



Universitat de Lleida

# DEGREE CURRICULUM **ENVIRONMENT TECHNOLOGIES AND SUSTAINABILITY**

Coordination: CHEMISANA VILLEGAS, DANIEL

Academic year 2020-21

## Subject's general information

<b>Subject name</b>	ENVIRONMENT TECHNOLOGIES AND SUSTAINABILITY			
<b>Code</b>	102118			
<b>Semester</b>	1st Q(SEMESTER) CONTINUED EVALUATION			
<b>Typology</b>	Degree	Course	Character	Modality
	Bachelor's Degree in Mechanical Engineering	2	COMPULSORY	Attendance-based
	Bachelor's Degree in Automation and Industrial Electronic Engineering	2	COMPULSORY	Attendance-based
	Master's Degree in Industrial Engineering	1	COMPLEMENTARY TRAINING	Attendance-based
	Bachelor's Degree in Energy and Sustainability Engineering	2	COMPULSORY	Attendance-based
	Not informed	2	COMPULSORY	Attendance-based
<b>Course number of credits (ECTS)</b>	6			
<b>Type of activity, credits, and groups</b>	Activity type	PRALAB	PRAULA	TEORIA
	Number of credits	0.6	2.4	3
	Number of groups	6	5	2
<b>Coordination</b>	CHEMISANA VILLEGAS, DANIEL			
<b>Department</b>	ENVIRONMENT AND SOIL SCIENCES			
<b>Important information on data processing</b>	Consult <a href="#">this link</a> for more information.			
<b>Language</b>	English 95 % Spanish 5%			
<b>Distribution of credits</b>	Chrysovalantou Lamnatou Daniel Chemisana Villegas			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
CHEMISANA VILLEGAS, DANIEL	daniel.chemisana@udl.cat	1	
LAMNATOU , CHRYSOVALANTOU	chrys.lamnatou@udl.cat	22,04	
SOLANS BARÓN, ALEJANDRO	alejandro.solans@udl.cat	2,88	

## Subject's extra information

The subject belongs to the module of "formation common to the industrial branch"

## Learning objectives

- Check the basic rules related to the environment to extract from it the legal requirements applicable to pollution control in industry
- Plan, at a basic level, a strategy of prevention and control of pollution in specific cases in the industry susceptible
- Learn to distinguish which are the essential elements of a complex system, and maintain its modelling only the essential
- Acquire skills to design useful models in the Environmental Sciences
- Derive and present the requirements set forth in the problems
- Construct formal mathematical models to synthesize a problem situation
- Select the most appropriate waste management and / or pollution control facilities sizing and simple effluent treatment

## Competences

### University of Lleida strategic competences

- **UDL4.** To respect the fundamental rights of equality between men and women, the promotion of the Human Rights and the principles of a culture of peace and democratic values.

### Degree-specific competences

- **GEM16 / GEEIA16.** Basic knowledge and application of environmental technologies and sustainability.

### Degree-transversal competences

- **EPS2.** Capacity to gather and interpret relevant data, within the area of study, to judge and think about relevant subjects of social, scientific and ethical nature.
- **EPS13.** Capacity to consider the socioeconomic context as well as the sustainability criteria in engineering solutions.

## Subject contents

### **1. Environment**

Atmosphere and climate

Natural cycles: water, carbon, nitrogen and phosphorous

Fluxes of matter and energy in ecosystems

Production, consumption and use of energy

### **2. Wastes**

Types of waste

Treatment technologies

Final treatments

### **3. Pollution**

Water pollution

Air pollution

Soil/groundwater pollution

Thermal pollution

Noise pollution

Light pollution

### **4. Environmental impacts**

Types of environmental impacts considered

Environmental impacts of industrial activities

Economic growth and the environment

Environmental costs

Global Climate Change – Phenomena

Natural hazards (risks)

Energy Sources: non-renewable, renewable

Renewable Energy Sources Technologies

Life Cycle Assessment (LCA)

### **5. Sustainable development**

Strategies for sustainable development

Environmental Sustainability

The role of renewable energy sources

Economic Sustainability

Sustainable Agriculture

Environmental regulations

## Methodology

The development of the subject is based on four actions:

### 1) Master classes

Exposure of the concepts , principles and relations of each topic

Approach examples illustrating the application

### 2) Problem resolution classes

Discussion and resolution of problems and applications related to the concepts of each topic

The proposed problems are basically those of the subject collection of problems

### 3) Lab

Practical demonstration of the concepts reached

### 4) Work

Group work and oral presentation

## Development plan

Week	Methodology	Topic	Lecture hours	Autonomous work hours
1	Master class	Topic 1. Environment Topic 2. Wastes	4	6
2	Master class Problems	Topic 3. Water pollution	4	6
3	Master class Problems	Topic 3. Water pollution	4	6
4	Master class Problems	Topic 3. Water pollution	4	6
5	Master class Problems	Topic 4. Environmental impacts Topic 5. Sustainable development	4	6
6	Master class Problems	Topic 3. Noise pollution	4	6
7	Master class Problems	Topic 3. Air pollution and other types of pollution	4	6

8	Master class Problems	Topic 3. Air pollution and other types of pollution	4	6
9		Evaluation. Written exam, topics 1-3 (water poll.)		
10	Master class Problems Practice	Topic 3. Noise pollution. Practice about noise pollution.	4	6
11	Master class Problems Practice	Topic 4. Environmental impacts. Practice about LCA.	4	6
12	Master class Problems Practice	Topic 3. Light pollution. Practice about light pollution.	4	6
13	Problems	Exercises related with the topics	4	6
14	Group work	Presentations of the works of the students	4	6
15	Group work	Presentations of the works of the students	4	6
16		Evaluation. Written exam, topics 3 (except water poll.) - 5		
17				
18		Tutoring period		
19		Recovery exams		

## Evaluation

### Exams:

1st part (25%), it will take place in the regular dates.

2nd part (35%), will take place in the regular dates.

Recovery (60%), will take place in the regular dates.

**Laboratory** (15%), Experiments complementary to the topics. You need to have approved practices to pass the subject.

**Group work** (25%). It will be held in groups of up to 4 people and will be delivered / expose at the end of the course.

## Bibliography

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Guyot,G. "Physics of the Environment and Climate". Wiley. 1998

Harte,J. "Consider a spherical cow". University Science Books. 1998

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Masters,G.M. "Environmental Engineering and Science" Prentice Hall. 1998.

TurcotteD.L. and Schubert G. "Geodynamics" Cambridge.2002.

KIELY. "Ingeniería Ambiental". McGraw-Hill.

HERNANDEZ, A. "Depuración de aguas residuales". CICCIP.Madrid.1994.

TCHOBANOUGLOUS. "Gestión integral de residuos sólidos".McGraw-Hill.

RAU,J.G.,WOOTEN,D.C. "Environmental Impact Analysis Handbook".

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STERN, A.C. "Air Pollution". AcademicPress.8º Vol. 1986.

RECUERO,M. "Ingeniería Acústica". UPM.1991.ISBN:84-404-8493-3.

"Legislación Ambiental de Catalunya". Vol.: 3. Generalitat deCatalunya. Departament de Medi Ambient.

MOPU. "Evaluaciones de Impacto ambiental". Dirección General delMedio Ambiente. 1984.