



Universitat de Lleida

# DEGREE CURRICULUM **SUSTAINABILITY OF PROCESSES AND PRODUCTS**

Coordination: PUIG VIDAL, RITA

Academic year 2023-24

## Subject's general information

Subject name	SUSTAINABILITY OF PROCESSES AND PRODUCTS			
Code	103157			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Master's Degree in Leather Engineering	1	COMPULSORY	Attendance-based
Course number of credits (ECTS)	5			
Type of activity, credits, and groups	Activity type	PRALAB	PRAULA	TEORIA
	Number of credits	3	0.5	1.5
	Number of groups	1	1	1
Coordination	PUIG VIDAL, RITA			
Department	INDUSTRIAL AND BUILDING ENGINEERING			
Teaching load distribution between lectures and independent student work	40% classes 60% autonomous work			
Important information on data processing	Consult <a href="#">this link</a> for more information.			
Language	Spanish/English			
Distribution of credits	Theoretical credits 2 Practical credits 3			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
PUIG VIDAL, RITA	rita.puig@udl.cat	3	OFFICE 07 - attention with previous appointment
SOLE FERRER, MARIA MERCE	mariamerce.sole@udl.cat	2	

## Subject's extra information

Continuous work during the semester is recommended in order to achieve the aims of the subject. It is also important to visit frequently the virtual space associated with the subject.

## Learning objectives

In this subject, the following objectives are to be achieved:

- Global vision of the environmental impacts associated with leather life cycle
- Identifying possibilities for eco-innovation in the leather sector and see sustainability as an opportunity.
- Knowing how to apply the life cycle thinking to any technological development, new process or new product.
- Understand the circular economy policy and its relationship with life cycle analysis.
- Knowing how to apply all this knowledge in personal and professional life.

The final objective is for the student to have the knowledge and criteria necessary to be able to contribute, in their workplace, to the new economic model necessary for our society.

## Competences

B06. Possessing and understanding the necessary knowledge to be able to be original in the development and/or application of ideas, often in a research context.

CG3. Research, develop and innovate.

CT4. Evaluate the sustainability and social impact of proposals and act with ethical, environmental and professional responsibility.

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

CE7. Apply the different evaluation, innovation and communication tools based on a life cycle thinking (LCA).

CE10. Design strategic planning and apply it to production, quality and environmental management systems in the field of leather engineering.

## Subject contents

The program is structured in 6 topics with a teaching load of 50h for students and a total dedication of about 125h. The topics are the following:

## - TOPIC 1. WATER AND WASTEWATER

Overview of the leather tanning process, water consumption and wastewater generated. Wastewater treatment.

## - TOPIC 2. THE TANNING PROCESS: CONSUMPTIONS AND EMISSIONS.

Overview of the leather tanning process, consumption of chemical products, generation of waste and atmospheric emissions. Discharge limits and waste management. The best available technologies (BATs).

## - TOPIC 3. ENVIRONMENTAL MANAGEMENT SYSTEMS (ISO 14001).

From mandatory legislation to voluntary tools. Initial environmental diagnosis, planning of objectives and program, implementation, review and certification.

## - TOPIC 4. LIFE CYCLE ASSESSMENT (LCA)

Towards a more global vision: the life cycle of the product. What is this tool and what is it for? The importance of the supply chain (upstream and downstream). Practical cases of application in the leather tanning sector.

## - TOPIC 5. LCA SOFTWARE.

Use of specific software to carry out LCA studies. Experimental practices with this software.

## Methodology

The face-to-face activities are divided into 3 complementary parts: theory, problems and practices.

**Master class:** in theory classes, the most relevant theoretical concepts and results are introduced, illustrating them with examples and exercises.

**Problems:** exercises of gradual difficulty will be solved to consolidate the concepts and the notions developed in the theory classes. Problems with real data will arise.

**Experimental practices:** practices will be done with specialized software in the computer classroom.

**Evaluation:** In the evaluation tests or evidences, the theoretical concepts and the resolution of problems will be valued. There will be two written tests and some follow-up test.

In addition, students will be responsible for reinforcing their knowledge autonomously based on the teaching material provided or recommended by the teacher.

Both theoretical and problem classes will be taught in small groups of students. The fact of having smaller groups of students favors dialogue and their participation.

**Software:** GaBi software (Sphera) will be used as a cutting-edge solution to support eco-efficiency, eco-design and value chain sustainability.

## Development plan

Topic	Weeks	Methodology	In Class (h)	Autonomous work (h)
1.Wastewater	1-5	Master class and problems	18	27
2.Tanning process: solid waste	6-7	Master class and problems	6	9
Midterm Exam	8	Written evaluation	2	3
3.EMS	9-10	Master class and problems	6	9
4. LCA	11-12	Master class and problems	6	9
5.LCA Software	13-15	Practices	10	15

Final Exam	16	Written evaluation	2	3
		TOTAL	50	75

## Evaluation

There will be two written exams, midterm and final, with a duration of about 2 hours each and in which neither books nor notes will be allowed.

The evaluation of the subject will be done through the following weighting:

Exams: 50%

Exercises: 25%

Practices: 25%

Whoever has not passed the subject in the first opportunity may take a **Final Recovery Exam** that will include all the content of the subject (and will replace the marks of all the previous exams). This test will take place **during the week marked in the academic calendar**.

The student who has the approval to be evaluated by **alternative evaluation** (see requirements and procedure in the evaluation regulations) must carry out the following activities: Practices (25%) and Final Written Exam (75%). The Final Written Exam can be recovered through the Final Recovery Exam

## Bibliography

The main resource are the notes taken by the student from the classes of the subject.

Further reading:

- Pere Fullana, Rita Puig, "El Análisis del Ciclo de Vida", Ed. Rubes, Barcelona, 1997, pp 143. ISBN: 84-497-0070-1 Legal deposit: B-19627-97.
- Rita Puig, Bruno Notarnicola and Andrea Raggi. "Industrial Ecology in the cattle-to-leather supply chain". Ed. FrancoAngeli, pp 187, 2007. ISBN 978-88-464-9696-6.
- ISO 14040, 2006. Environmental management, Life cycle assessment, Principles and framework. ISO, Geneva, Switzerland.
- ISO 14001, 2015. Environmental Management Systems Standard. ISO, Geneva, Switzerland.
- BAT reference document for the tanning of hides and skins, 2013. Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control). European Commission. Joint Research Centre. ISBN 978-92-79-32947-0
- ISO 14044, 2006. Environmental Management - Life Cycle Assessment – Requirements and Guidelines. International Organization for Standardization, Geneva, Switzerland.
- ISO 14067, 2013. Greenhouse Gases – Carbon footprint of products – Requirements and guidelines for quantification and communication. International Organization for Standardization, Geneva, Switzerland.
- ISO 14064, 2006. Greenhouse Gases – Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals. International Organization for Standardization, Geneva, Switzerland.
- Ellen Mac Arthur Foundation. Circular Economy. Available at: <https://www.ellenmacarthurfoundation.org/circular-economy>