



Universitat de Lleida

DEGREE CURRICULUM
**LIFE CYCLE ANALYSIS IN
LEATHER**

Coordination: PUIG VIDAL, RITA

Academic year 2019-20

Subject's general information

Subject name	LIFE CYCLE ANALYSIS IN LEATHER			
Code	103120			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Master's Degree in Leather Engineering	2	OPTIONAL	Attendance-based
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Activity type	PRALAB	PRAULA	TEORIA
	Number of credits	1.5	1	3.5
	Number of groups	1	1	1
Coordination	PUIG VIDAL, RITA			
Department	COMPUTER SCIENCE AND INDUSTRIAL ENGINEERING			
Teaching load distribution between lectures and independent student work	40% class 60% autonomous work			
Important information on data processing	Consult this link for more information.			
Language	Spanish/English			
Distribution of credits	Theoretical credits 2 Practical credits 4			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
PUIG VIDAL, RITA	rita.puig@udl.cat	6	

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:

- Having a more global vision of the environmental impacts associated with leather
- Knowing the importance of aspects such as the value chain, traceability, transparency, etc., highly valued by the customers of a company
- Identifying possibilities for eco-innovation in the sector and see sustainability as an opportunity.
- Knowing how to apply the life cycle thinking to any technological development, new process or new product.
- To know the new model that the circular economy proposes 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

The most significant skills that will be worked on in this subject are:

B08 That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.

CG3. Investigate, develop and innovate.

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

Subject contents

The program is structured in 6 topics with a teaching load of 60h for students and a total dedication of about 150h. The topics are the following:

- TOPIC 1. 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 2. ENVIRONMENTAL MANAGEMENT SYSTEMS (ISO 14001).

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

- TOPIC 3. LIFE CYCLE ANALYSIS (LCA) AND CIRCULAR ECONOMY

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. What is the circular economy, its main strategic axes and how the LCA contributes to the circular economy.

- TOPIC 4. ECODESIGN OF PRODUCTS AND ECO-LABELS

The client's vision of a tanning company. The designers and sustainability departments. The importance of the customer-supplier relationship: transparency. What are the main eco-design criteria? Type of eco-labels and their relationship with the LCA.

- TOPIC 5. INDUSTRIAL SIMBIOSIS AND LCA

The industrial symbiosis, the exchange of resources between companies. Industrial networks that want to operate in a similar way as natural ecosystems: what is rejected by one company is used as raw by another and the resources are kept the maximum time within the economic system.

- TOPIC 6. LCA SOFTWARE.

Use of specific software to carry out LCA studies. 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.

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.

Development plan

Topic	Weeks	Methodology	Hours in class	Hours of autonomous work
1.Tanning process	1-2	Master class and problems	8	12
2.EMS	3-4	Master class and problems	8	12
3.LCA and CE	5-7	Master class and problems	12	18
Midterm exam	8	Written test	2	3
4.Eco-design and ecolabels	9-10	Master class and problems	8	12
5.Industrial symbiosis and LCA	11-12	Master class and problems	8	12
6.LCA software	13-15	Practices	12	18
Final exam	16	Written test	2	3
		TOTAL	60	90

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: 60%

Exercises: 20% (mandatory)

Practices: 20% (mandatory)

Bibliography

The main resource are the notes 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>