



Universitat de Lleida

DEGREE CURRICULUM
**ENERGY MANAGEMENT AND
INTEGRATION**

Coordination: CASTELL CASOL, ALBERT ORIOL

Academic year 2019-20

Subject's general information

Subject name	ENERGY MANAGEMENT AND INTEGRATION			
Code	102150			
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Bachelor's Degree in Energy and Sustainability Engineering	3	COMPULSORY	Attendance-based
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Activity type	PRAULA		TEORIA
	Number of credits	3		3
	Number of groups	1		1
Coordination	CASTELL CASOL, ALBERT ORIOL			
Department	COMPUTER SCIENCE AND INDUSTRIAL ENGINEERING			
Teaching load distribution between lectures and independent student work	60 h face-to-face (40%) 90 h autonomous work (60%)			
Important information on data processing	Consult this link for more information.			
Language	English			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
CASTELL CASOL, ALBERT ORIOL	albert.castell@udl.cat	7,2	

Subject's extra information

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

- Blue or white laboratory gown from UdL (unisex)
- 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/>

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

The main objectives of the subject are:

- To learn the methodologies to perform energy audits.
- To learn the methodologies to measure and verify the savings achieved, both at energetic and economic level.

Competences

Basic

CB2. That students know how to apply their knowledge to their work or vocation in a professional way and possess the skills that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study.

CB3. That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include a reflection on relevant issues of a social, scientific or ethical nature.

CB5. That the students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.

General

CG12. To have knowledge about the fundamentals of automatisms and control methods.

Specific

CE12. To have applied knowledge about renewable energies.

CE15. To acquire the ability to understand, interpret and apply the legislation on energy and environment.

CE19. Acquire capacity for the control of facilities and energy systems and their energy efficiency.

Cross-cutting

CT2. Master a foreign language, especially English.

CT5. Acquire basic knowledge on scientific thinking.

Subject contents

Chapter 1 - Energy audits

Chapter 2 - Measurement and verification protocols

Chapter 3 - Companies on energy systems

Chapter 4 - Maintenance operation of energetic facilities and registry operation

Chapter 5 - Sustainable economic-financial concepts applied to energy efficiency projects

Methodology

The methodological axes of the course will be divided into:

- **Master class:** In master classes the contents are presented orally by the lecturer with no active participation of the students.
- **Problems resolution:** In this activity, the lecturer presents a complex question that the students must solve, either individually or in group.
- **Team work:** Learning activity that must be developed in collaboration with the other members of a team.

Development plan

The development plan will follow the order of the content. This plan may be subject to change throughout the year as a function of the number of students, working groups, and the evolution of the class.

Week	Methodology	Topic	Lecture Hours	Autonomous work hours
1	Lecture	Introduction and subject presentation	2	3
1-5	Lecture Resolution of problems	Chapter 1. Energy audits	18	27
6-8	Lecture Resolution of problems	Chapter 2. Measurement and verification protocols	12	18
9		Evaluation. Written test.		
10	Lecture Resolution of problems	Chapter 3. Companies on energy systems	4	6
11	Lecture Resolution of problems	Chapter 4. Maintenance operation of energetic facilities and registry operation	4	6
12 - 14	Lecture Resolution of problems.	Chapter 5. Sustainable economic-financial concepts applied to energy efficiency projects	12	18
15		Evaluation. Written Test.		
16-19		Evaluation. Written Test. Recovery		

Evaluation

Evaluation activities	%	Dates	C/V (1)	I/G (2)	Observations
PA1: Written exam	35	Week 9	C	I	
PA2: Written exam	35	Week 17	C	I	
PA3: Project	20	Week 17	C	G	
PA4: Assignment	10	Week 17	C	G	
PA7: Recovery exam		Week 19	C	I	Only exams PA1 and PA2 are recoverable

(1) Compulsory/Voluntary

(2) Individual/Group

Bibliography

- Albert Thumann, Terry Niehus, William J. Younger. Handbook of Energy Audits Ninth Edition. CRC Press. Taylor & Francis Group.
- Wayne C. Turner and Steve Doty. Energy Management Handbook. Sixth Edition. CRC Press. Taylor & Francis Group.
- International Performance Measurement and Verification Protocol (IPMVP).
- International Energy Efficiency Financing Protocol (IEEFP).

Adaptations to the contents due to COVID-19

Chapter 1 - Energy audits

Chapter 2 - Measurement and verification protocols

Chapter 3 - Maintenance operation of energetic facilities and registry operation

Chapter 4 - Sustainable economic-financial concepts applied to energy efficiency projects

Adaptations to the methodology due to COVID-19

The methodological axes of the course will be divided into:

- **Virtual class and questions:** The content is given to the students and virtual sessions (via chat and videoconference) are done to give complementary explanations, solve questions and doubts and clarify concepts.
- **Problems resolution:** In this activity, the lecturer presents a complex question that the students must solve, either individually or in group.
- **Team work:** Learning activity that must be developed in collaboration with the other members of a team.

Adaptations to the evaluation due to COVID-19

Evaluation activities	%	Dates	C/V (1)	I/G (2)
PA1: Virtual exam	40	Week 17	C	I
PA2: Project presentation	15	Week 17	C	G
PA3: Proyecto report	25	Week 17	C	G
PA4: Assignment	20	Week 17	C	G
PA5: Recovery exam	40	Semana 19	C	I

(1) Compulsory/Voluntary

(2) Individual/Group