Development of a joint study program between higher education and vocational education and training: International Master's Degree for the FUrniTURE Sector and Transversal Capacities.

O2-A2 Definition of learning content modules

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INDEX

1. INTRODUCTION

The aim of "IM-FUTURE" is to develop the content for an International Masters' Degree in the furniture sector

This activity was focused on breaking down the learning pillars into smaller and more manageable training modules and units. The objective is that the granularity of the modules will be such that student and companies can meet all their needs, assuring that no unnecessary training is received.

Each partner has participated in this definition according to their expertise and best practice training (face to face, on-line, slides, video, etc.). The training modules are going to be organised according to analysis of priority order and local requirements. It is going to be reflected the results of the research and survey that it was done in IO1

In previous IO, the partnership has received feedback about the necessities from the industry by surveys and workshops in UK, Spain, Poland and Italy. Finally, it was received more than 300 professional contributions. Moreover, the partnership has studied the current educational offer in HE in furniture sector in 22 countries (Austria, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Italy, Latvia, Lithuania, Malta, Netherland, Poland, Portugal, Ireland, Romania, Slovakia, Slovenia, Spain, Sweden, UK) and, also it was studied in those 22 countries the educational offer in VET in furniture sector.

That information has been used to design the structure of the Master, training paths and training modules and units. Obviously, it was need a restructuration of the contents when the structure of the Master and modules, subjects and units were fixed because they had duplicate content and it was not organized in a comprehensible and training way.

In this report, you can find the structure of the Master, their modules, subjects and units with an explanation of each one.

Finally, it is using some terminology that it is necessary to know to understand properly the structure of the Master:

- Master is the whole content that we will develop

- Training paths, the different possibilities inside the Master – 60 ECTS

- Modules, are made to regularize the contents of the Master and make its structure and Training paths easier to be understood. For example: "Furniture design history" and "Design" is a Module

- Subjects, for example "Quality control". Subject is a branch of knowledge studied or taught. It will be referred to an important part of the contents of furniture sector. Inside a subject, the

content will have a common structure. Each subject has a number of ECTS, depending the number of hours to acquire the required knowledge, skills and competences.

- Units, inside each subject, for example "Material properties, construction, product development including proto-types". Each unit could have a "powerpoint"

- ECTS: European Credit Transfer and Accumulation System. It is a standard mean for comparing the volume of learning based on the outcomes and their associated workload. It is considered 25 hours per credit point (because we are considering an academic year of 1500 hours of total workload and 60 ECTS credit). Moreover, the ECTS is split in 40% of teaching content, 40% of student work and 20% of tutorship and exam, in conclusion, 10 hours of teaching content, 10 hours of student work and 5 hours of tutorship and exams.

2. PARTNERS

An International Masters' Degree in the furniture sector which is being developed in this European project (2016-1-UK01-KA203-024438) is a joint programme with different partners who are in charge of constructing the structure and the content of that International Master (they have intervened in this report):

P1	BUCKINGHAMSHIRE NEW UNIVERSITY (Coordinator)	*BUCKS*	*UK*
P2	BRITISH FURNITURE MANUFACTURERS	*BFM*	*UK*
P3	UNIVERSIDAD DE MURCIA	*UM*	*ES*
P4	ASOCIACIÓN EMPRESARIAL CENTRO TECNOLÓGICO DEL MUEBLE Y LA MADERA DE LA REGIÓN DE MURCIA	*CETEM*	*ES*
P5	UNIVERSITA DEGLI STUDI DI CAMERINO	*UNICAM*	*IT*
P6	CONSORZIO DEL MOBILE	*COSMOB*	*IT*
P7	SZKOLA GLOWNA GOSPODARSTWA WIEJSKIEGO	*WULS*	*PO*




3- ABOUT THIS DOCUMENT

This document presents a preliminary framework of an International Master´s degree for the furniture sector, including modules, subjects, units, abstracts. Changes may be necessary because Master could evolve during the development of the contents. For that, the distribution of the Master in this document is considered as a Draft.

- Point 4, there are an explanation about the main structure of the Master with the number of modules, subjects and units
- Point 5 and Point 6, these points are focused in the selection of the modules and subjects according precious steps of the project
- Point 7 is focused in the structure of the subjects
- Point 8 is referring to the responsible and collaborators entities in the moment of develop the content
- In Point 9 could be found the modules which are composing the Master
- Point 10 is about the 5 possible learning paths
- Finally Point 11 is focused in each subject with their content, units and knowledge, skills and capacities you could acquire.

4- STRUCTURE OF THE MASTER

The Master, after studying the different possibilities and the received sector recommendations in previous output, it was decided that the following structure is the one which could have the best results:

- 5 training paths: Production, Business, Design, Research and No specialization

- 4 Main modules (compulsory) and 6 optional modules (10 modules in total), and Practices and Dissertation

- 18 Subjects (including Practices and Dissertation inside)

- 84 ECTS in total for a Master of 60 ECTS (one year)

It was created a draft structure of the Master with the following steps: Main Modules + Optional Modules + Practices + Dissertation

Main Modules will have 21 ECTS, Practices 12 ECTS and Dissertation 9 ECTS. At Optional Modules the student has to select 18 ECTS

It will be created 6 different Optional Modules with the composition of 2 linked subjects. According to that Optional Modules, it will stablish the 5 different Learning Paths (Production, Business, Design, Research and No specialization)

Subjects of the Master were selected to add to the student curriculum the needed knowledges and skills has consensus according the survey and desk research that it was done in previous steps of this project.

5- SELECTION OF THE FUNDAMENTAL MODULES

The main modules were selected according the consensus of the sector with the obtained information in previous output.

It was selected 4 fundamental modules (or common to every students) which will be compulsory but no each one with have the same number of credits:

- Production engineering – technology, process & maintenance – 7,5 ECTS

- Production – scheduling and planning – 7,5 ECTS

- Innovation, product & process improvement systems – 3 ECTS

- Fundamentals of enabling technology applications – 3 ECTS

The 3 first modules were the most selected ones to be included in a Master Degree for the furniture sector at the survey and according the sector it has to be incorporated into the master

("Production engineering – technology, process & maintenance" with 98% of votes, "Innovation, product & process improvement systems" with 97% and "Production – scheduling and planning" with 96%). "Fundamentals of enabling technology applications" has a really strong support of 88% in the survey but it is slight smaller than other subjects, but in spite of this, it is considered by the consortium as an important tool for achieving the development of a Master which is looking to the future.

These fundamental modules represent 21 ECTS (60 ECTS are the total)

6- SELECTION OF THE OPTIONAL MODULES / SUBJECTS

It is needed, at least, 18 ECTS of Optional Modules which will free to be selected by the students in their curriculum among the optional subjects.

The possible subjects that it would be integrating the Optional Modules are the following:

- Operations, business, & process management – 3 ECTS
- Materials management – 3 ECTS
- Furniture design history – 3 ECTS
- Design – 3 ECTS
- Quality control – 3 ECTS
- Workplace, leadership & personal effectiveness competences – 3 ECTS
- Logistics, warehouse, distribution & supply chain management – 3 ECTS
- Sales and Marketing – 3 ECTS
- Furniture process – 3 ECTS
- Industrial Property Rights and Entrepreneurship – 3 ECTS

Moreover, in order to prepare the students to the furniture research field, it would be added two additional subjects:

- Information Search and Retrieval – 6 ECTS
- Investigation Methodology – 6 ECTS

Each one of the 10 first optional subjects have 3 ECTS but ISR and Investigation methodology have 6 ECTS. These subjects will constitute 6 different modules of 2 unbreakable subjects; in fact, the student has to select modules and not subjects.

The selection of subjects to be part in the Master were done according the results of desk research and surveys across Europe and mainly in UK, Spain, Poland and Italy. In fact "Materials management" (the name of this subject is changed to "Materials") and "Quality control" were

selected to be included in a Master Degree for the furniture sector by 95% of the sample, "Operations, business, & process management" was selected by 94%, "Fundamentals of making & finishing" (the name of this subject is changed to "Furniture Process" to be clearer and more attractive) and "Workplace, leadership & personal effectiveness competences" were selected by 92%, "Logistics, warehouse, distribution & supply chain management" was selected by 90%. With these 6 subjects (and the compulsory ones), it is included in the curriculum of the Master, any subject that the sector has concluded that it has to be included by beyond 90% of professionals. But this joint Master needs to be complemented by other subjects, to be completed, for that it is included a subject of "Fundamentals of design and furniture design history" (selected by 87%), but the consortium thought that it will be really extensive in this way and it is better to be split in two different subjects: "Furniture Design History" and "Design". It is necessary to add a subject about "Sales and Marketing", in that case, it is included 2 subjects of the survey in 1 ("Marketing" was selected by 87% and "Sales" by 84%). Finally it is added "Industrial Property Rights and Entrepreneurship" which it is inside "Fundamentals of standards – regulatory and technical", it was selected by 86%

According to this, it is added to the Master every important request of the furniture sector (beyond 87%), making it to be closest to the professionals of the sector and ensuring that the Master addresses the needs of furniture community, indeed, it is a strong potential to make sure the sustainability. Moreover, it has to take into account that they are involved 4 universities of different countries, 2 VET providers and business representatives.

Finally, it is added to the curriculum "Information Search and Retrieval" and "Investigation Methodology", as important step to train professionals in Research and Development (R&D), which have a positive correlation with firm productivity. It is proved that new developments, materials, designs… is a crucial factor in the sector.

7- SUBJECTS FRAMEWORK

These subjects will have a similar framework to facilitate the study of the learners and their acquisition of knowledge and skills. Each subject will have, at least:

- Structure of different units inside each subject. Each unit will have an independent e-learning content to work in, learners could access to this content through e-learning platform which is developing in IO3

- Base support document with the development of the explanation of the subject. That document could be used by the student to achieve the required knowledge of this subject. The content will be ample and easy to understand without any extra support.

- Knowledge, skills and competences to be acquired or developed in the module

- Practical exercises in order that the learner could acquire skills or competences related to this subject and put into practice the achieved knowledge

- Assessment criteria of the subject with different suitable questions

Subjects and units will have different type of material according the necessities: videos, slides, bibliographic material, hands-on training sessions…

The content of the modules, subjects and units will be done in English, however the consortium will analize the possibility of releasing some of the content in Spanish, Italian and Polish depending the necessities but the consortium agrees that it is a considered a language training for the learners to do the whole master in English. In this case, it will be possible for the students to learn professional terminology in English and it will be easier to improve their possibilities of working abroad. In spite of this, at least, the abstracts of each subject will be done in Polish, Italian and Spanish too.

8- DEVELOPMENT OF THE CONTENT

Each unit will be carefully reviewed and improved to make ensure a smooth transition between the different units in order that the subject has an internal consistency and without any redundant or missing part.

The development of each subject will be assigned to a consortium partner according their expertise as leader, the rest of partners will contribute to those subjects but following the instructions of the Subject Leader.

8.1. LEADERS AND COLLABORATORS OF THE MODULES / SUBJECTS

	BUCKS	CETEM	UNICAM	COSMOB	UM	BFM	WULS
Production engineering – technology, process & maintenance (FM)	**LEADER**	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB
Production – scheduling and planning (FM)	COLLAB	**LEADER**	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB
Innovation, product & process improvement systems (FM)	COLLAB	**LEADER**	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB
Fundamentals of enabling technology applications (FM)	COLLAB	COLLAB	COLLAB	**LEADER**	COLLAB	COLLAB	COLLAB
Operations, business, & process management (OS)	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB	**LEADER**

Materials (OS)	COLLAB	COLLAB	COLLAB	**LEADER**	COLLAB	COLLAB	COLLAB
Furniture design history (OS)	**LEADER**	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB
Design (OS)	COLLAB	COLLAB	**LEADER**	COLLAB	COLLAB	COLLAB	COLLAB
Quality control (OS)	COLLAB	COLLAB	COLLAB	**LEADER**	COLLAB	COLLAB	COLLAB
Workplace, leadership & personal effectiveness competences (OS)	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB	**LEADER**
Logistics, warehouse, distribution & supply chain management (OS)	COLLAB	**LEADER**	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB
Sales and Marketing (OS)	**LEADER**	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB
Furniture process (OS)	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB	**LEADER**
Industrial Property Rights and Entrepreneurship (OS)	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB	COLLAB	**LEADER**
Information Search and Retrieval (OS)	COLLAB	COLLAB	COLLAB	COLLAB	**LEADER**	COLLAB	COLLAB
Investigation Methodology (OS)	COLLAB	COLLAB	COLLAB	COLLAB	**LEADER**	COLLAB	COLLAB

FM: Fundamental Modules

OS: Optional Subjects

COLLAB: Collaborator

9- MODULES IN THE MASTER

Modules are made to regularize the contents of the Master and make its structure easier to be understood. The 4-compulsory subjects of the beginning will be a fundamental module by itself:

MODULE 1 (FM): Production engineering – technology, process & maintenance – 7,5 ECTS

MODULE 2 (FM): Production – scheduling and planning – 7,5 ECTS

MODULE 3 (FM): Innovation, product & process improvement systems – 3 ECTS

MODULE 4 (FM): Fundamentals of enabling technology applications – 3 ECTS

Fundamental Modules are forming the Main part of the Master; this compulsory part has 21 ECTS.

The rest of the subjects are Optional and they are part of possible selected Modules to follow the different learning paths. Specifically, it has been built 6 different Modules, with unbreakable subjects. The connection of the subjects in one module has been done according their similarities and joint content

MODULE 5 (OM): 6 ECTS

SUBJECT 1: Operations, business, & process management – 3 ECTS

SUBJECT 2: Quality control – 3 ECTS

MODULE 6 (OM): 6 ECTS

SUBJECT 1: Furniture design history – 3 ECTS

SUBJECT 2: Design – 3 ECTS

MODULE 7 (OM): 6 ECTS

SUBJECT 1: Materials – 3 ECTS

SUBJECT 2: Furniture process – 3 ECTS

MODULE 8 (OM): 6 ECTS

SUBJECT 1: Logistics, warehouse, distribution & supply chain management – 3 ECTS

SUBJECT 2: Sales and Marketing – 3 ECTS

MODULE 9 (OM): 6 ECTS

SUBJECT 1: Workplace, leadership & personal effectiveness competences – 3 ECTS

SUBJECT 2: Industrial Property Rights and Entrepreneurship – 3 ECTS

MODULE 10 (OM): 12 ECTS

SUBJECT 1: Information Search and Retrieval – 6 ECTS

SUBJECT 2: Investigation Methodology – 6 ECTS

The learner has to select 18 ECTS of the OM (Optional Modules), in total Master has 42 ECTS of Optional Subjects.

Additionally, Master has two extra components in order of the needed 60 ECTS

PRACTICES – 12 ECTS

DISSERTATION – 9 ECTS

According to this, the learner has to follow the next structure to obtain the certification of this Masters' Degree in the furniture sector.

Master	ECTS
FUNDAMENTAL MODULES	21
OPTIONAL MODULES	18
PRACTICES	12
DISSERTATION	9

10- LEARNING PATHS

In accordance with the selected subjects, it has built different learning paths that the learner could chose to build their knowledge, skills and competences in the matters that they prefer according their necessities.

PRODUCTION SPECIALIZATION

In this specialization, besides of the main training, the student is receiving information closer to how the piece of furniture is produce; it is included the study of the production management process, the control of the quality in raw material, semi-finished and finished products,

introduction of new technologies in the production, selection of appropriate materials and their properties, how to understand technical specifications, eco-sustainability in production process, tools and machinery. Finally, it is added other concepts as leadership skills, more connected to improve the employment relationship, and principles related with the protection of intellectual property and entrepreneurship.

MODULE 1 (FM): Production engineering – technology, process & maintenance – 7,5 ECTS

MODULE 2 (FM): Production – scheduling and planning – 7,5 ECTS

MODULE 3 (FM): Innovation, product & process improvement systems – 3 ECTS

MODULE 4 (FM): Fundamentals of enabling technology applications – 3 ECTS

MODULE 5 (OM): 6 ECTS

SUBJECT 1: Operations, business, & process management – 3 ECTS

SUBJECT 2: Quality control – 3 ECTS

MODULE 7 (OM): 6 ECTS

SUBJECT 1: Materials – 3 ECTS

SUBJECT 2: Furniture process – 3 ECTS

MODULE 9 (OM): 6 ECTS

SUBJECT 1: Workplace, leadership & personal effectiveness competences – 3 ECTS

SUBJECT 2: Industrial Property Rights and Entrepreneurship – 3 ECTS

PRACTICES – 12 ECTS

DISSERTATION – 9 ECTS

DESIGN SPECIALIZATION

In this specialization, besides of the main training, the student is receiving information closer to how it is thought a piece of furniture and how it is created the draft or model according to that idea; it is included the use of ICT in the development of design project, the application of creative strategies, the design history, the study of methods for the realization of virtual prototypes, also, selection of appropriate materials and their properties, how to understand technical specifications, eco-sustainability in the design process. Finally, it is added other concepts as leadership skills, more connected to improve the employment relationship, and principles related with the protection of intellectual property and entrepreneurship.

MODULE 1 (FM): Production engineering – technology, process & maintenance – 7,5 ECTS

MODULE 2 (FM): Production – scheduling and planning – 7,5 ECTS

MODULE 3 (FM): Innovation, product & process improvement systems – 3 ECTS

MODULE 4 (FM): Fundamentals of enabling technology applications – 3 ECTS

MODULE 6 (OM): 6 ECTS

SUBJECT 1: Furniture design history – 3 ECTS

SUBJECT 2: Design – 3 ECTS

MODULE 7 (OM): 6 ECTS

SUBJECT 1: Materials – 3 ECTS

SUBJECT 2: Furniture process – 3 ECTS

MODULE 9 (OM): 6 ECTS

SUBJECT 1: Workplace, leadership & personal effectiveness competences – 3 ECTS

SUBJECT 2: Industrial Property Rights and Entrepreneurship – 3 ECTS

PRACTICES – 12 ECTS

DISSERTATION – 9 ECTS

BUSINESS SPECIALIZATION

In this specialization, besides of the main training, the student is receiving information closer to manage the company, it is more connected to financial results of the organization, obviously it is included aspects of production and design in order to the better understanding of the whole process. Also, it is included the operations strategy, business management, the examination of the benefits, company management, control of the quality, storage and warehouse functions, make inventories, orders, implementation of a WMS, make a supply chain strategy, how to apply marketing tools. Finally, it is added other concepts as leadership skills, more connected to improve the employment relationship, and principles related with the protection of intellectual property and entrepreneurship.

MODULE 1 (FM): Production engineering – technology, process & maintenance – 7,5 ECTS

MODULE 2 (FM): Production – scheduling and planning – 7,5 ECTS

MODULE 3 (FM): Innovation, product & process improvement systems – 3 ECTS

MODULE 4 (FM): Fundamentals of enabling technology applications – 3 ECTS

MODULE 5 (OM): 6 ECTS

SUBJECT 1: Operations, business, & process management – 3 ECTS

SUBJECT 2: Quality control – 3 ECTS

MODULE 8 (OM): 6 ECTS

SUBJECT 1: Logistics, warehouse, distribution & supply chain management – 3 ECTS

SUBJECT 2: Sales and Marketing – 3 ECTS

MODULE 9 (OM): 6 ECTS

SUBJECT 1: Workplace, leadership & personal effectiveness competences – 3 ECTS

SUBJECT 2: Industrial Property Rights and Entrepreneurship – 3 ECTS

PRACTICES – 12 ECTS

DISSERTATION – 9 ECTS

RESEARCH SPECIALIZATION

In this specialization, besides of the main training, the student is receiving information closer to the investigation in the furniture field. It is proved that new developments, materials, design… are crucial factors in the sector. It is necessary to reinforce the connection between science and furniture sector. It is included how to seek information, how to establish objective in the search of information, the scientific method, development of an investigation, how to share the results. Moreover, it will be added aspects of other learning paths, focused in the interests of the student about their future specialization inside the furniture field.

MODULE 1 (FM): Production engineering – technology, process & maintenance – 7,5 ECTS

MODULE 2 (FM): Production – scheduling and planning – 7,5 ECTS

MODULE 3 (FM): Innovation, product & process improvement systems – 3 ECTS

MODULE 4 (FM): Fundamentals of enabling technology applications – 3 ECTS

MODULE 10 (OM): 12 ECTS

SUBJECT 1: Information Search and Retrieval – 6 ECTS

SUBJECT 2: Investigation Methodology – 6 ECTS

MODULE 5, 6, 7, 8 or 9 (OM): 6 ECTS

SUBJECT 1: – 3 ECTS

SUBJECT 2: – 3 ECTS

PRACTICES – 12 ECTS

DISSERTATION – 9 ECTS

NO SPECIALIZATION

The students could select the modules that they think more useful for their future integration into the workforce of the sector. In this case, they are learning about different areas according their personal interests.

MODULE 1 (FM): Production engineering – technology, process & maintenance – 7,5 ECTS

MODULE 2 (FM): Production – scheduling and planning – 7,5 ECTS

MODULE 3 (FM): Innovation, product & process improvement systems – 3 ECTS

MODULE 4 (FM): Fundamentals of enabling technology applications – 3 ECTS

MODULE 4, 5, 6, 7, 8 or 9 (OM): 6 ECTS

SUBJECT 1: – 3 ECTS
SUBJECT 2: – 3 ECTS

MODULE 4, 5, 6, 7, 8 or 9 (OM): 6 ECTS
SUBJECT 1: – 3 ECTS
SUBJECT 2: – 3 ECTS

MODULE 4, 5, 6, 7, 8 or 9 (OM): 6 ECTS
SUBJECT 1: – 3 ECTS
SUBJECT 2: – 3 ECTS

PRACTICES – 12 ECTS

DISSERTATION – 9 ECTS

11- BREAKING DOWN MODULES, SUBJECTS AND UNITS

MODULE 1 (FM): Production engineering – technology, process & maintenance – 7,5 ECTS

LEADER TO DEVELOP CONTENTS: BUCKINGHAMSHIRE NEW UNIVERSITY

Engineering: Production technology, process & maintenance module is exploring Engineering: origins, methods, context. It explores some key principles of engineering, while helping students to improve their study skills and develop as an independent learner. Scientific and mathematical skills are both essential tools for engineering. They form a major part of this module and are included and practised throughout, with the engineering topics providing a clear context for their application. Engineering is all about innovation, engineers are also required to work to many standards, and health and safety are essential considerations. This module examines examples of standards and be introduced to some key principles of production technology and process. Module explore how the materials used in manufacturing products are obtained and transformed, from extraction from natural resources through to final use.

Also, this module includes aspects of engineering analysis, design and modelling methods, and uses appropriate mathematical software for each. Analytical, communication and learning skills

necessary for all engineering disciplines are developed in a context that provides grounding for higher-level, more specialized study.

UNITS

- ***UNIT 1: Material properties, construction, product development including proto-types***
- ***UNIT 2: Production technology, production optimization***
- ***UNIT 3: Production organisation and business administration***
- ***UNIT 4: Mechanical engineering and automation***
- ***UNIT 5: Maintenance management and tracking programs***
- ***UNIT 6: Eco-sustainability including 'design-for-life'***

MODULE/SUBJECT: **PRODUCTION ENGINEERING – TECHNOLOGY, PROCESS & MAINTENANCE**		
Knowledge	**Skill**	**Competence**
• Explain why it is important to design interactive products that are usable. • Define key terms used in engineering design. • Explain key theories used in the design of engineering products. • Describe different techniques for involving users in the design of engineering products. • Explain the importance of iteration, evaluation and prototyping in engineering design. • Discuss theoretical or empirical evidence supporting a list of	• Management of learning and ability to reflect on development as an independent learner. • The ability to use specialist knowledge to solve problems creatively • Effective communication skills • Project management skills • The ability to turn concepts into reality • Evaluate an interactive product using suitable techniques. • Perform data gathering in the context of	• Carry out research and apply creative strategies for generating design ideas • Conceptualise and develop design ideas through drawing and modelling • Carry out critical observations on the factors that influence the creation of designs around you

engineering design principles. • Discuss accessibility issues for engineering products.	developing a simple engineering product using suitable techniques • Communicate effectively to peers and specialists about requirements, design, and evaluation activities relating to engineering products.	

MODULE 2 (FM): Production – scheduling and planning – 7,5 ECTS

LEADER TO DEVELOP CONTENTS: CENTRO TECNOLÓGICO DEL MUEBLE Y LA MADERA DE LA REGIÓN DE MURCIA

The Production-Scheduling and Planning module is a basic material for the management and direction activities in companies that work in the furniture sector, and therefore its knowledge is fundamental for the training of the students that take this course.

The main objective of the subject is to transmit the knowledge of the production area, which is the heart of the company, and that if it can be handled properly; it can achieve great competitive advantages.

The Production Scheduling and Planning module aims to be a subject that shows the main types of Production Programming problems at an operational level both for a long time horizon (year or year and a half), and for a relatively short time (weeks or days) and that gives the student tools and capabilities to solve them.

The module has a theoretical and practical approach since, on the one hand is intended that students understand the complexity of the problems to solve it and difficulties to address it and on the other you are offered tools, both academic and originating in the business reality, to obtain solutions to them.

At the end of the course the student must have achieved two generic objectives of similar relevance:

- Recognize the basic problems of production programming, understood the way in which resources are assigned and programmed in the different departments that have a close relationship with the production systems and operations of the company.
- Know how to use different tools for each scenario that allow to obtain maximum efficiency and effectiveness and to solve them in a satisfactory way.

Through this module we present a modern overview on the proper management of the functioning of the Productive System of a company in the furniture sector and its coordination with customers (demand, orders) through different approaches, which will help to achieve and preserve a competitive advantage for the company.

Demand forecasting with statistical methods (moving averages, exponential smoothing, regression, etc.), the planning of both aggregate and master production, material requirements planning systems and capacity management will be addressed.

After completing this course, students must achieve an understanding of the essential concepts of production planning in the field of the company in the furniture sector and related organizations.

The student will be able to identify the different problems that arise in the production department of a company in the furniture sector and will have a sufficient knowledge base to apply the different tools that are provided to solve them.

They will have the capacity to make decisions on key aspects such as the process, process time, industrial capacity and workforce that must be developed in the normal course of a company in the sector.

They must be able to apply the basic knowledge of the profession and relate them to production management, fostering the development of generic skills and competencies such as teamwork, problem solving and decision making.

UNITS

- ***UNIT 1: Demand management and forecasting***

  Specific statistics for forecasting demand through objective methods:

  TEMPORAL SERIES

  - Smoothing
    - Moving averages
    - Exponential Smoothing
  - Of Decomposition
    - Brow, Holt, Winters
    - Classic Multiplicative
    - Box Jenkins Univariate

  ASSOCIATIONS

  - Regression
  - Box Jenkins No Univariate

- ***UNIT 2: Scheduling techniques and control***

  Explain existing types of production planning:

  - With forecast of the demand: Aggregate Planning, Master Production Plan, Material Requirement Plan...

- No demand forecast: Just in Time System...

- ***UNIT 3: Aggregate Planning (AP)***

  Aggregate Planning: Aggregate planning addresses labor force determination, production quantity, inventory levels, and external capacity, to meet the requirements for a medium-term planning horizon (6 to 18 months).

- ***UNIT 4: Master Planning (MPS)***

  MPS is an operative decision regarding the articles and quantities that must be manufactured in the next planning period. Their characteristics are:

  - Determine what should be done and when
  - It is established in terms of specific products and not in families
  - It is a decision of what is going to take place, not a more prognosis

- ***UNIT 5: Capacity Resource Planning (CRP)***

  In this subject we are going to study the planning of resources, both machine and man, necessary to realize in a set time a whole series of works assigned to a productive center.

- ***UNIT 6: Material requirements planning (MRP)***

  In this subject we are going to study a production planning, scheduling, and inventory control system used to manage manufacturing processes.

- ***UNIT 7: Risk management. Theory of Constraints (TOC)***

  In this subject we are going to study a theory that tries to reduce or eliminate the bottlenecks of the productive system.

- ***UNIT 8: Improvement of Plant Layout***

  In this subject we are going to study a theory and technique to improve the productivity of the company by improving the distribution of the production plant.

MODULE/SUBJECT: **PRODUCTION- SCHEDULING AND PLANNING**		
Knowledge	**Skill**	**Competence**
• Specific statistics for forecasting demand through objective methods. • Knowledge about existing types of production planning with the demand forecast (Aggregate Planning, Master	• Performing a forecasting demand of a specific product used to do it a historical database. • Ability to distinguish different production system depending on the demand and temporal horizon.	• Develop different forecasting of the demand for different products in the furniture sector using historical sales. • Implement different production planning system in a company of the furniture sector

Production Plan, Material Requirement Plan ...) and no demand forecast (Just in Time system). Knowledge to use and implement the aggregate Production Plan. • Knowledge about the operation, advantages and disadvantages and implementation of production Scheduling and Planning systems such as: Production Aggregate Plan, Production Master Plan, Materials Requirement Planning and Capacity Requirements Planning. • Knowledge basic about theory of constraints and improvement of layout of industrial plants.	• Adapt and create different production planning systems such as: Production Aggregate Plan, Production Master Plan, Materials Requirement Planning and Capacity Requirements Planning. • Analyze and identify improvements in the field of the theory of constraints and layout of production plants.	such as: Production Aggregate Plan, Production Master Plan, Materials Requirement Planning and Capacity Requirements Planning. • Manage and optimize the different resources of a company to meet the sales deadline of the production of any product in the furniture sector. • Implement and execute improvement plans related to the theory of restrictions and the layout of the production plant in the furniture sector.

MODULE 3 (FM): Innovation, product & process improvement systems – 3 ECTS

LEADER TO DEVELOP CONTENTS: CENTRO ECNOLÓGICO DEL MUEBLE Y LA MADERA DE LA REGIÓN DE MURCIA

In a globalized environment like the current one, in which the importance of information and knowledge inside the organization is increasingly important, managing them efficiently can be the greatest of our competitive advantages.

This growing complexity of the business environment is forcing both commercial and scientific organizations, private and public, to have suitable information management systems according their information needs environment. However, organizations are affected by their ability to manage and take advantage of both information and strategic knowledge, so it is vital to identify what they really need, know it, catch it, analyze it, and disseminate and prioritize correctly in the organization, in order to guide, in a proper way, the policy-making and detect new business opportunities.

Technological surveillance is, therefore, an essential tool for detecting opportunities about technological innovation and new ideas to facilitate the introduction of improvements in the processes, products and / or organization services.

Technological surveillance is a systematic business practice, oriented to the search and to the analysis of scientific and technological information, that information about the environment could be useful in the moment of taking certain decisions, and increasing the chances of anticipating possible changes and improving the business.

It is an indispensable practice that is often perform without being totally aware of it, and, therefore, it is made in an unstructured way, for that, learning to manage it is crucial for the s organization strategy.

The general objectives of the Technological Surveillance module are based on:

- Define Surveillance in general and Technological Surveillance and Competitive Intelligence according to the UNE EN 166000 standard.
- Know about typologies of modern sources of information: patents, databases.
- Knowledge about the data and text mining, and its role in the Surveillance / Intelligence process. – Awareness of the applications of the Surveillance / Intelligence from real cases and studies developed in several industrial sectors.
- Define and characterize the function of intelligence in the company.
- Know about the usefulness of Technological Surveillance Systems and Competitive Intelligence as an essential aspect for continuous innovation.
- Develop specific competences on the main components of the process of acquiring and processing information about the competitive environment of the company.
- Use the basic and advanced techniques that allow defining and anticipating the events of the competitive environment, critical for the success of the company.
- Learn the method to respond correctly to strategic, business and operational intelligence requests from decision makers.
- Use the methodology for its implementation in an organization.

At the end of the Technological Surveillance module, the student should be able to:

Apply the methodology and tools -basic and advanced techniques for the identification, systematic collection and analysis of critical information of the environment- of the Surveillance and Competitive Intelligence in order to achieve the development and innovation of existing products or processes, for the diversification towards new products or markets and for making strategic business decisions.

UNITS

- **UNIT 1: Technological surveillance & information management**

- Introduction to technological surveillance

- Design of a technological surveillance system

- Software Surveillance Technology

- **UNIT 2: Innovation management & systems**

MODULE/SUBJECT: **INNOVATION, PRODUCT & PROCESS IMPROVEMENT SYSTEMS**		
Knowledge	**Skill**	**Competence**
• Basic computer knowledge (word processors, databases, etc.): user level. • Use consulting techniques • Statistical analysis system software. • Data mining • Data models	• Advise on efficiency improvements • Align efforts towards business development • Analyse the context of an organisation • Create a work atmosphere of continuous improvement • Develop company strategies • Gather technical information • Interpret business information • Use consulting techniques • Perform data analysis • Provide improvement strategies	• Planification and organization. • Learning and use of knowledge. • Analytical thinking • Initiative. • Achievement orientation. • Strategic orientation.

MODULE 4 (FM): Fundamentals of enabling technology applications – 3 ECTS

LEADER TO DEVELOP CONTENTS: CONSORZIO DEL MOBILE SCPA

The goal of a higher industrial automation, integrating new production technologies to improve working conditions and to increase productivity and quality of the plants, is summed up with the term Industry 4.0. This latter applies to a set of rapid transformations in design, operation and service in the area of manufacturing systems and products. Designation 4.0 indicates that it is the fourth world industrial revolution, the successor to the three previous industrial revolutions that brought about great advances in productivity and changed the lives of people around the world. More in detail, the objective is the complete transformation in few years of the entire spectrum of industrial production, through the fusion of digital technology and the Internet with the conventional industry. In short time, everything in or around manufacturing operations (suppliers, plant, distributors, even production itself) will be digitally connected, offering a value chain with a high level of integration. The concept of a new industrial revolution originated in Europe, but it overlaps extensively all over the world each time we speak about smart factories, the Internet of industrial goods, smart industry, advanced manufacturing and so on. Industry 4.0 depends on a series of new and innovative technological developments:

- The application of information and communication technologies (ICT) to digitize information and integrate systems at all stages of product creation and use (including logistics and procurement)
- Physical Cyber-Systems that use ICT to monitor and control physical processes and systems
- Network communications involving wireless and Internet technologies that serve to link machines, labour products, systems and people, both within the manufacturing plant and with suppliers and distributors
- Simulation, modelling and virtualization of product design and installation of production processes
- Collection of large amounts of data, and their analysis and exploitation, either immediately on the ground or through analysis of big data and cloud computing
- Broader ICT-based support for workers, including robots, augmented reality and intelligent tools

The transformations planned for the coming years will bring about changes in different areas ad several issues will be faced such as high costs for SMEs, big data management, web security, property rights and new professional skills: about this latter issue, Employers will need personnel with creativity and decision-making

Expertise, as well as technical and ICT competences. By 2020, labour markets in the EU could need as much as 825.000 ICT professionals; this shortage may be even more pronounced in advanced manufacturing settings where big data analysts and cybersecurity experts are required.

UNITS

- **UNIT 1: Materials requirements planning systems**
- **UNIT 2: Manufacturing resource planning systems**
- **UNIT 3: Sales Order Processing systems**
- **UNIT 4: 3-D visualization**
- **UNIT 5: 3-D printing (proto types)**
- **UNIT 6: Computer aided design (CAD)**
- **UNIT 7: Computer Aided Manufacture including cutting optimisation systems**
- **UNIT 8: Enterprise Resource Planning**
- **UNIT 9: Production Management Information Systems**
- **UNIT 10: Inventory Control Systems**
- **UNIT 11: Warehousing and Distribution Systems**
- **UNIT 12: Integrated Manufacturing and Distribution Systems**
- **UNIT 13: Customer relationship management systems**
- **UNIT 14: Integrated Accounting Systems**
- **UNIT 15: Internet of things**

MODULE/SUBJECT: **FUNDAMENTALS OF ENABLING TECHNOLOGY APPLICATIONS**		
Knowledge	**Skill**	**Competence**
• Big data • ICT • Domotics • Digital prototyping	• Basic knowledge of functioning of digital manufacturing technologies • Identification of best enabling technologies	• Technical (IT, engineering) • Statistical

	• to be integrated in furniture (sensors, automation) • Identification of best technological application for new business models	

MODULE 5 (OM): 6 ECTS

SUBJECT 1: Operations, business, & process management – 3 ECTS

SUBJECT 2: Quality control – 3 ECTS

LEADER TO DEVELOP CONTENTS:

SUBJECT 1: SZKOLA GLOWNA GOSPODARSTWA WIEJSKIEGO – WULS

SUBJECT 2: CONSORZIO DEL MOBILE – COSMOB

SUBJECT 1: Operations, business, & process management – 3 ECTS

Subject is a combination of engineering knowledge in the field of furniture production and modern forms of business management. The aim of the subject is to explain basic assumptions of production & business management and draw attention to the progress and evolution of production processes at all levels of the organization.

UNITS

- **UNIT 1: Operations strategy**

History of operations management. Development of operations strategies.

- **UNIT 2: Business Management**

Categorization of business management into design, modeling, execution, monitoring, and optimization. Re-enginering of businesses

- **UNIT 3: Manufacturing & finishing process environments**

Main types of manufacturing. Specific environment of furniture production. Design - product development – manufacturing – post-launch improvements.

- **UNIT 4: Standards (time measurement)**

Basics of time standardization, and application to workforce planning, line load balancing, MRP, wages, cost etc.

- **UNIT 5: Lean management**

Basics of lean management – lean production, maximizing value and minimizing waste. Types of waste. Demand-based flow manufacturing. Essential lean concepts and tools

- **UNIT 6: Process improvement**

Lean and six sigma process improvements method. Basics of statistics. Value mapping in process. Kaizen, Process mapping, 5S, Six sigma basics

- **UNIT 7: General sustainability**

Creation of business & manufacturing processes with caution to environmental effects. Conservation of energy & resources. Basics of environment protection. Sustainability goals. Sustainability as economic opportunity. Case studies of sustainable manufacturing.

- **UNIT 8: Total quality management**

Concept of Total Quality management. Basics of long term success as dependent on customer satisfaction. Deming's principles and diseases. Zero defect.

- **UNIT 9: Recycling opportunities**

Basics of recycling for the furniture and woodworking industry. Business possibilities.

SUBJECT: **OPERATIONS, BUSINESS, & PROCESS MANAGEMENT**		
Knowledge	**Skill**	**Competence**
• Defining the environment of the enterprise and examining the benefits this environment provides. • Identify new technologies • Understanding the nature of environmental protection • Knowledge of sources and disposal methods of waste.	• Ability to use all sources of information for the best analysis of the situation of the company's favourable solutions. • Implementation of new technologies and methods into furniture industry. • Assessment of the impact of the company's activities on the external environment	• Ability to manage company in accordance to current standards, improvement of the processes utilizing most of the lean production&management rules, with the rational use of natural resources.

SUBJECT 2: Quality control – 3 ECTS

Generally the consumer who wants to buy a new product gets information by sellers, advertisements and people. In parallel, information concerns aesthetical features (shape and colour) and prices.

On the other hand, the consumer does not know if a product is dangerous for health, its weight resistance, if there is an associated risk for children, the response to safety tests; moreover, the technical fiche related to a specific product is not so easy to be understood. For these reasons, the European Union, for 30 years, has been defining a project of economic politics with the aim to increase the level of trust between consumers and producers and in order to have a progressively higher quality level of products. The necessary subjects for the realization of this project are: regulatory boards, testing laboratory and institutions for system and product certification. The regulatory boards for the issue of the Technical Standards in national and international spheres are recognized by the public authorities and charged with the aim of ensuring the participation of all stakeholders: producers, traders, consumers, research institutes, governments, etc.

For each reference context, there is a specific of technical standards (World: ISO; European EN; Italy: UNI; France: ANFOR; Germany: DIN; UK: BS; U.S.A.: ANSI / BIFMA)

The importance of technical standards is related to identify, define and uniform the measurement criteria of technical features of products. Technical Standards is therefore a common language made available to technical and commercial operators in order to facilitate the free movement of products with defined and agreed characteristics.

It should be borne in mind and emphasized that the technical standards, national or international, are not a law; their legal force takes over when they are included as a clause in a supply contract or when national legislator organs turn them into laws, decrees and regulations of the state.

About quality control, the testing laboratory is generally an internal or external supporting structure, strictly connected with the company: each phase of the internal process such as design and manufacturing, in fact, can be related to a specific activity carried out by the laboratory.

This latter, operates to ensure the quality of manufacturing processes and finished products according to the technical standards. In this regard, in 2001 a European directive on general product safety was published; from that point, the subsequent legislative decrees on different issues (emissions of toxic substances, safety of workers, children and students, etc.) strengthen the bond with the technical rules, in order to increase the benefits both for producers and for consumers. A product, in fact, can be considered as safe when it complies with national and sectorial laws, as well as technical European standards; in case this latter are missing, the main

reference are the national standards in force within the country where a product is commercialized.

UNITS

- **UNIT 1: Principles of Total quality management (TQM) – customer – supplier interface**
- **UNIT 2: Quality improvement tools - six sigma/ flowcharts/ Pareto charts/cause-and-effect diagrams/control charts/check sheets/scatter diagrams/histograms**
- **UNIT 3: Continuous improvement**
- **UNIT 4: Statistical techniques**
- **UNIT 5: Standards registration**

SUBJECT: **QUALITY CONTROL**		
Knowledge	**Skill**	**Competence**
• Design fundamentals. • Features of raw materials, semi-finished and finished products • Manufacturing process	• Development of a master plan of technical standards for quality and safety of products • Identification of technical requirements for specific materials, products and processes • Definition of best practices to be implemented for quality products and processes	• Technical (chemical, physical, environmental) • Regulatory

MODULE 6 (OM): 6 ECTS

SUBJECT 1: Furniture design history – 3 ECTS

SUBJECT 2: Design – 3 ECTS

LEADER TO DEVELOP CONTENTS:

SUBJECT 1: BUCKINGHAMSHIRE NEW UNIVERSITY

SUBJECT 2: UNIVERSITA DEGLI STUDI DI CAMERINO – UNICAM

SUBJECT 1: Furniture design history – 3 ECTS

Exploring designs and designing sets the scene for the whole module. It looks at the relationship between people and products and discusses the human, cultural and engineering factors that influence the creation of designs. Creative design looks at the creative strategies that designers employ in order to address design problems, particularly strategies for idea generation in the early concept design phases. It also teaches some of the core theories of creativity. Embodying designs looks at the details of designs, the geometry and function of the parts that make up designs, the configuration of these parts and their impact on the overall form and function of a design.

In this module students will develop essential design skills and the knowledge that you need in order to identify and solve problems through design. Students will learn how to recognize needs and opportunities for design, how to generate ideas but also how to turn your ideas into detailed solutions.

UNITS

- **UNIT 1: Materials & making - themes in design history**

- **UNIT 2: History of furniture design**

SUBJECT: **FURNITURE DESIGN HISTORY**		
Knowledge	**Skill**	**Competence**
• The factors that drive the development of designs. • The design process and the issues that arise in the progression from conceptual to detailed design • Research methods and strategies for creativity used in design	• Make models to develop and communicate design ideas • Apply knowledge of research methods and creative strategies used in design • Respond to critical comments and feedback from others	• Respond to critical comments and feedback from others • Use ICT and digital media in the development of a design project • Apply methods and tools that professional designers use

SUBJECT 2: Design – 3 ECTS

This subject combines lectures with readings, class discussions, and a three-phased comprehensive assignment on the subject of smart and innovative design, focusing on furniture design, product design, and interior design. The course offers a introduction into the subject area of Smart and Innovative Design tethered to digital design and fabrication tools fueling today's 4th Industrial Revolution. The course is structured into three parts: a first theoretical part; a second that starts from a base design exercise (the design process) till the making of a final project; a collective presentation through which each student will show his smart and innovative furniture/ product/ interior projects.

UNITS:

- **UNIT 1 System Design for Sustainability (ecodesign)**
  In this unit we are going to study:
  - sustainable development and designer's role;
  - evolution of sustainability within design;
  - Life Cycle Design: methods, tools, strategies, guidelines and examples;
  - System (IPP) design for eco-efficiency: criteria, guidelines and examples

- **UNIT 2: Virtual and Physical Prototyping**
  In this subject we are going to study methods and techniques for the realization of virtual and physical prototypes and their use in the design considerating the engineering and validation of industrial products in their life cycle. At the end of the subject we will acquire knowledges on the product-oriented approach to virtual prototyping, on the product development process, on system architecture, and on the efficient and integrated use of methodologies and technologies based on the paradigms of Virtual and Physical Prototyping for the concept, definition, simulation, analysis and validation of products in various domains (industrial products, consumer products, fashion, communication, etc.). Topics include methods and technologies for virtual prototyping, advanced 3D modeling of products, photorealistic rendering, real-time stereo 3D visualization of products, rapid prototyping, CNC milling, robotics, smart-wraps, and other digital innovation / technologies.

- **UNIT 3- The Design Process (Formal synthesis of product)**
  In this subject we will study how to set up the skills to frame the problematic context in terms of project opportunities, constraints, possibilities, selection and hierarchy of priorities; to analyze the user-product interaction from the selection phase to the use phase up to the product disposal; to analyze artifacts and artefact systems in their formal, structural, functional, typological, morphological, relational, ergonomic

characteristics, etc. In the design synthesis phase, this knowledge is merged into the development-project activities that involve the ability to translate needs into product requirements; to define, based on the performances required of the product, the materials, the component parts, the construction technologies and the assembly methods; to relate product qualities with essential industrial production constraints, with compliance with regulatory provisions and safety requirements.

- **UNIT 4- Role of designer within the manufacturing process**

  This assignment is designed to guide redesign efforts (synthesis) in transforming the documented and analyzed product by retooling it into a more Smart and Innovative one. In this phase, we will explore, resolve, and present the transformed product side-by-side from the original to the documented product - discovering subtle or obvious characteristics of Smart design and Innovative design.

SUBJECT: **DESIGN**		
Knowledge	**Skill**	**Competence**
• Methodological tools for analytical study and critical understanding of the intrinsic qualities of an industrial product • To relate the form to the use for which it was conceived, to the technical modalities that have enabled its concrete realization • Develop a learning methodology related to the "project culture" • Methods and tools for system design for sustainability • Verification of the performances required of the product	• Creative and practical ability • Drawing skills and strong visual awareness • An understanding of computer-aided design (CAD) and other technological advances • Knowledge of industrial processes and techniques • Communication skills • The ability to work to deadlines • Collaborative skills, particularly if working in a multidisciplinary practice • Methods and tools for system design for sustainability	• The figure formed is a "technical project" that, at the conclusion of the training course, possesses the necessary skills to carry out the many technical-design activities of support and assistance to the project as it develops and is characterized at various stages ranging from the moment of concept, planning and control of the executive activity related to the realization of both the environments and the furniture design.

MODULE 7 (OM): 6 ECTS

SUBJECT 1: Materials– 3 ECTS

SUBJECT 2: Furniture process – 3 ECTS

LEADER TO DEVELOP CONTENTS:

SUBJECT 1: CONSORZIO DEL MOBILE – COSMOB

SUBJECT 2: SZKOLA GLOWNA GOSPODARSTWA WIEJSKIEGO – WULS

SUBJECT 1: Materials – 3 ECTS

With reference to the furniture sector, when we speak about materials, we mean various typologies such as glass, cardboard, metals, plastics and textiles of various kinds that are used in different ways generally combined with wood (solid or in the form of fibre or particleboard panels). Furthermore, we have to consider also binders, coatings and paintings since they are important elements for the realization of wood-based panels and/or in semi-finishing process.
Materials are an indispensable element of the furniture making process. Due to their significance in that framework, they are classified as:

- Basic: materials of fundamental importance, which create the basis for final product, i.e. a ready piece of furniture (they include materials of solid wood (such as sawnwood, veneers, glued furniture panels), composite wood materials (wood-based panels), and wood composites (wood and wood-based materials combined with non-wood materials),
- Complementary: finishing materials, which improve functional and aesthetic properties and design of furniture (foils, lacquers, wood stains etc.).

The selection of appropriate materials for the production of furniture has a bearing on the quality, durability, the possibility of renovation and application of final product.
Materials for the furniture industry can contain "novelties" of different nature. They can be connected with the changes of the production technology and material structures or properties and applications. The following things can play the role of a novelty carrier:

- New or improved materials (basic or complementary) for the production of furniture,
- New or improved/changed features and properties of materials for the production of furniture (such as: durability, strength, the possibility of renovation, functionality, eco-sustainability, etc.), which eventually also influence the features and properties of final products,

- New or changed applications of materials (basic and complementary) in the production of individual types of furniture, which most often also determine the applications of final products.

It's important to highlight that technical specification are required: in case of materials or final products a document containing technical requirements must be available. Sometimes technical specification also contains procedures for the evaluation whether the requirements are fulfilled.
Materials can also benefit of the application of digital technologies to improve logistics efficiency and operator activity through systems for their identification and location in warehouse operations, thus facilitating the preparation of production orders, storage of goods, replacement management, inventories, etc.
Another important aspect is the eco-sustainability and in particular the recyclability at the end of the product lifecycle, as well as the management and saving of raw materials. Such criticisms have recently been taken into account by the sector through the development of alternative solutions or the integration with other typologies of materials, a key element of innovation and implying the use of recycled, recyclable materials of natural origin and / or biodegradable such as cardboard, glass, cork, bamboo and leather. Market demands and the orientation of the Community legislative framework (e.g. Circular Economy) clearly show that this is the direction that companies must pursue.

UNITS

- **UNIT 1: Materials science and new materials**
- **UNIT 2: Converting demand requirements into schedules for inventory acquisition**
- **UNIT 3: Calculate key inventory performance metrics**
- **UNIT 4: Inventory management**
- **UNIT 5: Communications with suppliers and with company departments**
- **UNIT 6: Sustainability**

SUBJECT: **MATERIALS**		
Knowledge	**Skill**	**Competence**
• New materials. • Eco-sustainability of materials • Future trends	• Development a basis for systematization of new materials for the European furniture industry • Identification of new and eco-sustainable materials for the European furniture industry • Definition of future trends in the development of materials for the European furniture industry	• Technical (chemical, physical, environmental) • Economic

SUBJECT 2: Furniture process – 3 ECTS

Subject is specific to furniture industry. It provides basic information about whole production technology, beginning from material itself, going through processing of solid wood and wood based materials, including mechanical processing, finishing, assembly - up to the end of production, safe handling and storage.

UNITS

- **UNIT 1: Materials for furniture making**

  Subject contains basics of furniture-making materials, along with designation and basic specifications.

- **UNIT 2: Tools and machinery**

  Review of machinery and tooling used in furniture and woodworking industry.

- **UNIT 3: Solid wood processing**

  Topic describes technology of solid wood preparation for furniture industry needs

- **UNIT 4: Solid wood furniture**

  Review of technology and production techniques used in furniture made of solid wood. Traditional and contemporary joinery.

- **UNIT 5: Furniture made of panel products**

  Review of technology and production techniques used in furniture made of panel products, like particleboard, medium density fiberboard, etc. Edge banding, connectors.

- **UNIT 6: Uses and applications for veneers and laminates**

  Topic describes veneering and finishing of products by laminates

- **UNIT 7: Sanding**

  Description of machinery and tools used in sanding of wood and wood-based materials, like grit sizes, techniques, applications

- **UNIT 8: Gluing**

  Subject deals with glues and gluing techniques used in furniture making

- **UNIT 9: Fitting mechanical or electrical components to furniture**

  Mechanical and electro mechanical fittings in furniture, hinges, connectors, etc.

- **UNIT 10: Finishing**

  Technology of wood finishing, coating, paints, stains, varnishes, drying, polishing, pressing

- **UNIT 11: Assembling**

  Assembly of furniture, packaging of finished or self-assembly furniture

- **UNIT 12: Safe handling and storage**

  Rules of storage, transportation, handling of materials and ready furniture

SUBJECT: **FURNITURE PROCESS**		
Knowledge	**Skill**	**Competence**
• Basics of technology • Basics of material science • Mechanical processing of wood and wood based materials • Gluing technology • Finishing technology • Assembling, packaging and storage of finished products.	• Ability to work, understand and improve technology of furniture. • Ability to use knowledge of production stages in the production process.	• 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.

MODULE 8 (OM): 6 ECTS

SUBJECT 1: Logistics, warehouse, distribution & supply chain management – 3 ECTS

SUBJECT 2: Sales and Marketing – 3 ECTS

LEADER TO DEVELOP CONTENTS:

SUBJECT 1: CENTRO TECNOLÓGICO DEL MUEBLE Y LA MADERA DE LA REGIÓN DE MURCIA

SUBJECT 2: BUCKINGHAMSHIRE NEW UNIVERSITY

SUBJECT 1: Logistics, warehouse, distribution & supply chain management – 3 ECTS

The subject of "Logistics, Warehouse, Distribution and Supply Chain Management" is a basic material for the exercise of activities of management and direction of the logistics department in companies that work in the furniture sector, and therefore their knowledge is fundamental for the training of the students who take this course.

The area of Logistics currently represents one of the areas of greatest growth and interest for the furniture sector. Logistics includes all the activities necessary to move products and the flow of information among the members of a supply chain. These chains, which in complex cases become real networks, are the system used by companies to provide goods, services and

information to their external and internal customers. The efficient management of this chain or logistics network is today a great challenge for most companies given its importance in business competitiveness. For this reason, logistics has advanced to the operational management of warehouse and transportation to the strategic direction of the company.

In the current supply networks there is a tendency to reduce manufacturing centers and increase warehouses; this can be clearly seen in the furniture sector. Therefore, the purpose of this module is to provide the student with a global and practical view of the operation of the stores, so that they can take responsibility for its management and improvement.

This subject introduces the problems associated with the design and management of distribution networks in the internal supply chain. The different types of networks and the means of physical distribution or handling means most commonly used for efficient internal transport are described.

Thanks to this subject the students of this course will have full knowledge of the functions and types of warehouses that exist, how a Warehouse Management System works, the existing typology of inventories, their management and the calculation of the optimal batch for Deterministic demands and especially the process of despatching to the last detail giving special importance to the delivery note of in and out of the product.

After completing this subject, students must achieve an understanding of the essential concepts to organize the storage of goods under the conditions that guarantee their integrity and the optimal use of available media and spaces, according to established procedures.

Analyze the storage processes and stock management methods applicable in the organization of a warehouse, assessing the internal distribution and the handling system of the goods, applying the current regulations on safety and hygiene, guaranteeing their integrity and optimizing the available resources, to organize the storage of the goods.

Once completed this subject, the student will have full notions of knowledge required for the design, management and control of a warehouse of furniture and related sector.

UNITS:

- **UNIT 1: Business and supply chain strategy**

  In this subject we are going to study a definition and introduction to the logistics of the supply chain.

- **UNIT 2: Warehousing**

  In this subject we are going to study a definition of storage and warehouse functions and types.

- **UNIT 3: Warehouse management systems**

  In this subject we are going to study a definition, functions and advantages of a Warehouse Management System

- **UNIT 4: Transportation, distribution, logistics**

  In this subject we are going to study a definition of zones of a warehouse, such as storing products and means of maintenance.

- **UNIT 5: Distribution requirements planning, inventory management**

  In this subject we are going to study a definition of types of inventories, methods of valuation and distribution of these.

- **UNIT 6: Calculation of the optimal lot.**

  In this subject we are going to study a conditions and method for the calculation of the economic quantity of order with deterministic demand.

- **UNIT 7: Dispatching**

  In this subject we are going to study the process of dispatching, how we must to do it and the importance of delivery note.

- **UNIT 8: Security and hazardous materials regulations**

  In this subject we are going to study a technical guide on occupational safety and health that is a reference in the sector in the field of prevention of occupational risks and helps to reduce the accident rates.

SUBJECT: **LOGISTICS, WAREHOUSE, DISTRIBUTION & SUPPLY CHAIN MANAGEMENT**		
Knowledge	**Skill**	**Competence**
• Knowledge relating storage and warehouse functions and types. • Knowledge and recognition of the most relevant Warehouse Management System (WMS) tools. • Knowledge of types of inventories, methods of valuation and distribution of these.	• Be able to identify the different types of warehouse and its functions. • Adapt WMS tools to a Furniture company. • Be able to use different methods of valuation inventories and identify it. • Be able to use different method of	• Manage the warehouses from furniture and woodworking industries. • Carry out the most suitable plant layout at a furniture/wood products manufacturing plant. • Implement a WMS tool in a Furniture

• Conditions and method for the calculation of the economic quantity of order with deterministic demand. • Knowledge about the process of dispatching of goods. • Knowledge on occupational safety and health in the different area of the production plant.	calculation the economic quantity of order with deterministic demand. • Be able to perform the process of dispatching of goods. • Analysis and identification of potential occupational safety and health.	company. • Implement and assess a valuation of inventory of a furniture company. • Performance the process of dispatching of goods in a furniture company. • Develop and implement a plan of occupational safety and health in a furniture company.

SUBJECT 2: Sales and Marketing – 3 ECTS

This subject aims to introduce you to three key areas where marketing impacts on society at large. Its potential for use and abuse is considered in Sales & marketing; Ethics and marketing and Responsible business marketing.

This subject guide describing the comprehensive introduction to marketing and its main principles. This subject is a mixture of lectures, discussion and group work, all of which aim to explore how individuals and organisations can gain a competitive advantage by applying marketing tools and techniques and by adopting a customer orientation. Ethics and marketing looks at the conduct and consequences of marketing activities from an ethical standpoint. Students will learn about various ethical frameworks as well as considering what is meant in marketing by 'ethical behaviour'.

UNITS:

- Sales & marketing
- Ethics and marketing
- Responsible business marketing

SUBJECT: **SALES AND MARKETING**		
Knowledge	**Skill**	**Competence**

• The nature of businesses and other organisations, including organisational structure, culture and values. • The principles of the main business functions (sales, marketing, resource management) • The principles of business ethics	• Selecting and analysing information relevant to a particular problem or issue related to maintenance management. • Selecting and analysing information relevant to a particular problem or issue related to business and management • Applying theories, models and concepts to practical situations. • Framing and addressing questions in relation to business and management • Interpreting, using and presenting numerical information effectively and appropriately	• Uses a variety of techniques/formats, selected to suit the needs of others and to aid understanding. • The nature of businesses and other organisations, including organisational structure, culture and values. • The principles of the main business functions (human resource management, accounting and finance, and marketing). • The principles of business ethics and the main social and environmental issues faced by businesses and other organisations.

MODULE 9 (OM): 6 ECTS

SUBJECT 1: Workplace, leadership & personal effectiveness competences – 3 ECTS

SUBJECT 2: Industrial Property Rights and Entrepreneurship – 3 ECTS

LEADER TO DEVELOP CONTENTS:

SUBJECT 1: SZKOLA GLOWNA GOSPODARSTWA WIEJSKIEGO – WULS

SUBJECT 2: SZKOLA GLOWNA GOSPODARSTWA WIEJSKIEGO – WULS

SUBJECT 1: Workplace, leadership & personal effectiveness competences – 3 ECTS

This subject familiarizes the students with basic concepts of the workspace, leadership and service management theories and the evolution of management processes. It provides knowledge on basic management functions, and thru some synthetic information on soft skills

related to the topic, helps to solve problems related to the management of the most important areas of business.

UNITS:

- **UNIT 1: Awareness of the needs of others**

  Empathy. Analysis of the needs of others. Training on development of empathy skills and analysis of needs& providing suitable solution.

- **UNIT 2: Supporting staff**

  Competences. Creative competences. Disruption possibilities. Career intend. Brain dominance index. Team building.

- **UNIT 3: Effective communication**

  The art of communication. Element of communications, content and context- words, tone, body language

- **UNIT 4: Interpersonal skills**

  Building relationship. Influencing, persuading.

- **UNIT 5: Leadership**

  Leadership styles - directing, coaching, supporting and delegating. Maturity level of the leaded group. Effectiveness of the team and individual performance

SUBJECT: **WORKPLACE, LEADERSHIP & PERSONAL EFFECTIVENESS COMPETENCES**		
Knowledge	**Skill**	**Competence**
	• Ability to recognize others' strength and weaknesses and build a work team. • Ability to build professional relationship. • Ability to lead the group	• Ability to manage company's workspace as a leader in accordance to current knowledge on human communication, interpersonal skills and leadership practices.

SUBJECT 2: Industrial Property Rights and Entrepreneurship – 3 ECTS

The purpose of the subject is to familiarize the student with basic concepts and principles related to the protection of intellectual property, ie. copyright, and industrial property rights, which decide on competitiveness and innovation in the modern economy [patents for inventions, trademarks]

The subject is meant to deepen knowledge in practical areas that are current for entrepreneurship, including: identifying business opportunities in the wood industry, managing a new business and creating the concept of its development, as well as shaping individual leadership skills.

UNITS:

- **UNIT 1: Industrial Property Rights**

  Intellectual property overview - Types of intellectual property, Protection of intellectual property.
  Patents - Purpose of a patent, Structure of a patent - necessary content,
  Legal requirements - timing, content, international protection
  Patenting process - Internal ant Patent Office
  Alternatives to patenting
  Claims - Descriptions of claims, review of claims
  Basics of commercialization - Licensing of Intellectual property

- **UNIT 2: Entrepreneurship**

  Opportunities – selection of right opportunity
  Target Markets and Business Models
  Teambuilding
  Entrepreneurial finance - milestones and financial models
  Venture capital
  Development of strategy and product roadmap
  Development of manufacturing
  Development of sales & distribution
  Development of marketing plan
  Financial model and funding strategy
  Pitches and speeches, presentation of the project to investors

SUBJECT: **INDUSTRIAL PROPERTY RIGHTS AND ENTREPRENEURSHIP**		
Knowledge	**Skill**	**Competence**

• Basic concepts and principles of industrial property protection and copyright law. • Knowledge about business opportunities. Basic knowledge about establishment and managing of a company.	• Search, understand, analyse and use the information needed in the field, from various sources and in various forms relevant to the furniture production. • Think and act in an entrepreneurial way, realizing the importance of innovation in the furniture industry. • Skills of working in a group • Creation of a concept and business plan of an enterprise.	• Identification of innovation, research on the topic, filing patent application form, application of the patent in an enterpsise. • Basic ability of setting up and leading an enterprise.

MODULE 10 (OM): 12 ECTS

SUBJECT 1: Information Search and Retrieval – 6 ECTS

SUBJECT 2: Investigation Methodology – 6 ECTS

LEADER TO DEVELOP CONTENTS:

SUBJECT 1: UNIVERSIDAD DE MURCIA

SUBJECT 2: UNIVERSIDAD DE MURCIA

SUBJECT 1: Information Search and Retrieval – 6 ECTS

In this subject, students will have the opportunity to learn how to seek for information, gather and analyse it in a useful and properly way. Thus, it is aimed to all students, not only those whose objective is the scientific research, although it is mandatory for them.

Thereby, we establish a main objective in the search for resources of information of any class, so that in that way, students may be able to recover it. For that, they will be taught about how to analyse the sources of information to discriminate those which are interesting for their work.

Special attention to the web and its possibilities will be granted so as techniques of information retrieval applied to furniture sector as well as for scientific research.

Thus, the subject begins with an overview importance of the web, because it's huge incidence and resources, so the students could know the methods, techniques and tools for a useful internet search. This, in the society of the *dis*information, due to the big amount of data available, it is more obvious that skills in the search and process of this data are needed.

Therefore, this knowledge will provide students the ability of reinforce and accelerate communication between science and the furniture sector: it stimulates paper publication, distance learning and it's a useful tool for marketing.

UNITS:

- INFORMATION, SEARCH AND RETRIEVAL

SUBJECT: **INFORMATION SEARCH AND RETRIEVAL**		
Knowledge	**Skill**	**Competence**
• Information retrieval on the web • Information retrieval evaluation • Applied techniques to science research • Utilities, tools and problems • Data collection and evaluation techniques	• Gather and interpret relevant data • Develop the necessary learning skills to undertake later studies with a high degree of autonomy • Work in teams and communicate their own ideas by creating an enabling environment, as well as the ability to integrate into a common project aimed at obtaining results • Identify the strengths and weaknesses of an organization, a product or a service, establish and use indicators, develop solutions to improve quality • Obtain, process and interpret data	• Manage online resources • Basic education for autonomous research • Team work • Recognise quality factors • Understand big quantities of information

SUBJECT 2: Investigation Methodology – 6 ECTS

In this subject we set out to achieve various general objectives. The first of them is to introduce the students to the world of research, so that from this knowledge they can investigate through the optimal use of techniques, methods and documentary resources. This way, there will be set the bases so that students can start to contemplate research as a possibility for working in the furniture field, such as the dissertation and doctoral thesis. For that, students will be taught about each and every one of the stages of the investigation and qualitative and quantitative research techniques.

At the beginning of the course, there will be presented the ethic bases of modern science, while the students learn how the scientific method works. Thus, they will know the meaning of the investigation, its function in the furniture and wood sector, its typologies and each of one of the stages that compose it. Consequently, they will have the knowledge of how to develop an investigation in the correct way, no matter if it's by themselves or as a part of a collective.

As the students will know how to research, next step taught is how to share their results, i.e. how to find a scientific publication, and to prepare their results. In order to find a proper publication, there will be space for quality indicators and impact index. In the same direction, this information will provide them the resources for keeping their knowledge updated.

Finally, two more topics will be attended: scientific meetings and research projects so that the individual formation acquired until then could be used to achieve greater goals.

UNITS:

- INVESTIGATION METHODOLOGY

SUBJECT: **INVESTIGATION METHODOLOGY**		
Knowledge	**Skill**	**Competence**

• Science and philosophy of science • The investigation. Meaning, function, typology and stages • Personal and collective ethics of research • Scientific publication • Methods of updating knowledge • Scientific meetings • Research projects	• Acquire the knowledge of the general framework in which experimental science is developed • Know of the requirements of the scientific method and its philosophical foundations • Know the ethics of the researcher's activity • Identify how to present a project to get funding • Integrate in a scientific community • Gather and interpret relevant data • Develop the necessary learning skills to undertake later studies with a high degree of autonomy	• Basics of scientific method • Research integrity • Projects making • Team work • Understand big quantities of information • Basic education for autonomous research

PRACTICES – 12 ECTS

This part involves a traineeship abroad for the student.

This Master is a construction of 4 Universities of 4 different countries (Spain, Poland, UK and Italy) and 3 partners with direct contact with furniture enterprise (2 Technological Centres who are working with more than 100 enterprises in Italy and Spain and the association of British Furniture Manufacturers); in this subject, the contact between the partners will be really important and the fact of the idea of the implementation of the Master in these 4 countries.

These practices will consist in a traineeship period in a company in a different country where the student is doing the Master. The student has to put in practice the knowledge, skills and competences that they have acquired during the Master. For that, this subject will be always done, in the moment that the student has passed the rest of contents of the Master (except "dissertation" that it could be done after "practices").

In this subject it will be an organisation who will be responsible of the student, this one will be the university where the student is doing the Master, and a Host Intermediary organisation who will be the responsible of the host enterprise in the country where the student is going.

Both organisations have the obligation of providing help and assistance during the length of "practice" subject.

The student has to prepare a full CV including their professional experience, moreover, the student has to add his interest about the possible kind of enterprise and tasks that he/she want to do there.

With that information, the Host Intermediary organisation will look for the most appropriate enterprise to receive the student according his interest. It is important that the proposed host enterprise has proven experience in furniture sector and could give the student tasks that will give him relevant learning opportunities, for that, the host has to describe previously the activities that the student could do during the traineeship. It is important that in the host organisation there will be a person who speaks English fluently. Finally, a CV of the organization will be prepared.

After the proposal of the host enterprise, the student has to accept or refuse with justified reasons the offer. In case of refuse, it will be offered a second organization, in case of acceptance, it will make the practice commitment between them according the length of stay (including hours per day) and tasks.

Intermediary organisations must ensure that student and host enterprise are aware that they may need to sign agreements as those ones related with confidentiality.

Before going abroad, the student should participate in a pre-departure induction course of 5 hours in order to be prepared for the traineeship.

The duration of stay abroad is two months at least and four months at maximum, depending the number of hours per day until completing 200 hours of practice. This stay could be completed in multiple periods

At the end of the traineeship, the student has to prepare an explanatory document about the apprenticeship, including their tasks, the skills that he/she has acquired, the achieved goals… and a presentation of 30 minutes in order that the tutor could consider if the student has used this period abroad with benefits.

In order to sum up, this "practices" will have 12 ECTS: 5 hours of pre-departure induction, 200 hours of traineeship in an enterprise, 80 hours of preparing the explanatory document and the presentation and 15 hours of mentoring program to solve doubts of the student.

DISSERTATION – 9 ECTS

It consists in the application of every knowledge, skill and competence that they have been developed during the Master. The student has to prove that they have achieved the goals that

this Master has planned. The student has to develop an innovative project related to one of the subjects of the Master. Each partner will have assigned a tutor who will give an academic support but he/she will not be the liable of the final result. The tutor will be assigned after the students have selected the subject to prepare their project. After this, the tutor could give different wide possibilities inside each subject.

The tutor could give some information to the student about Module 10 - Investigation Methodology I and II in case of necessity; and give some notions about what is the final objective with this "Dissertation". Innovation could be applied to any part of the project (contents, methodology, materials, tasks…)

Project may have between 45-55 pages, including, if it is appropriate, the index, bibliography and references and annexes.

It will be included, among other things, the following parts:

- Justification of the project
- Theoretical framework – state of art
- Objectives
- Personal reflection
- Bibliography

The student has to defend the project, the final mark in this subject would be split in 40% corresponding to the public exposure and 60% corresponding to the quality of the project. The oral presentation will last between 12 to 15 minutes, accompanied by a round of questions, comments and suggestions from the evaluating members. After that, the student will have the chance to clarify, specify or answer to the asked questions.