



Universitat de Lleida

# DEGREE CURRICULUM **INNOVATIVE TECHNIQUES**

Coordination: COMBALIA CENDRA, FELIP

Academic year 2023-24

## Subject's general information

Subject name	INNOVATIVE TECHNIQUES			
Code	103112			
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Master's Degree in Leather Engineering	1	COMPULSORY	Blended learning
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Only examination			
Coordination	COMBALIA CENDRA, FELIP			
Department	INDUSTRIAL AND BUILDING ENGINEERING			
Teaching load distribution between lectures and independent student work	SUBJECT IN EXTINCTION			
Important information on data processing	Consult <a href="#">this link</a> for more information.			
Language	Catalan Spanish English			
Distribution of credits	Theoretical credits: 3 ECTS (Felip Combalia) Practica credits: 0 ECTS Practical credits: 3 ECTS (Esther Bartolí)			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
COMBALIA CENDRA, FELIP	felip.combalia@udl.cat	0	

## Subject's extra information

SUBJECT IN EXTINCTION. ONLY RIGHT TO EXAMINATION

It is **COMPULSORY** that the students bring the following elements of individual protection (EPI) to the practices at the laboratory.

- Laboratory gown from UdL
- Protection glasses
- Mechanical protection gloves

They can be purchased through the shop Údels of the UdL:

C/ Jaume II, 67 baixos  
Centre the Cultures i Cooperació Transfronterera

<http://www.publicacions.udl.cat/>

There will be a specific service for the *Campus Universitari d'Igualada*.

The use of other elements of protection (for example caps, masks, gloves of chemical or electrical risk, etc.) will depend on the type of practice to be done. In that case, the teacher will inform of the necessity of specific EPI.

Not bringing the EPI's described or not fulfilling the norms of general security that are detailed below imply that the student can not access to the laboratories or have to go out of them. The no realisation of the practices for this reason imply the **consequences in the evaluation** of the subject that are described in this course guide.

## GENERAL NORMS OF SECURITY IN LABORATORY PRACTICES

- Keep the place of realisation of the practices clean and tidy. The table of work has to be free from backpacks, folders, coats...
- No short trousers or short skirts are allowed in the laboratory.
- Closed and covered footwear is compulsory in the laboratory.
- Long hair needs to be tied.
- Keep the laboratory gown laced in order to be protected from spills of chemicals.
- Bangles, pendants or wide sleeves are not allowed as they can be trapped.
- Avoid the use of contact lenses, since the effect of the chemical products is much bigger if they enter between the contact lense and the cornea. Protection over-glasses can be purchased.
- No food or drink is allowed in the laboratory.
- It is forbidden to smoke in the laboratories.
- Wash your hands whenever you have contact with a chemical product and before going out of the laboratory.
- Follow the instructions of the teacher and of the laboratory technicians and ask for any doubt on security.

For further information, you can check the following document of the *Servei de Prevenció de Riscos Laborals de la UdL*: <http://www.sprl.udl.cat/alumnes/index.html>

## Learning objectives

1. Understand and apply the innovative techniques.
2. Apply the main systems to process special leathers. Design production systems for the production of special leathers. Apply the best available techniques to the process.
3. Understand and apply the processes of tanning, retanning, dying and fatliquoring on those leathers.
4. Understand the chemical fundamentals for special techniques.
5. Design advanced formulations in this area.
6. Acquire the criteria to analyze formulations of the processes related with special techniques.
7. Recognise the last techniques in this field of study.
8. Acquire the capacity of self study in this field of study.

## Competences

### Basic

B06 To possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.

B07 That students know how to apply the acquired knowledge and have the ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.

B10 That students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.

### General competitions

CG1. To apply properly mathematical, analytical, scientific, instrumental, technological and management aspects.

CG2. To technically and economically manage projects, facilities, plants, companies and technology centers.

CG3. To investigate, develop and innovate.

### Specific competences

CE2. To analyze, apply and project the main unit operations and the systems that make up the leather manufacturing process.

CE3. To apply basic knowledge and applications of environmental technologies and sustainability in the field of leather engineering.

CE4. To apply theories and principles of leather engineering in order to analyze complex situations and make decisions through engineering resources.

CE9. To project, calculate and design products, processes, facilities and layouts, related to the field of leather

engineering.

CE12. To perform individually, present and defend in front of a university court an original exercise, consisting of a project in the field of leather engineering of a professional nature, which synthesizes and integrates the skills acquired in the master.

## Subject contents

### 1. SPECIAL PROCESSES IN LEATHER DYING

#### 1.1 Main aspects and characteristics in the special techniques related with leather dying.

- General view of leather dyeing
- Dyeing in wet blue
- Dyeing in crust
- Dyeing in vegetable tanning
- Dyeing in splits
- Dyeing in nubuck
- Dyeing in furs

### 2. COMBINED TANNING

#### 2.1 Main aspects and characteristics from the tanning systems that combine mineral tanning agents and organic tanning agents.

#### 2.2 General view of combined tanning.

- Combined tanning using aluminium salts
- Combined tanning using zirconium salts
- Combined tanning using titanium salts
- Combined tanning using zinc salts
- Combined tanning using iron salts

### 3. CHEMICAL SHRUNKEN

#### 3.1 Main aspects and characteristics that define the chemical shrunken grain

- Shrunken system using astringent syntans
- Shrunken system using vegetable tanning agents
- Shrunken system using aldehydes
- Shrunken system using tanned leathers

### 4. TANNING IN EXOTIC SKINS

#### 4.1 Main aspects and characteristics that define the tanning in exotic skins

- Tanning in ostrich skins
- Tanning in fish skins
- Tanning in mammals skins
- Tanning in reptiles

### 5. SPECIAL PROCESSES

#### 5.1 Main aspects and characteristics in tanning and retanning systems

- Waterproofing
- Wet-white
- Polimeric agents
- Humic agents

## Methodology

### THEORY CLASSES

Expository lectures: by the teacher, with the explanation of concepts, materials and work plan.

Support material: Course notes and relevant bibliography.

Specific objectives :At the end of the course the student should be able to: - Know the different raw materials used in leather manufacturing. - Specificities and conservation systems. - Meet every stage of processing from the skin to the tanned leather (beamhouse, pretanning and tanning processes). - Design processes based on the requirements of the final article. Acquire judgment to modify processes based on existing problems in the leather.

### EXERCISES AND SELFSTUDY

General description: Individual exercises, self-learning and individual study.

Support material: Course notes and relevant bibliography.

Deliverable: Exercises to deliver at the end of every unit via digital campus.

Specific objectives:At the end of the course students should have increased their abilities to: Solve problems ,reading understanding ,find information ,self study

### PRACTICES IN THE TANNING PILOT PLANT

General description: Formulations of different processes will be performed on a pilot level, individually or in small groups. It should be performed a notebook where to recorded all the modifications of the process and used products during the process.

Support material:Practices are held at the tanning pilot plant. All materials and reagents are in the same pilot plant. The scripts of the processes will be provided by the teacher in charge of monitoring practices.

Deliverable:At the end of these practices the student shall deliver the practices report, which will content note of all the data, calculations, incidents, and observations.

## Development plan

Week	Methodology	Unit	Hours	Self study hours
1	Class/Virtual/Problems	1.1	4	6
2	Class/Virtual/Problems	1.1	4	6
3	Class/Virtual/Problems	1.1	4	6
4	PRACTICES ADVANCED DESIGN OF LEATHER PROCESSES 2			
5	Class/Virtual/Problems	2.1	4	6
6	Class/Virtual/Problems	2.1	4	6
7	Class/Virtual/Problems	3.1	4	6
8	Class/Virtual/Problems	4.1	4	6
9	PARTIAL EXAMS			
10	Class/Virtual/Problems	4.1	4	6
11	PRACTICES LEATHER FINISHING TECHNOLOGY 2			
12	Class/Virtual/Problems	5.1	4	6

13	Class/Virtual/Problems	5.1	4	6
14	Class/Virtual/Problems	5.1	4	6
15	Class/Virtual/Problems	5.1	4	6
16	PARTIAL EXAMS			
17	PARTIAL EXAMS			
18	TUTORIAL			
19	RECOVERY EXAMS			

## Evaluation

Exercices	30%
Exam 1	35%
Exam 2	35%

## Bibliography

### Basic:

Bacardit, A.;Ollé, Ll. Técnicas especiales de curtidos Igualada: EUETII-ESAI,2000  
 Soler, J. Procesos de Curtidos. Igualada: EUETII-ESAI,2000. ISBN 84-1837-2-5  
 Soler, J. Diseño de Procesos de Curtidos. Igualada:EUETII-ESAI,2005. ISBN 84-931837-6-8

### Supplementary:

Adzet, J.M. Química Técnica de Tenería. Igualada: EUETII-ESAI, 1985.  
 Bacardit, A.;Ollé, Ll. Maquinaria de Curtidos. Igualada: EUETII-ESAI, 2005. ISBN 84-931837-4-1  
 Font, Joaquim. Análisis y ensayos en la Industria del Curtido. Igualada: EUETII-ESAI, 2005. ISBN 84-931837-5-X  
 Gerhard, J. Posibles fallos en el cuero y en su producción. [s. l.]: Lampertheim: G. John , 1998.  
 Morera, J.M. Química Técnica de Curtición . Igualada: EUETII-ESAI, 2000. ISBN 84-931837-0-9  
 O'Flaherty,F.(Ed). [et al.]. "The Chemistry and Technology of Leather". USA: Malabar, Krieger Pub., 1978.  
 Martignone, G. Manual de Práctica Conciaria. Editma Sas. Rescaldina (Milano) 1997.