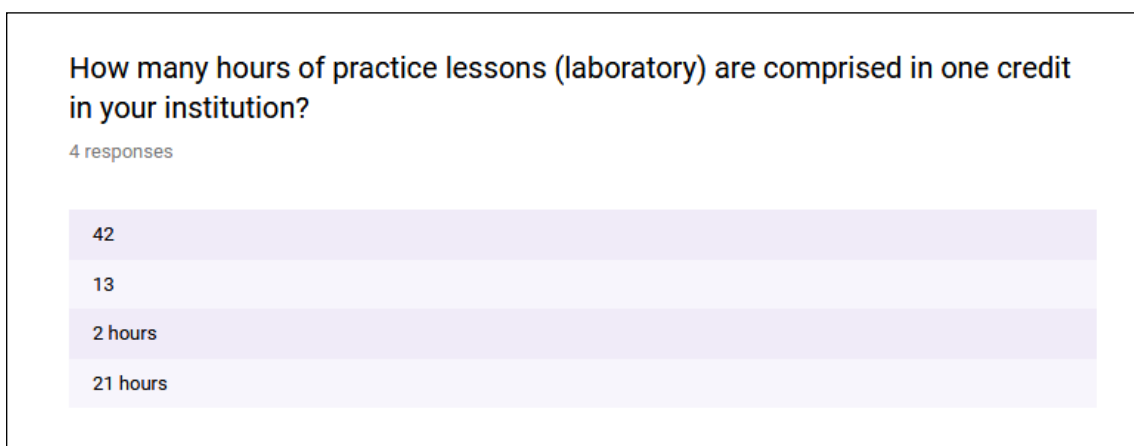


Figure 2. Hours of practice lesson (laboratory) in one credit.

By looking deep into each response, the result can be analysed case by case as follows:

Case 1: 42

Assume that the practice lesson is 3 hours per week for 14 weeks (2 credits).

3 hours x 14 weeks = 42 hours.

If 42 hours for 2 credits, therefore 21 hours for 1 credit.

Case 2: 13

Assume that the practice lesson is 2 hours per week for 13 weeks (2 credits).

2 hours x 13 weeks = 26 hours.

If 26 hours for 2 credits, therefore 13 hours for 1 credit.

Case 3: 2 hours

Assume that 2 hours means the practice lesson is 2 hours per week for 14 weeks (2 credits).

2 hours x 14 weeks = 28 hours.

If 28 hours for 2 credits, only 14 hours for 1 credit.

Case 4: 21 hours

This could be similar as Case 1.

Overall, the hours of practice lesson (laboratory) for all partners' institutions can be said within 13 to 21 hours for 1 credit. Depending on the universities, the hours offered for laboratory, are either 2 or 3 hours per week.

Figure 3 illustrates hours of student home work in one credit. There is no clear trend at all among all partners institutions result for this questionnaire.

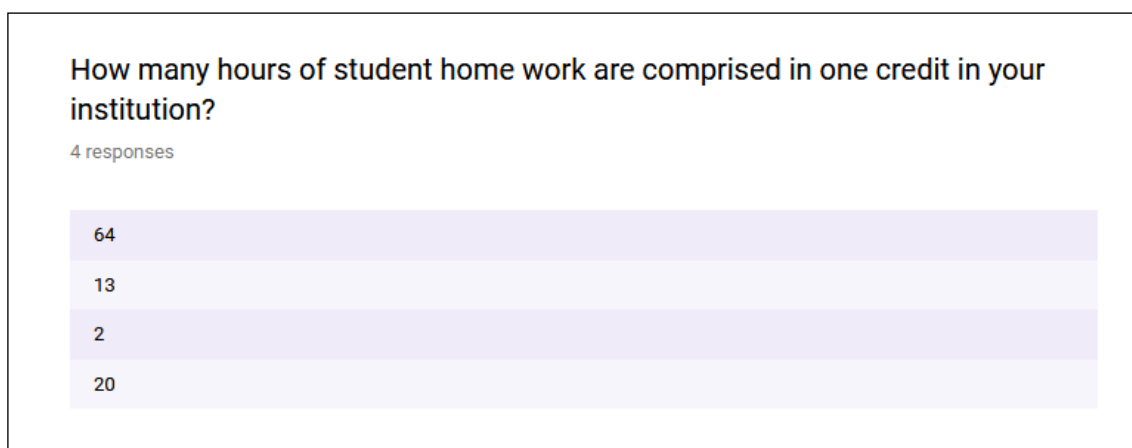


Figure 3. Hours of student home work in one credit.

Same as previous situation, this result can be analysed case by case with some general assumptions:

1. Student home work is equal to independent learning time (non face to face) which is one of the Student Learning Time (SLT) components.
2. Ratio face to face lecture to independent learning time is 1:1-2 [1]

Case 5: 64

Assume that the face to face lecture is 4 hours per week for 14 weeks (4 credits).

4 hours x 14 weeks = 56 hours. *The differences value between response (64) and calculated (56) is 8 hours. Perhaps 8 hours is considered as another component of SLT such as preparation time for assignment*.

With ratio 1:2, the independent learning time = 2 x 56 hours = 112 hours.

Thus, independent learning time for one credit = $112/4 = 28$ hours

Therefore, hours of student home work in one credit is 28 hours.

Case 6: 13

Assume that the face to face lecture is 4 hours per week for 13 weeks (4 credits).

4 hours x 13 weeks = 52 hours.

With ratio 1:1, the independent learning time = 1 x 52 hours = 52 hours.

Thus, independent learning time for one credit = $52/4 = 13$ hours

Therefore, hours of student home work in one credit is 13 hours.

Case 7: 2

Perhaps number 2 is representing the ratio of face to face lecture to independent learning time is 1 to 2.

Assume that the face to face lecture is 4 hours per week for 14 weeks (4 credits).

4 hours x 14 weeks = 56 hours.

With ratio 1:2, the independent learning time = 2 x 56 hours = 112 hours.

Thus, independent learning time for one credit = $112/4 = 28$ hours

Therefore, hours of student home work in one credit is 28 hours.

Case 8: 20

Assume that the face to face lecture is 4 hours per week for 13 weeks (4 credits).

4 hours x 13 weeks = 52 hours.

With ratio 1:1.5, the independent learning time = 1.5 x 56 hours = 78 hours.

Thus, independent learning time for one credit = $78/4 = 19.5$ hours

Therefore, hours of student home work in one credit is close to 20 hours.

Overall, the hours of student home work in one credit for all partners' institutions can be said within the range of 13 to 28. Depending on the universities, the ratio of face to face lecture to independent learning time is 1:1-2]. [6]

Figure 4 shows Types of methodology using in lectures. Based on Figure 4, all institutions (100%) use traditional lecture, project-based learning and thinking based learning in their teaching methodologies. However, only 25% of them involved with flipped classroom, collaborative learning and gamification. At a moment, not all institutions have capabilities to facilitate and engage with new teaching methodologies. 75% of the institutions used design thinking method in teaching.

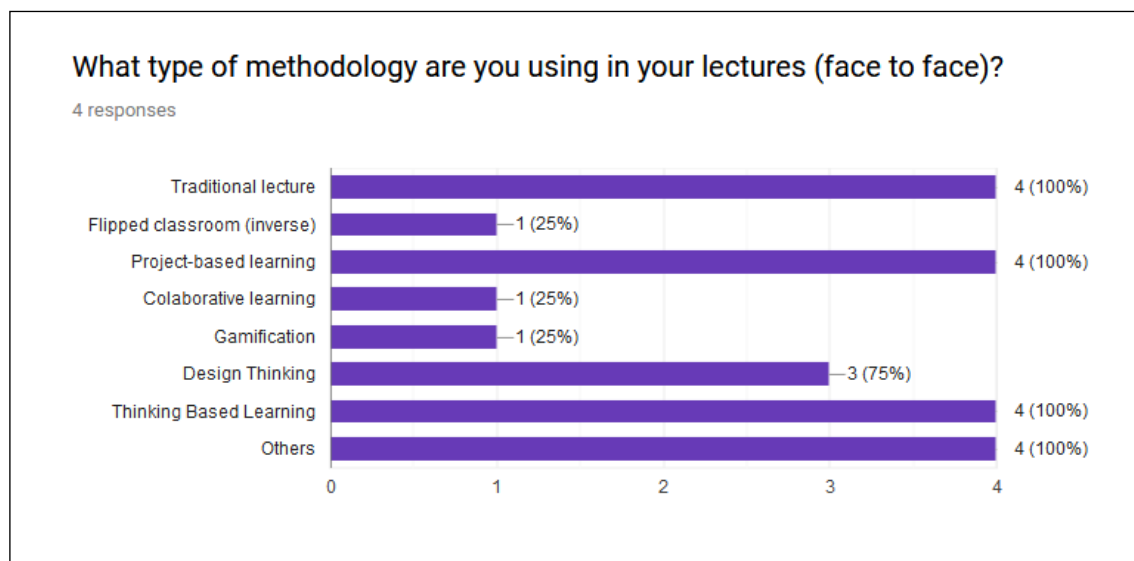


Figure 4. Types of methodology using in lectures.

All the institutions also adapted others type of methodologies listed in Figure 5 such as case study, factory visits, online based learning, problems-based learning, skill based learning and ICT.

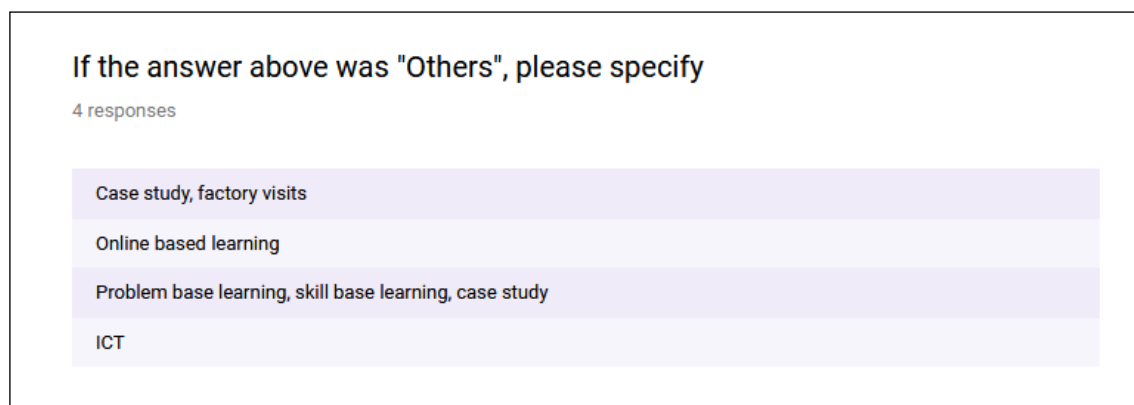


Figure 5. Other types of methodology in lectures

Figure 6 shows Types of resource using in lectures. All institutions (100%) used same resources in lectures such as slides, textbook, lectures using blackboard, case studies, and practice lessons in laboratories. Except 1 out of 4 (25%) institution do not use exercise using blackboard. In addition, all institutions also used others resources as listed in Figure 7.

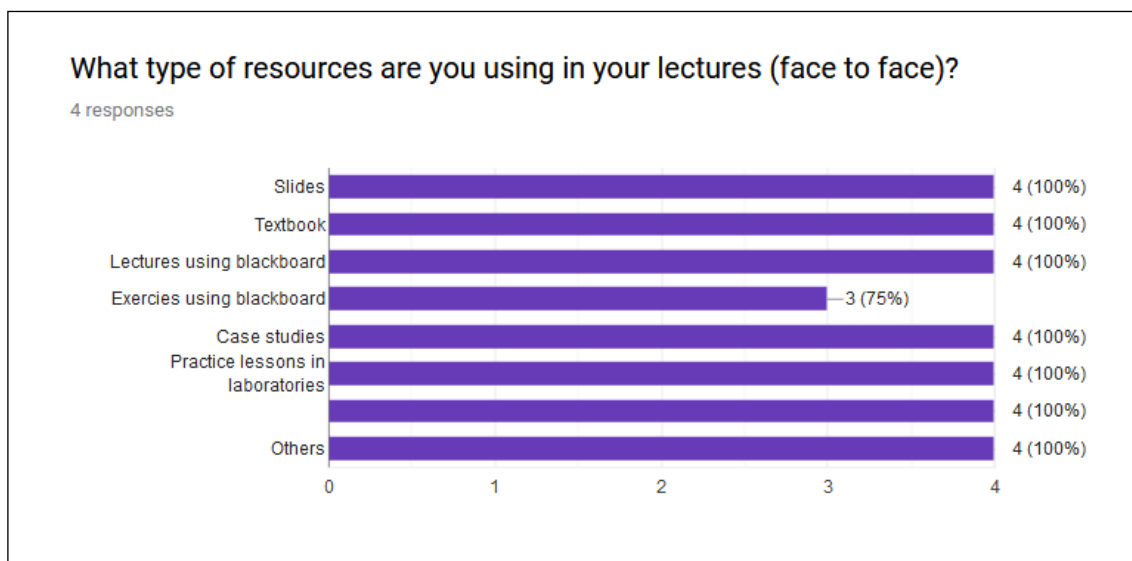


Figure 6. Types of resource using in lectures.

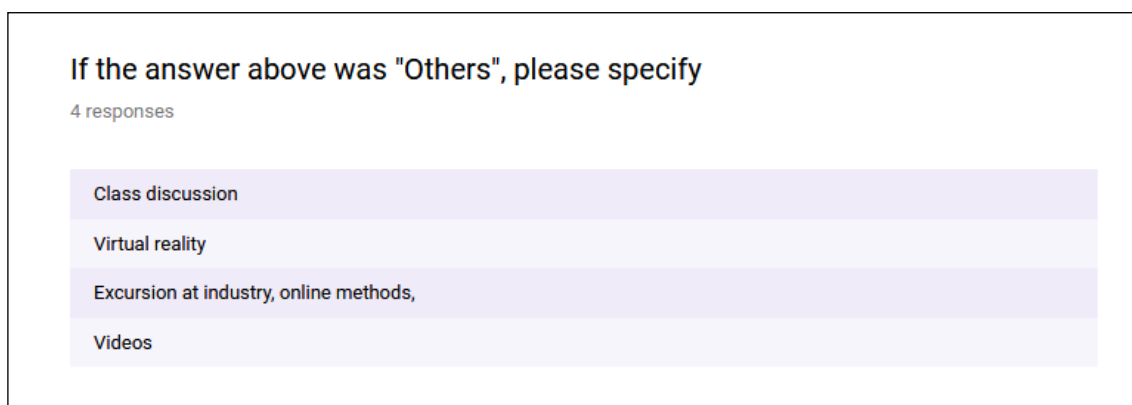


Figure 7. Other types of resource using in lectures

Figure 8 indicated types of assessment methodology using in lectures. Based on Figure 8, 75% of the Malaysian universities use continuous assessment and 25% (one response) choose others. By referring Figure 9, some the lists of response for others can be included as continuous assessment as well. [7]

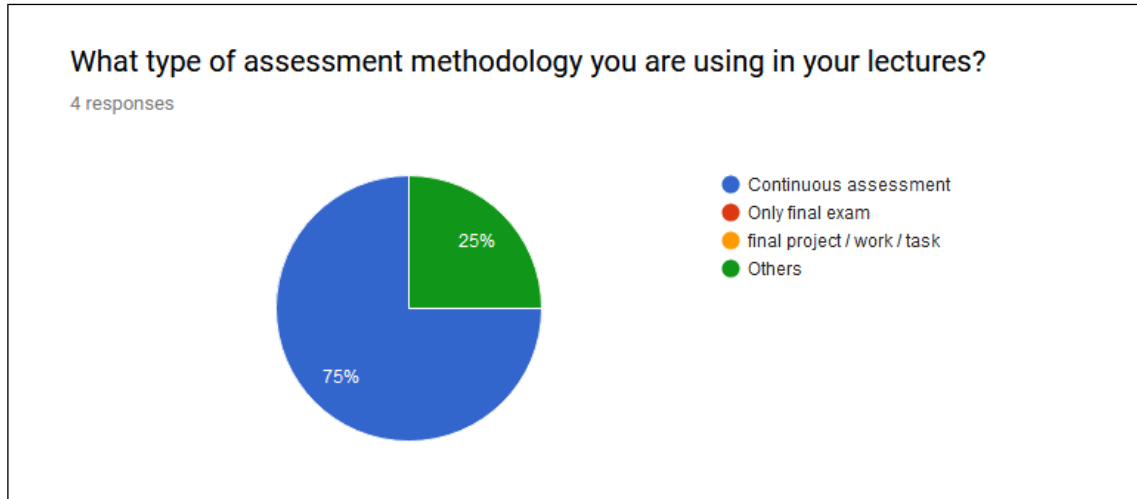


Figure 8. Types of assessment methodology in lectures

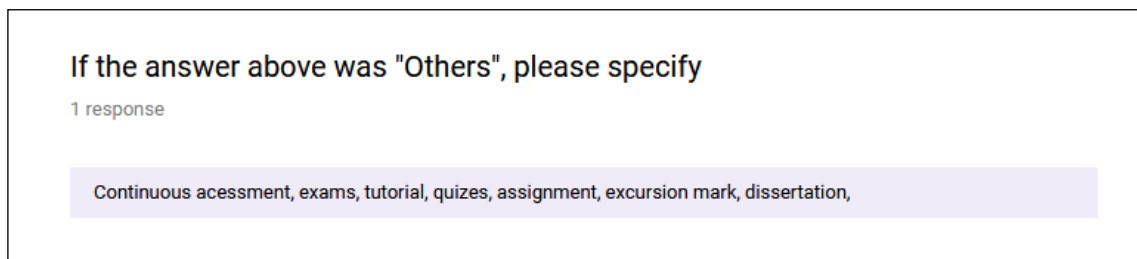


Figure 9. Others types of assessment methodology in lectures

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