



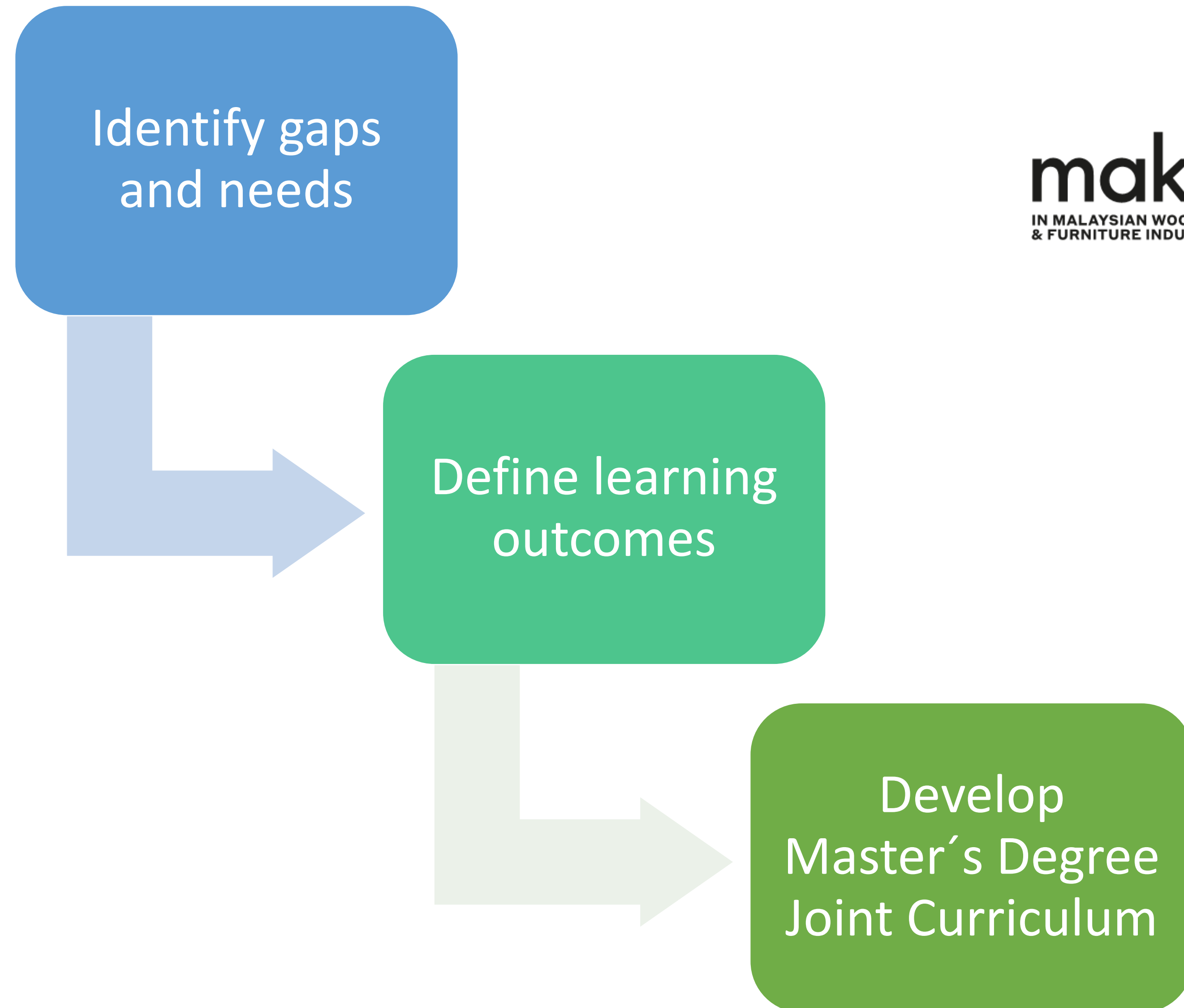
A proposal of Joint Curriculum for a Master Degree in industrz4.0 for the Malaysian industry

3rd Meeting

Malaysia

D e c e m b e r 2 0 1 9

Steps

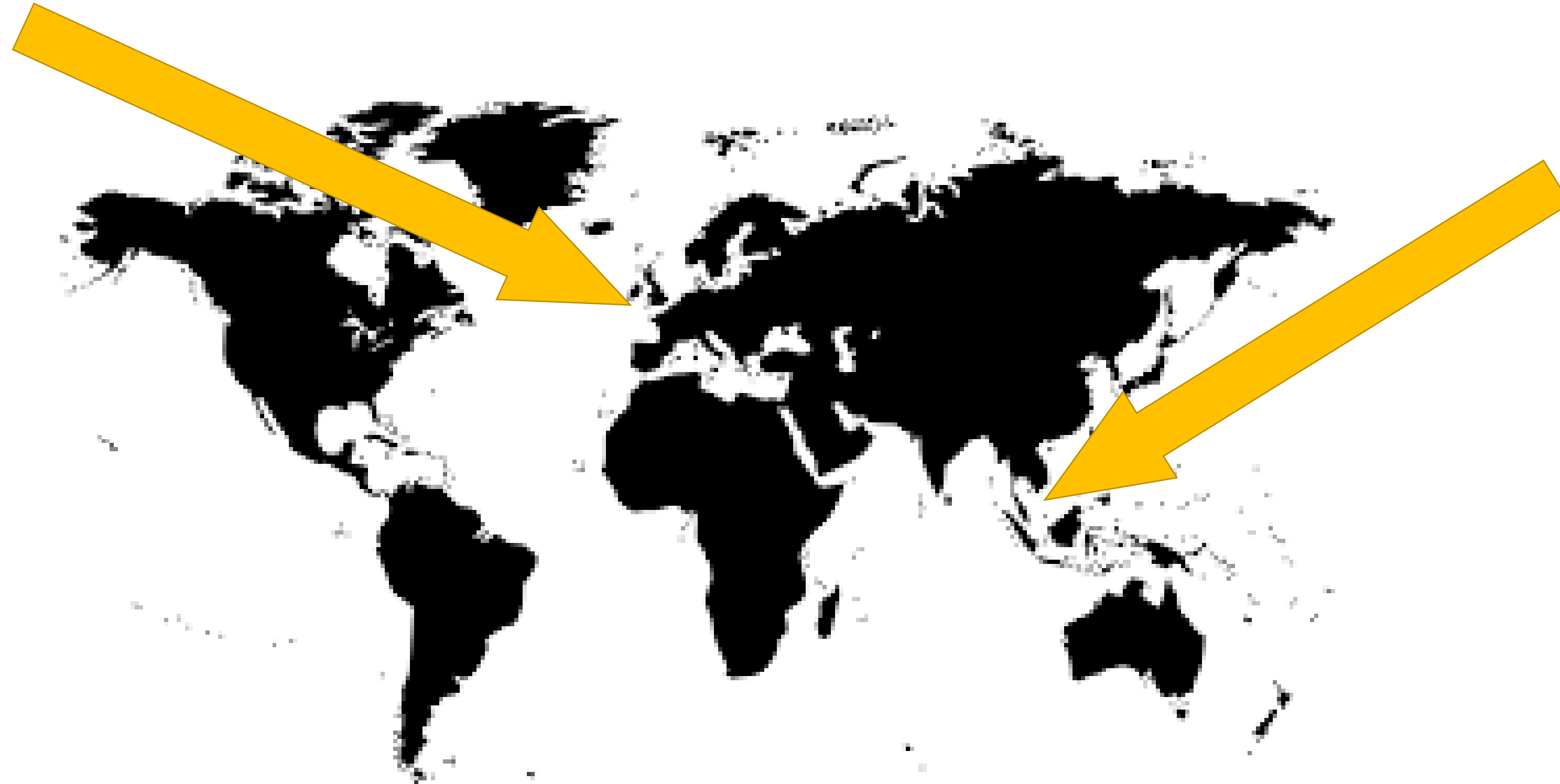


How to identify needs and gaps on Industry4.0 in Malaysia?

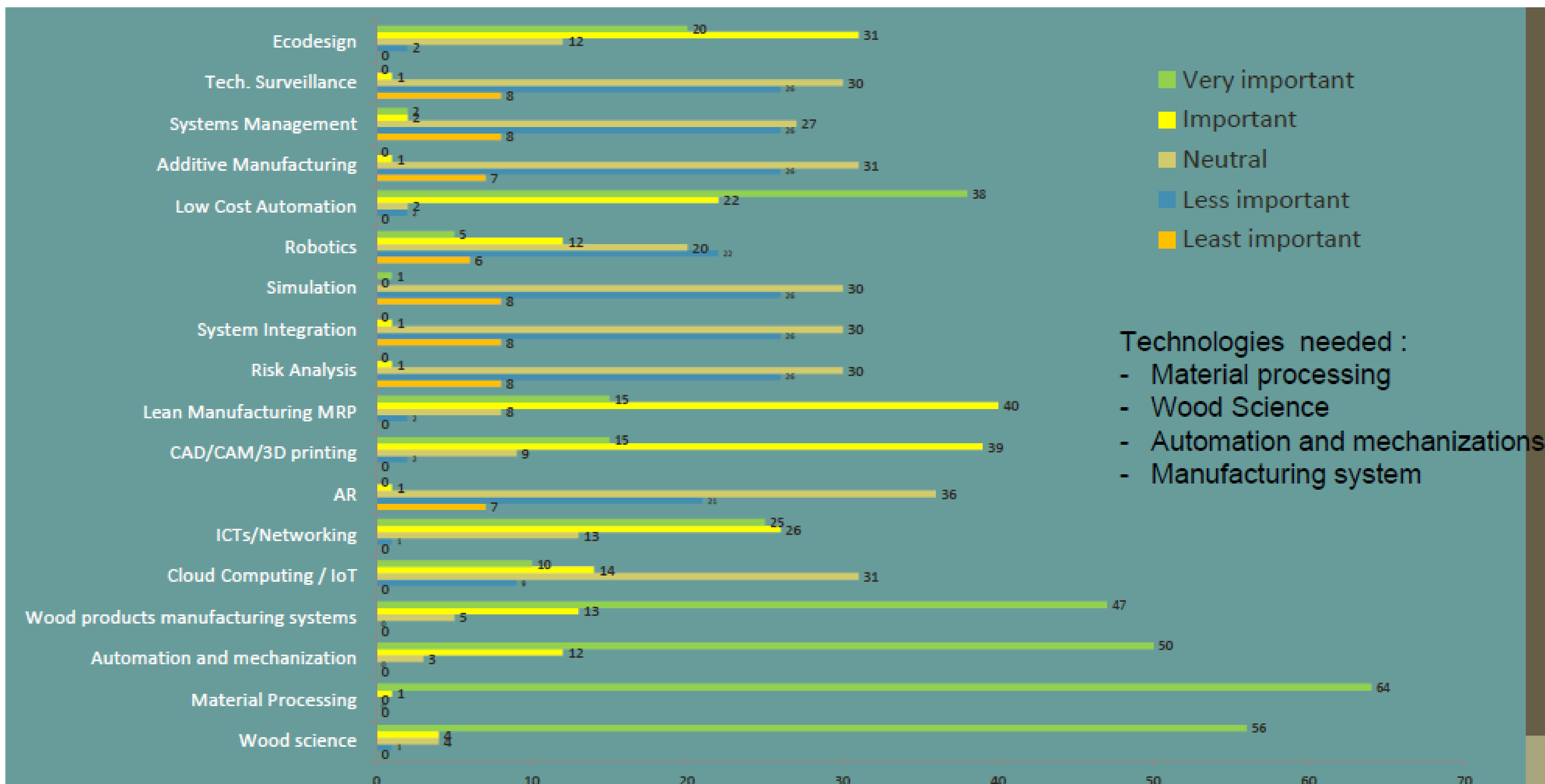

82 respondents
(11 different countries)

Survey


131 respondents
(95% Malaysia)



Responses



Results to the question “In any case, of the following technologies/ processes do you consider essential to be implemented in your company in the following 5 years?”

Responses



Needs and gaps

Define needs and gaps → necessary to be covered by MAKING4.0 Master

Wood, furniture manufacturing processes, and design

- Wood and material processing
- Automation and mechanization
- Ecodesign

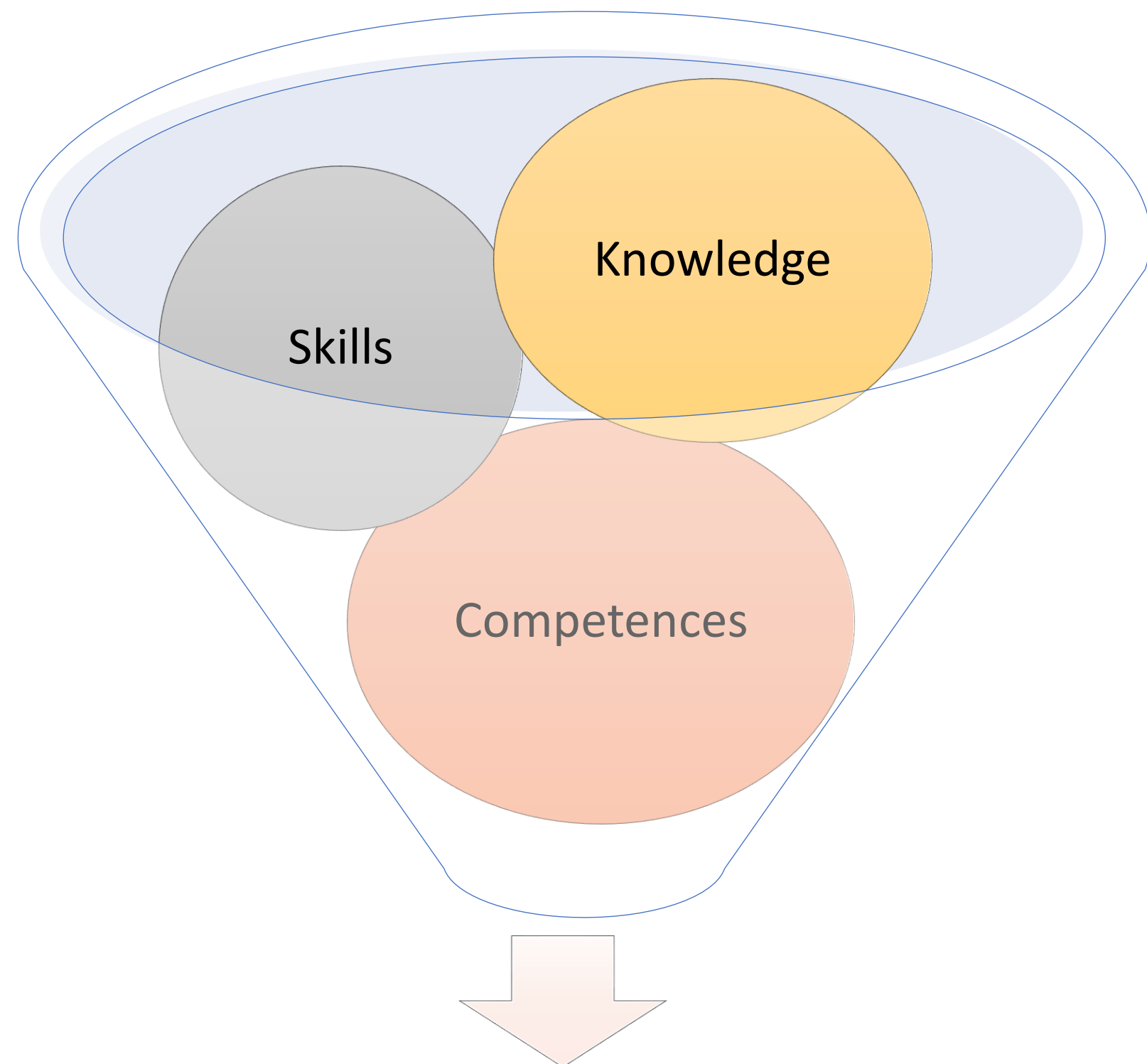
KETs of Industry4.0

- Cloud computing
- IoT
- ICT/Networking
- Augmented Reality
- Additive manufacturing
- Simulation
- Robotics

Management system and integration

- Lean Manufacturing
- Low Cost Automation
- System Management
- Technological surveillance and competitive intelligence

Learning outcomes – European Qualification Framework (EQF)



Learning outcomes

“Sets of knowledge, skills and/or competences that an individual has acquired and/or is able to demonstrate after completion of a learning process, either formal, non-formal or informal.”

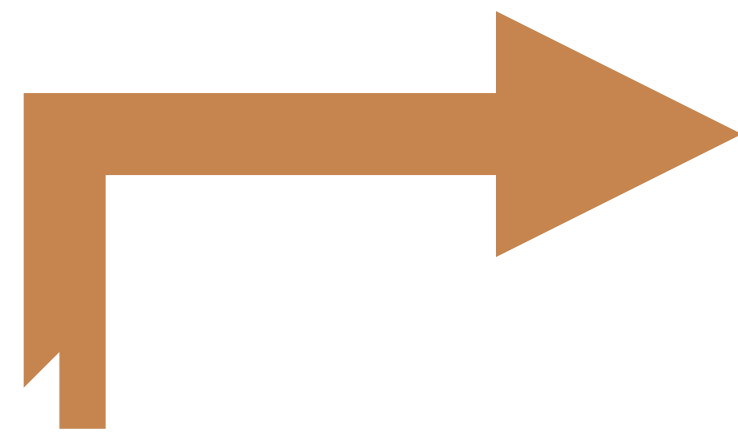
Learning outcomes – Malaysian Qualification Framework (MQF)

5 clusters
learning outcomes

1. knowledge and understanding
2. Cognitive skills
3. Functional work skills with focus on:
 - a) Practical skills
 - b) Interpersonal skills
 - c) Communication skills
 - d) Digital skills
 - e) Numeracy skills
 - f) Leadership, autonomy and responsibility
4. Personal and entrepreneurial skills
5. Ethics and professionalism

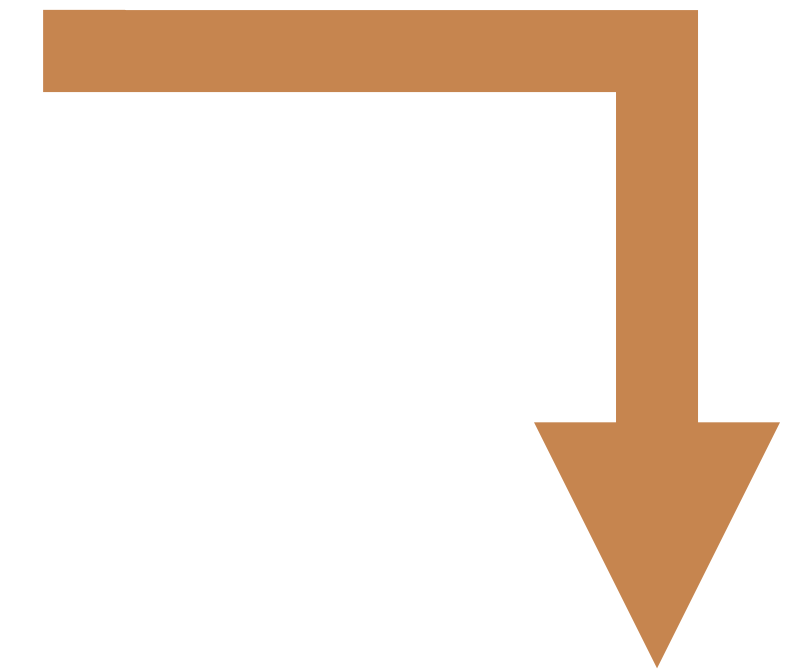
“Statements on what students should know, understand and can do upon successful completion of a period of study, which generally lead to a qualification or part of a qualification.

MQF level

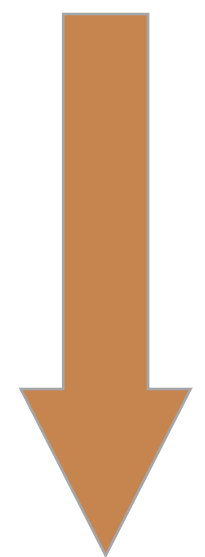


MQF Level	Minimum Graduating Credit	Academic Sector	TVET Sector
8	No credit rating	PhD by Research	
	80	Doctoral Degree by Mixed Mode & Coursework	
7	No credit rating	Master's by Research	
	40	Master's by Mixed Mode & Coursework	
	30	Postgraduate Diploma	
6	20	Postgraduate Certificate	
	120	Bachelor's degree	
	68*	Graduate Diploma	
	36*	Graduate Certificate	
5	40	Advanced Diploma	5
4	90	Diploma	4
3	60	Certificate	3
2	30	Certificate	2
1	15	Certificate	1

* Inclusive of 6 credits from general studies subjects.



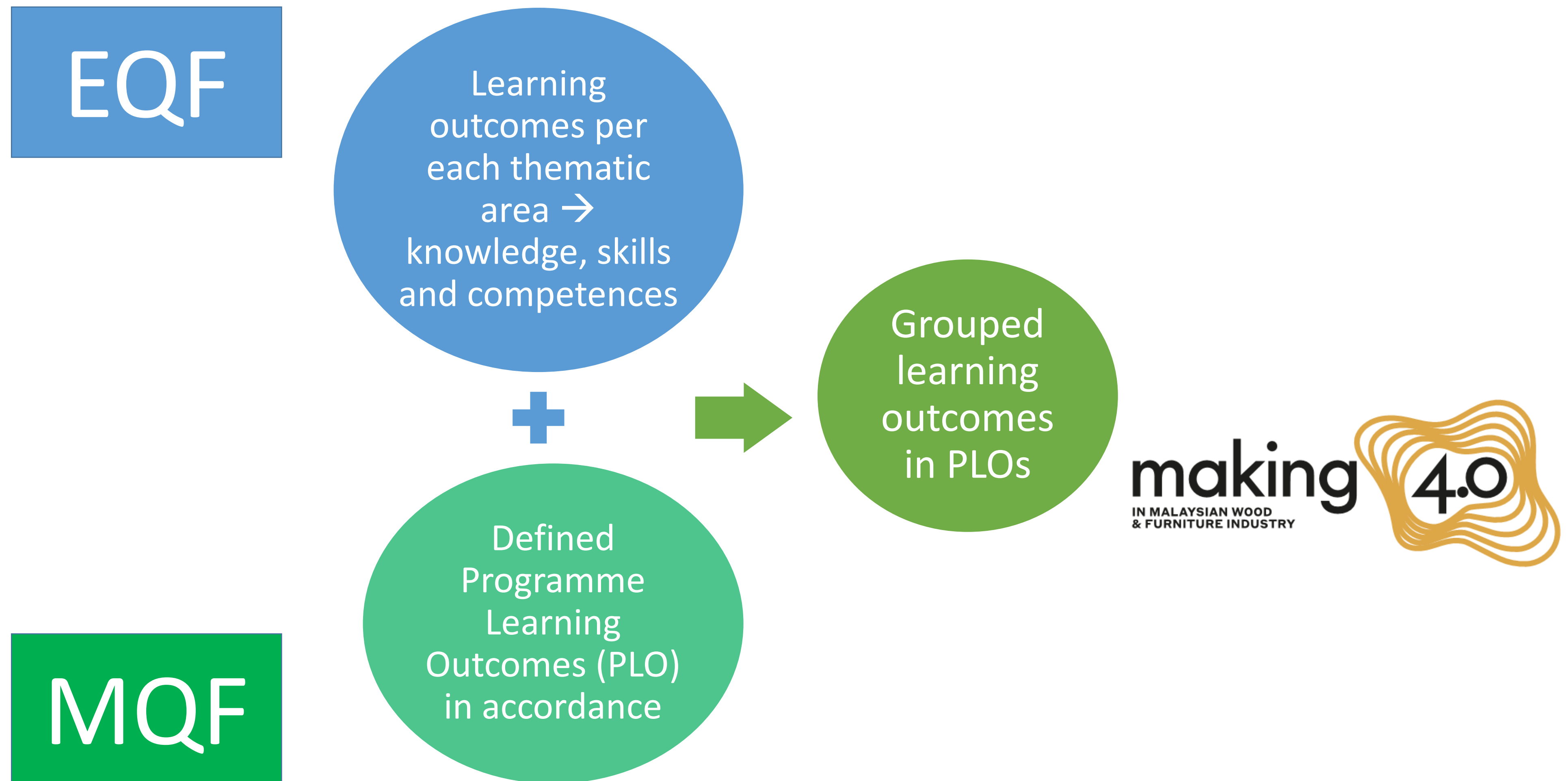
Learning outcomes
description



Programme objective

Summary of learner's profile	CLUSTER 1: knowledge and understanding	CLUSTER 2: cognitive skills	CLUSTER 3				CLUSTER 4: Personal and entrepreneurial skills	CLUSTER 5: Ethics and professionalism
			Practical skills	Interpersonal and communication skills	Digital and numeracy skills	Leadership, autonomy and responsibility		
<p>Learners at this level will demonstrate a mastery of knowledge in specific field/fields of study/work and through further learning, research, and/or professional practice; and Butressed by a comprehension of strong theoretical knowledge, critical thinking, creative and innovative skills.</p> <p>They will also be able to generate new solutions to problems. They operate with confidence, knowledge and skills both in Malaysia/ASEAN as well as the wider world</p>	<p>Demonstrate originality and independence in undertaking analytical and critical evaluation, and synthesis of complex information, specialized concepts, theories, methods and practice in a field(s) of study/practice as a basis for research.</p>	<p>Apply knowledge critically and interactively to manage and resolve complex problems/issues in a field(s) of study/practice through research, using advance techniques, tools, skills or by a range of approaches or (integrative) combination of approaches for decision making and producing new ideas, and/or innovative solutions or practice.</p> <p>Exemplify capacity to solve and manage complex problems or issues in a field(s) of study/practice.</p>	<p>Conduct standard and specialized research methods/ approaches and/or apply practical skills, tools or investigative techniques which are informed by knowledge at its forefront and the latest development in the subject/discipline.</p>	<p>Communicate clearly the knowledge, skills, ideas, critique and conclusion/rationale using appropriate methods to peers, experts, and non-experts in at least one international language.</p> <p>Work together and collaboratively with different people in learning and working communities and other groups and networks, ethically and professionally.</p> <p>Demonstrate competencies to work and undertake advanced study in at least one foreign language</p>	<p>Competently use a wide range of suitable digital technologies and appropriate software to enhance study, research and/or work/practice.</p> <p>Adapt applications and systems to address defined and new situations/problems.</p> <p>Show skills to design, plan evaluation activities, using quantitative/ statistical tools.</p> <p>Apply mathematical and other quantitative, qualitative tools to analyse and evaluate numerical and graphical data for study/work.</p>	<p>Demonstrate significant autonomy, independence, leadership, and interpersonal skills at work and class.</p> <p>Show substantial responsibility in planning, resource management, supervision and problem solving and managing work within own team and collaboratively with other teams especially in the context of complex application and unpredictable situations.</p>	<p>Exemplify self-advancement through continuous academic and/or professional development.</p> <p>Initiate and/or lead entrepreneurial ventures/ projects.</p>	<p>Demonstrate adherence to legal, ethical and professional codes of practice. Demonstrate confidence to give advice and make decision(s) on complex issues based on critical reflections and ethical considerations.</p> <p>Contribute professionally to social, technological and economic development both nationally and internationally.</p> <p>Demonstrate ability to engage meaningfully on a range of civic and global issues in one's own area of expertise.</p>

How we have proceed in Making to mix EQF & MQF?



EQF

Learning
outcomes per
each thematic
area →
knowledge, skills
and competences

Thematic area	Knowledge	Skills	Competences
Wood and material processing	<ul style="list-style-type: none"> ▪ Basics of material science ▪ New materials. ▪ Eco-sustainability of materials ▪ Future trends 	<ul style="list-style-type: none"> ▪ Development a basis for systematization of new materials for the Malaysian furniture and wood industry ▪ Identification of new and eco-sustainable materials for the furniture and wood industry ▪ Definition of future trends in the development of materials for the furniture and wood industry 	<ul style="list-style-type: none"> ▪ Technical (chemical, physical, environmental) ▪ Economic
Automation and mechanization	<ul style="list-style-type: none"> ▪ Basics of technology ▪ Mechanical processing of wood and wood-based materials ▪ Gluing technology ▪ Finishing technology ▪ Knowledge about existing types of production planning with the demand forecast 	<ul style="list-style-type: none"> ▪ Ability to work, understand and improve technology of furniture. ▪ Ability to use knowledge of production stages in the production process. ▪ Ability to distinguish different production system depending on the demand and temporal horizon. ▪ Ability to adapt and create different production planning systems 	<ul style="list-style-type: none"> ▪ Working in the production process as the supervisor. ▪ Managing company's technology and production routines in accordance to knowledge, good practices and standards existing in furniture production. ▪ With the help of other modules, one can apply innovation to the technology or improve processes. ▪ Implement different production planning system in a company of the furniture sector.

MQF

Defined
Programme
Learning
Outcomes (PLO)
in accordance

Summary of learner's profile	CLUSTER 1: knowledge and understanding	CLUSTER 2: cognitive skills	CLUSTER 3				CLUSTER 4: Personal and entrepreneurial skills	CLUSTER 5: Ethics and professionalism
			Practical skills	Interpersonal and communication skills	Digital and numeracy skills	Leadership, autonomy and responsibility		
<p>Learners at this level will demonstrate a mastery of knowledge in specific field/fields of study/work and through further learning, research, and/or professional practice; and Buttressed by a comprehension of strong theoretical knowledge, critical thinking, creative and innovative skills.</p> <p>They will also be able to generate new solutions to problems. They operate with confidence, knowledge and skills both in Malaysia/ASEAN as well as the wider world</p>	<p>Demonstrate originality and independence in undertaking analytical and critical evaluation, and synthesis of complex information, specialized concepts, theories, methods and practice in a field(s) of study/practice as a basis for research.</p>	<p>Apply knowledge critically and interactively to manage and resolve complex problems/issues in a field(s) of study/practice through research, using advance techniques, tools, skills or by a range of approaches or (integrative) combination of approaches for decision making and producing new ideas, and/or innovative solutions or practice.</p> <p>Exemplify capacity to solve and manage complex problems or issues in a field(s) of study/practice.</p>	<p>Conduct standard and specialized research methods/ approaches and/or apply practical skills, tools or investigative techniques which are informed by knowledge at its forefront and the latest development in the subject/discipline.</p>	<p>Communicate clearly the knowledge, skills, ideas, critique and conclusion/rationale using appropriate methods to peers, experts, and non-experts in at least one international language.</p> <p>Work together and collaboratively with different people in learning and working communities and other groups and networks, ethically and professionally.</p> <p>Demonstrate competencies to work and undertake advanced study in at least one foreign language</p>	<p>Competently use a wide range of suitable digital technologies and appropriate software to enhance study, research and/or work/practice.</p> <p>Adapt applications and systems to address defined and new situations/problems.</p> <p>Show skills to design, plan evaluation activities, using quantitative/ statistical tools.</p> <p>Apply mathematical and other quantitative, qualitative tools to analyse and evaluate numerical and graphical data for study/work.</p>	<p>Demonstrate significant autonomy, independence, leadership, and interpersonal skills at work and class.</p> <p>Show substantial responsibility in planning, resource management, supervision and problem solving and managing work within own team and collaboratively with other teams especially in the context of complex application and unpredictable situations.</p>	<p>Exemplify self-advancement through continuous academic and/or professional development.</p> <p>Initiate and/or lead entrepreneurial ventures/ projects.</p>	<p>Demonstrate adherence to legal, ethical and professional codes of practice. Demonstrate confidence to give advice and make decision(s) on complex issues based on critical reflections and ethical considerations.</p> <p>Contribute professionally to social, technological and economic development both nationally and internationally.</p> <p>Demonstrate ability to engage meaningfully on a range of civic and global issues in one's own area of expertise.</p>

MQF

Defined
Programme
Learning
Outcomes (PLO)
in accordance

PLO nº	Description
PLO 1	Acquire and understand the necessary concepts and knowledge on Industry4.0.
PLO 2	Manage complex problems in the industry through the implementation of industry4.0 techniques.
PLO 3	Research and apply about the trendy tools and technologies of the Industry4.0
PLO 4	Demonstrate team work and critique communicative ability on industry4.0 topics.
PLO 5	Use digital technologies and apply mathematical tools to analyse and solve problems in industrial process management.
PLO 6	Be able to work and solve own solutions for industry problems related with the implementation of Industry4.0 technologies.
PLO 7	Show the ability to lead entrepreneurial projects on smart factories of the wood and furniture industry.
PLO 8	Learn about how to boost the Malaysian industry and demonstrate the ability to provide professional advice on it.

Grouped learning outcomes in PLOs

Thematic areas	Programme Learning Outcomes							
	Acquire and understand the necessary concepts and knowledge on Industry4.0	Manage complex problems in the industry through the implementation of industry4.0 techniques	Research and apply about the trendy tools and technologies of the Industry4.0	Demonstrate team work and critique communicative ability on industry4.0 topics	Use digital technologies and apply mathematical tools to analyse and solve problems in industrial process management	Be able to work and solve own solutions for industry problems related with the implementation of Industry4.0 technologies	Show the ability to lead entrepreneurial projects on smart factories of the wood and furniture industry	Learn about how to boost the Malaysian industry and demonstrate the ability to provide professional advice on it
TOPIC 1. WOOD, FURNITURE MANUFACTURING PROCESSES, AND DESIGN.								
Wood and material processing								
Basics of material science	X							
New materials.			X					
Eco-sustainability of materials			X					
Future trends	X		X					X
Development a basis for systematization of new materials for the Malaysian furniture and wood industry		X				X		X
Identification of new and eco-sustainable materials for the furniture and wood industry		X				X		
Definition of future trends in the development of materials for the furniture and wood industry				X			X	
Technical (chemical, physical, environmental)		X	X					
Economic					X		X	

Programme Learning Outcomes vs MQF learning outcomes

MQF2.0 learning outcomes Programme learning outcomes	CLUSTER1: knowledge and understanding	CLUSTER 2: cognitive skills	CLUSTER 3				CLUSTER 4: Personal and entrepreneurial skills	CLUSTER 5: Ethics and professionalism
			Practical skills	Interpersonal and communication skills	Digital and numeracy skills	Leadership, autonomy and responsibility		
PLO 1	X							
PLO 2		X						
PLO 3			X					
PLO 4				X				
PLO 5					X			
PLO 6						X		
PLO 7							X	
PLO 8								X

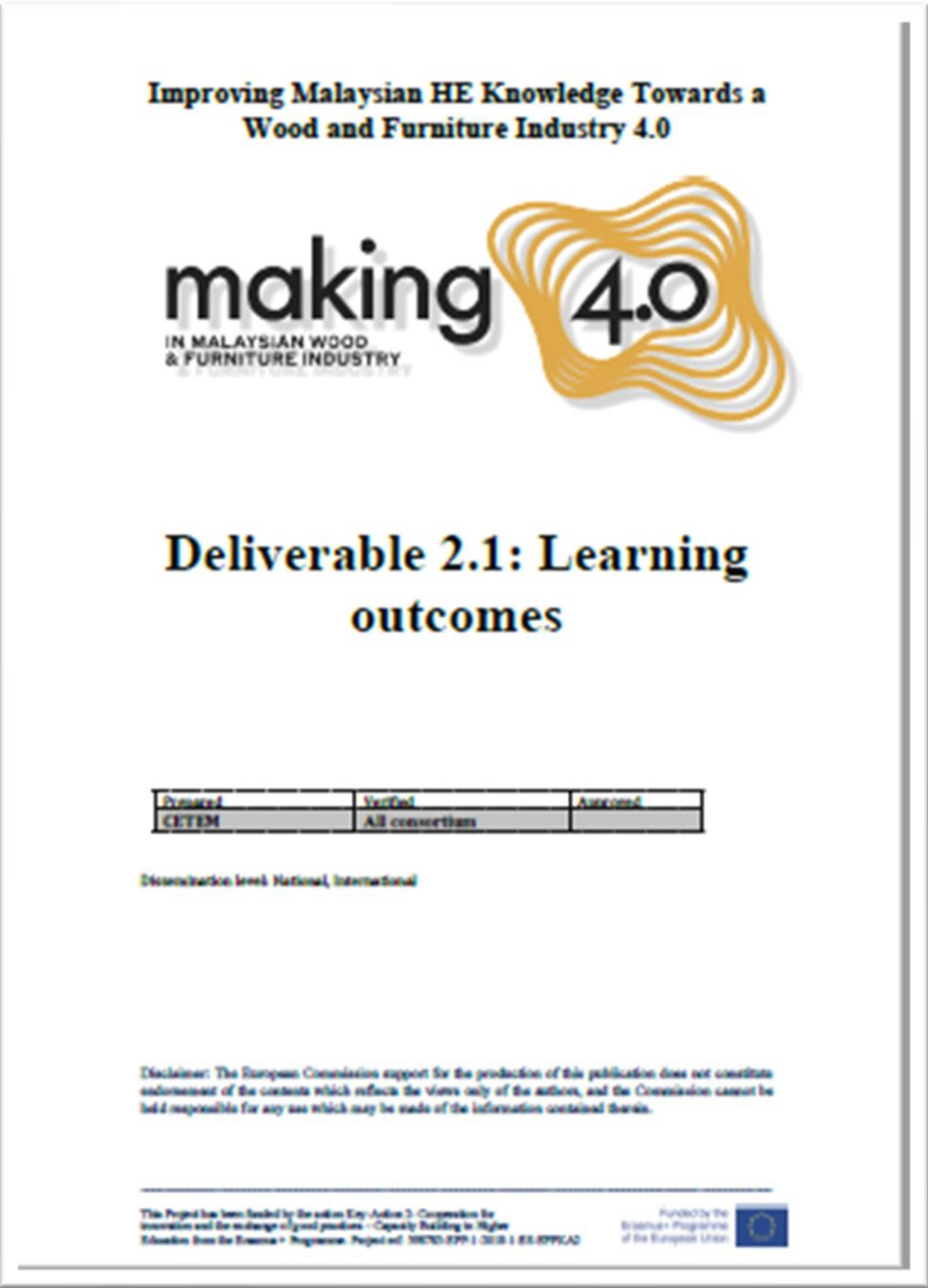
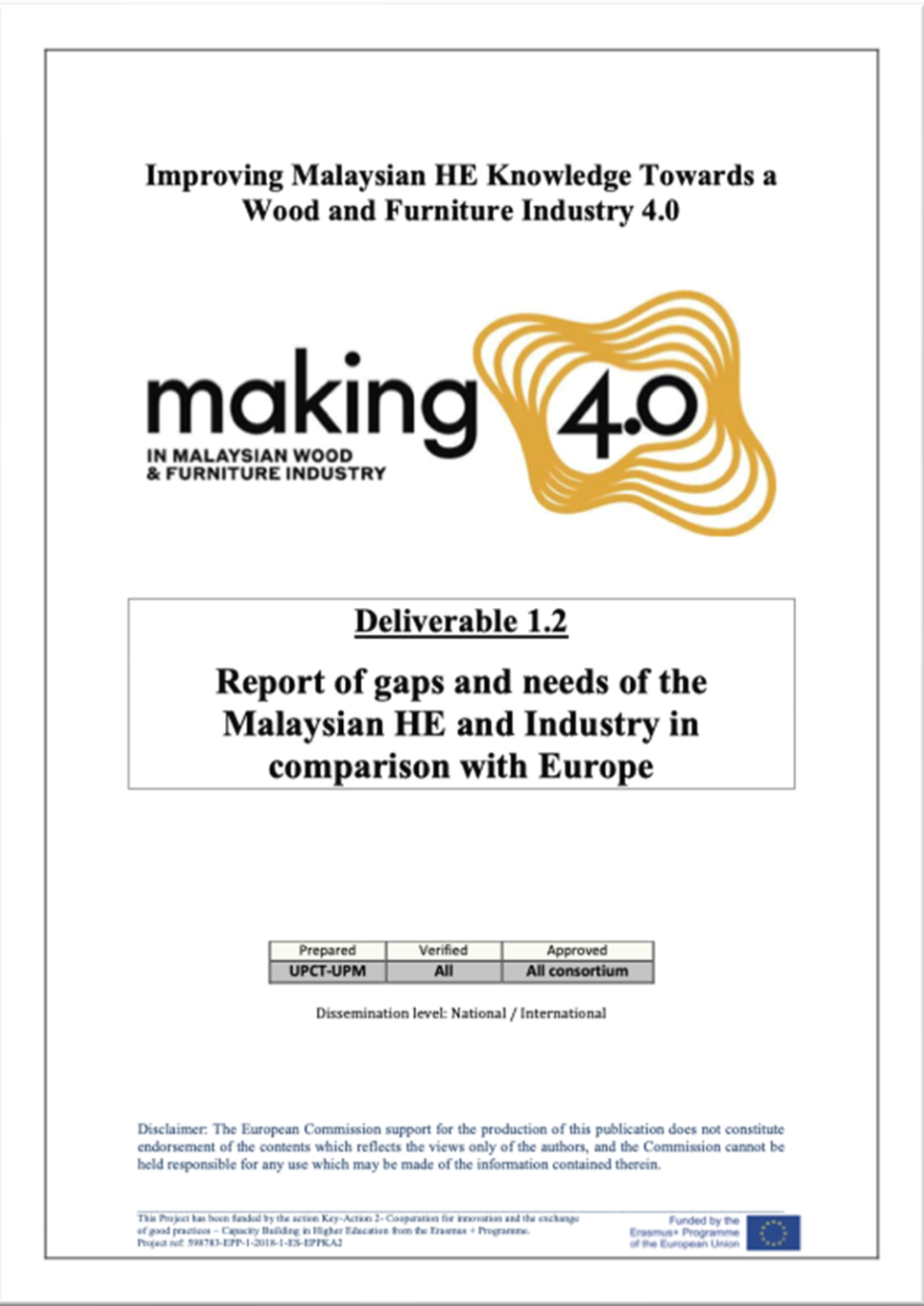
Conclusions

Making4.0 Master's Degree will fulfil the requirements of both qualifications systems, European and Malaysian, because:

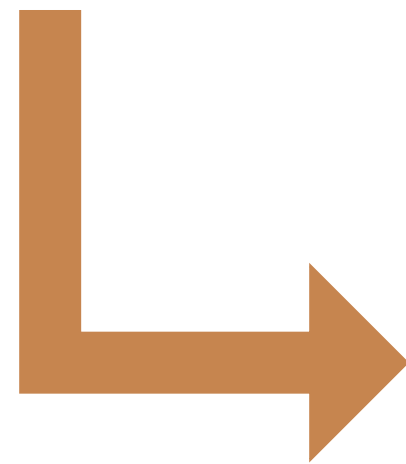
- ✓ The defined 8 Programme Learning Outcomes are aligned with the MQF2.0 learning outcomes.
- ✓ It has been defined the learning outcomes based on the concept of the EQF: knowledge, skills and competences. These has been also aligned with the PLOs.



Starting Point. Identification of the Master’s Modules



Modules identified for the Master Making 4.0



Module 1



Processes and Production of Furniture

Module 2



Intelligent and Sustainable design

Module 3



Wood and New Materials

Module 4



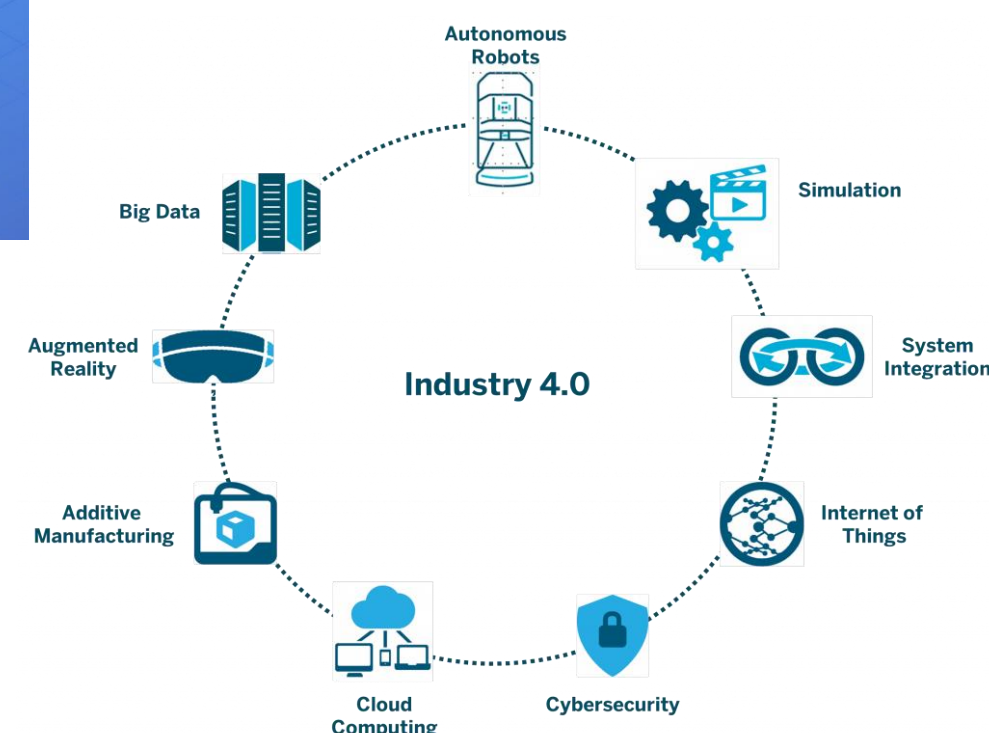
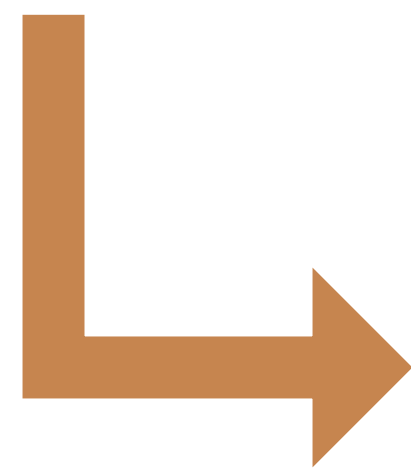
Innovation Management

Subject identified for each Module

Module 1

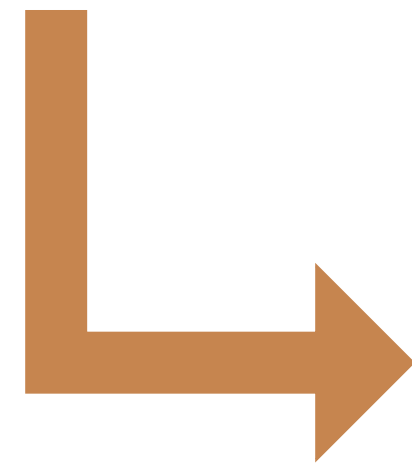


Processes and Production of Furniture



- 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)
- Communication and Network
- Sensors and Wearables. RFID and NFC
- Robotics
- Augmented reality
- Simulation and 3D Scanning
- Cloud computing and Big Data.

Subject identified for each Module



Module 2



Intelligent and Sustainable Design

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

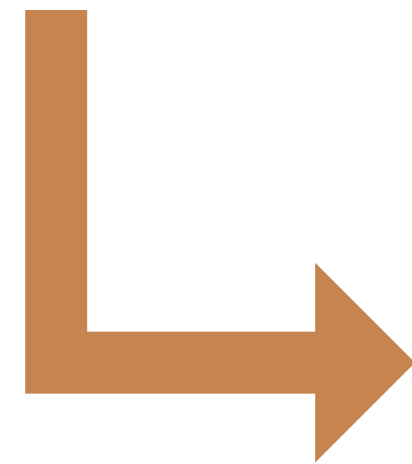


Subject identified for each Module

Module 3



Wood and New Materials



→ Wood science.

→ Materials for furniture manufacturing.

→ Material Processing



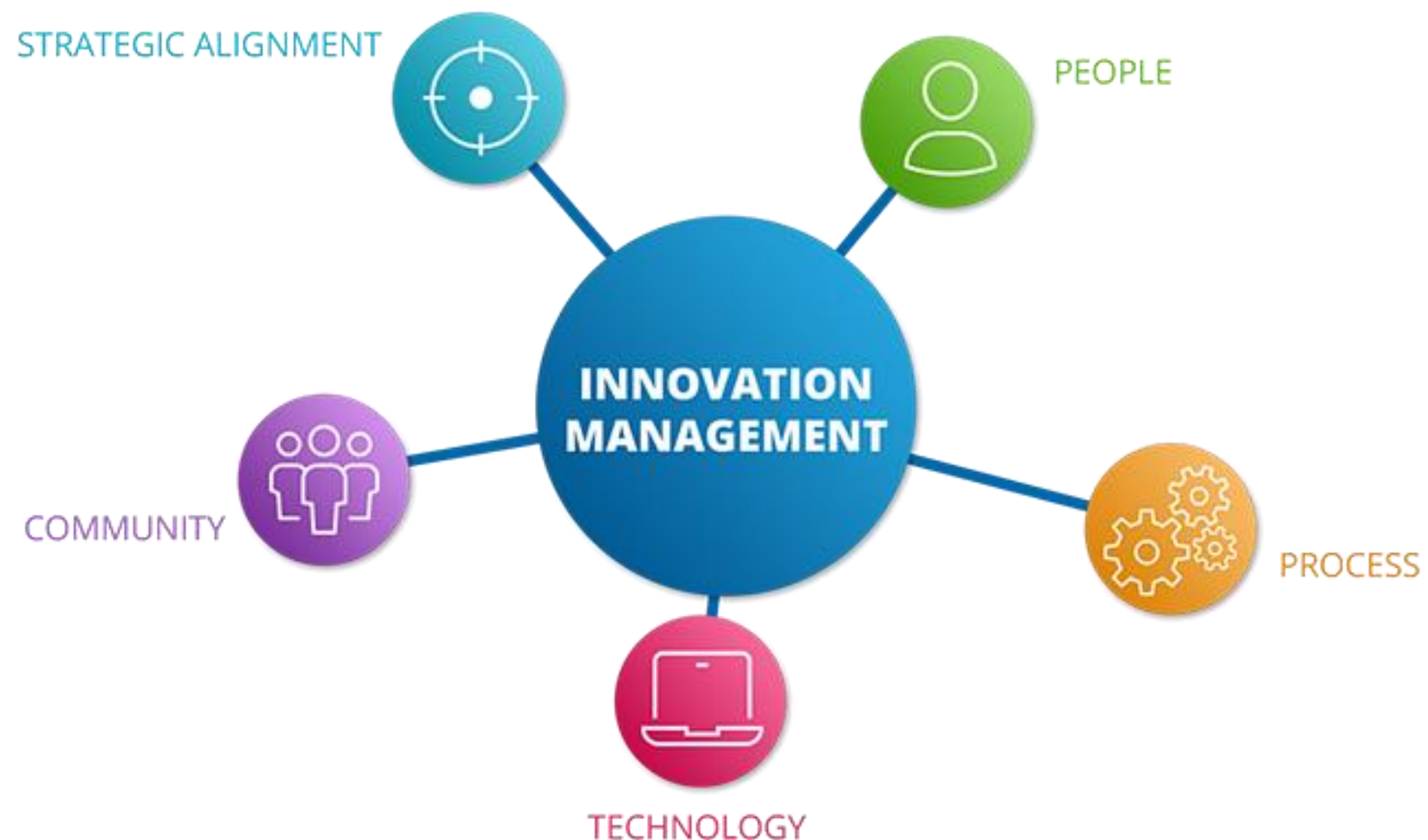
Subject identified for each Module

Module 4

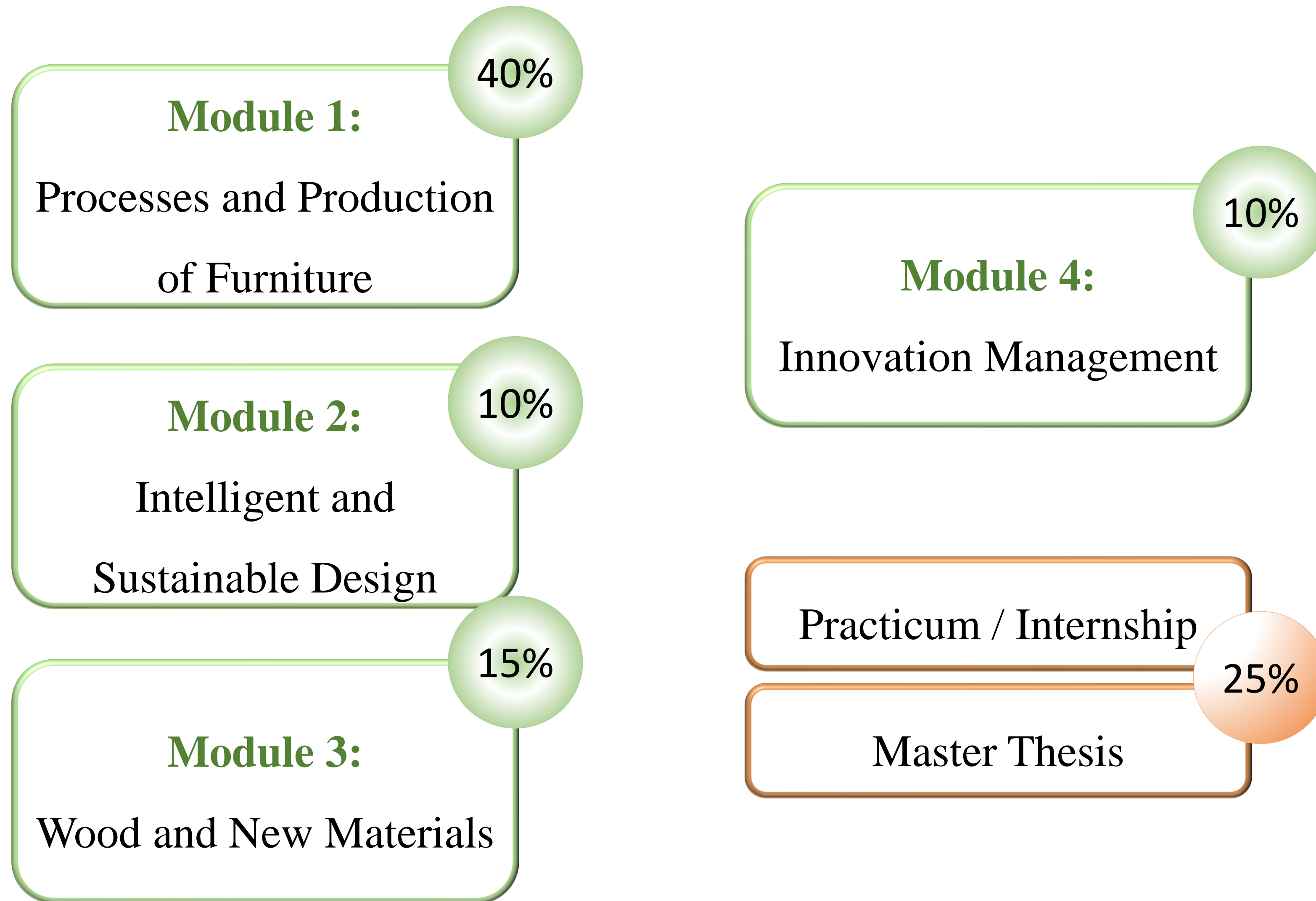


Innovation Management

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



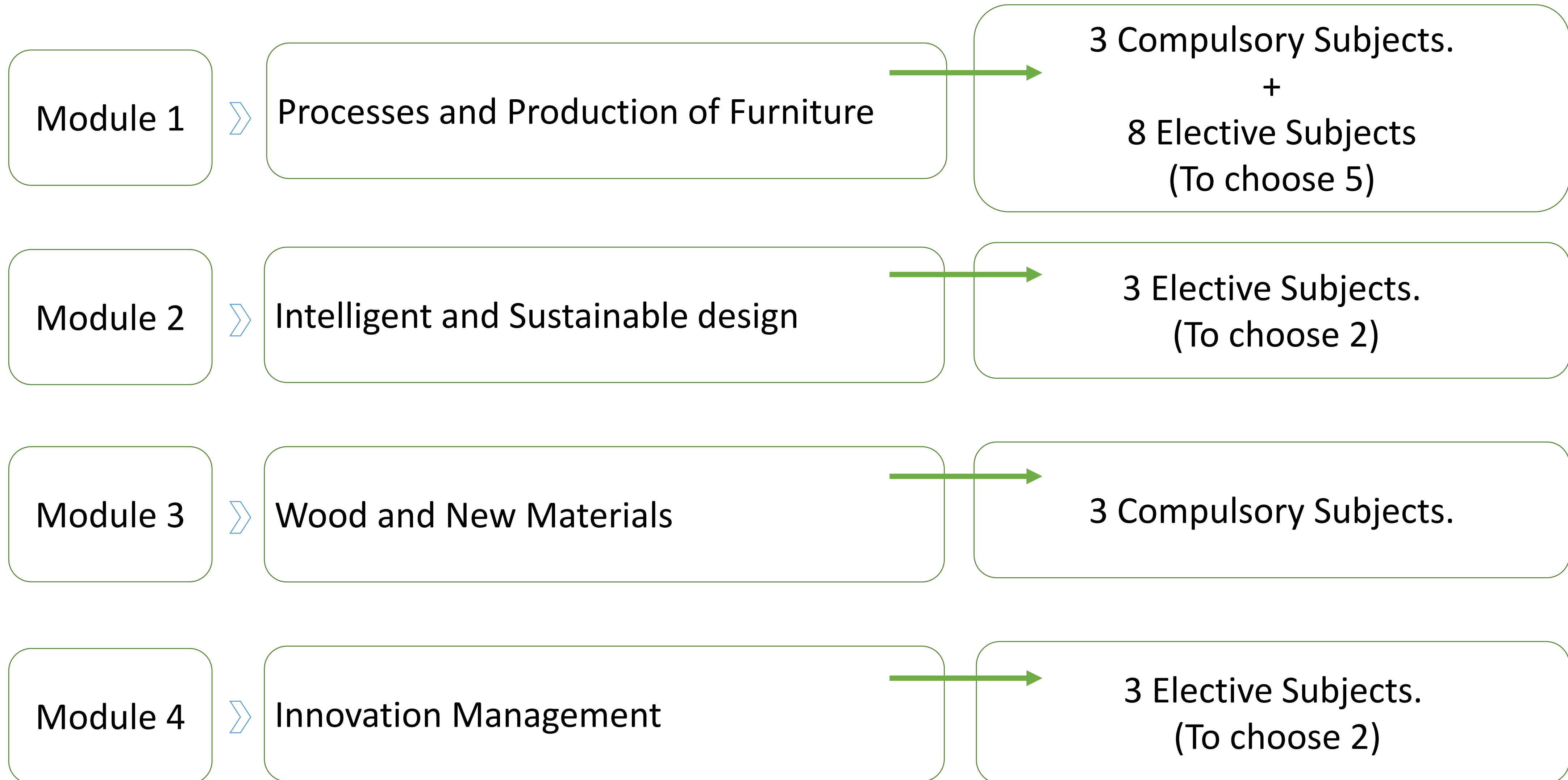
Weight distribution among modules



ECTS Credits distribution among modules

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

ECTS Credits distribution among modules



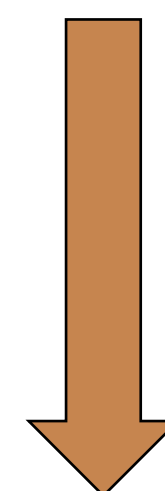
ECTS Credits distribution among modules

F. MASTER'S DEGREE BY COURSEWORK

Table 6:

MINIMUM GRADUATING CREDIT – 40			
COMPONENT	CREDIT	PERCENTAGE	REMARKS
Compulsory Courses	9-13	22-32	e.g.: Qualitative and Quantitative Research Methods; Seminar in Education and Academic and Professional Writing
Discipline Core/Elective	15-25	38-63	Electives from the discipline of education
Project Paper/Practicum/ Other Courses(for 100% coursework)	6-12	15-30	
Total	40	100	

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



	ECTS	Percentage
Compulsory	12	30,0%
Elective (Optional Subjects)	18	45,0%
Internship	5,00	12,5%
Master Thesis	5,00	12,5%
Total	40	100,00%

STRUCTURE OF THE MASTER

	ECTS	Percentage
Compulsory	12	30,0%
Elective (Optional Subjects)	18	45,0%
Internship	5,00	12,5%
Master Thesis	5,00	12,5%
Total	40	100,00%

MASTER'S STRUCTURE				
	SUBJECTS	ECTS	TYPE	Total ECTS
MODULE 1	Processes and Production of Furniture. Elective subjects. Choose five			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	E	
	Internet of Things (IoT)	2	E	
	Communication and Network	2	E	
	Sensors and Wearables. RFID and NFC	2	E	
	Robotics	2	E	
	Augmented reality	2	E	
	Simulation and 3D Scanning	2	E	
	Cloud computing and Big Data.	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. Elective 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	4	Other Components	
	Master Thesis			5
	Master Thesis	5	Other Components	
TOTAL ECTS:				40

Distribution of work between semesters

FIRST SEMESTER			SECOND SEMESTER		
SUBJECTS	TYPE	ECTS	SUBJECTS	TYPE	ECTS
Processes and Production of Furniture. Elective subjects. Choose five		16	Wood and New Materials. Elective 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	E	2	Innovation Management. Elective subjects. Choose two		4
Internet of Things (IoT)	E	2	Innovation management systems	E	2
Communication and Network	E	2	Technological surveillance and competitive intelligence.	E	2
Sensors and Wearables. RFID and NFC	E	2	Management Systems. Lean manufacturing	E	2
Robotics	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.	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			

Methodological aspects

Resources and Tools to be used

Training Methodology

Face to Face Lectures.
Practice Lessons (Laboratory).
Independent Learning
Others.

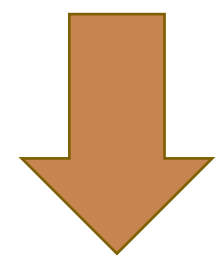


Teaching Materials

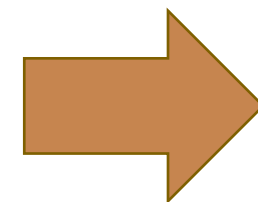
Guide for teachers
Coursebook for Students
Power Points to be used in Lectures
Practical laboratory exercises specific to each subject.

Validation of the Joint Curriculum

SURVEY FOR SEMINARS



<https://cutt.ly/Ce9U8JT>



SCAN ME





Thanks! - Terima kasih!

