



Universitat de Lleida

DEGREE CURRICULUM
**CONTROL, CERTIFICATIONS
AND AUDITING**

Coordination: MEDRANO MARTORELL, MARCO

Academic year 2017-18

Subject's general information

Subject name	CONTROL, CERTIFICATIONS AND AUDITING			
Code	14527			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Typology	Modality
	Master's Degree in Industrial Engineering	2	COMPULSORY	Attendance-based
ECTS credits	6			
Groups	1GG			
Theoretical credits	3.5			
Practical credits	2.5			
Coordination	MEDRANO MARTORELL, MARCO			
Department	INFORMATICA I ENGINYERIA INDUSTRIAL			
Teaching load distribution between lectures and independent student work	60 h lecture (40%) 90 h autonomous (60%)			
Important information on data processing	Consult this link for more information.			
Language	Catalan			
Distribution of credits	Dr. Marc Medrano Martorell (2.5) Josep Marín Vitalla (3.5)			
Office and hour of attention	To set up by email with the teacher			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
MARIN VITALLA, JOSE VICENTE	jymarin@diei.udl.cat	3,5	
MEDRANO MARTORELL, MARCO	mmedrano@diei.udl.cat	2,5	

Subject's extra information

Today an industrial engineer should be able to do checks, audits and certifications . This is a subject taught in the second year of the first semester of the master's degree in industrial engineering and its content is geared to building controls, energy certification of buildings and facilities and to perform audits in works facilities, buildings and industries. It is a subject that has a high content of norms and regulations but also practical works and installations, tours and seminars given by leading experts in the sector .

This subject is important for students to go over how to balance energy and matter because they are essential when doing audits .

Learning objectives

GENERAL PURPOSE OF THE SUBJECT

To **provide** students with the **knowledge** and **techniques** , **tools**, **skills** and **abilities** needed to perform effectively **controls, certifications and audits** .

The achievement of this overall objective is based on :

- To **transmit** to specialists and non-specialist audiences the knowledge acquired in the course.
- **To use engineering tools** to conceive , design, implement solutions and projects .
- To prove to **have sufficient knowledge** for this subject , both scientific and technological .
- **To have ability to carry out controls, certifications and audits** .
- **To have ability to solve complex problems** related to the topic of the course

Competences

Basic Competences according to Real decret 861/2010 and Ordre CIN/311/2009:

- **CB1.** To possess and understand knowledge that provides a base or opportunity to be original in the development and/or application of ideas, often in a research context.
- **CB3.** To be able to integrate knowledge and face complexity in order to make judgements from an information that, being incomplete or limited, it would include issues of social and ethical responsibilities directly related to the application of this knowledge and judgements.
- **CB4.** To be able to communicate conclusions –and knowledge and reasons that support them– to either specialized or not specialised publics in a clear way and without ambiguities.
- **CG13.** Knowledge, understanding and capacity to apply the necessary legislation in order to practice the profession of Industrial Engineer.

General Competences according to Ordre CIN/311/2009 and EPS criteria:

- **CG2.** Capacity to consider the socioeconomic context as well as the sustainability criteria in the engineering

solutions.

Specific Competences according to Ordre CIN/311/2009:

- **CE14.** Knowledge and skills to carry out verification and control of installations, processes and products.
- **CE15.** Knowledge and skills to carry out certifications, audits, verifications, essays and reports.

Subject contents

Block I: CONTROL AND AUDITS

Theory Program

Chapter 1. Introduction: energy and energy efficiency

Chapter 2.- Control and audits

2.1. Introduction

2.2. Definition: energetic audit

2.3. Objectives

2.4. Type of study and energetic audits

2.5. Audit team: who is in charge of an audit?

2.6. Legislation

2.7. Steps in an energetic audit

Chapter 3: Building energy analysis

Block II: CERTIFICATIONS

Theory Program

Chapter 1. Certifications

1.1. Introduction

1.2. Situation in Catalonia, Spain and Europe

Chapter 2. Energetic certification in buildings

2.1. Energy and edification

2.2. Legislation

2.3. Energetic certification in buildings

2.4. Certification process in Catalonia

2.5. Software

Chapter 3. Other types of certifications in buildings: environmental

Methodology

The activities will be divided into three parts that complement each other: lectures, visits and seminars and problem solving.

- **Lectures:** In the lectures expose the contents of the subject orally by the teacher without the active participation of students.
- **Visits and seminars:** Practical sessions where students will play an active role: individual or in-group activities.
- **Problem solving:** In problem solving sessions teachers present a complex issue that students should solve, whether working individually or in teams .

Development plan

Week	Methodology	Topic	Lecture hours	Autonomous work hours	Professor
1	Lecture	Presentation and introduction	2	3	Marc Medrano J. V. Marín
1	Lecture	BLOCK I. Chapter 1. Introduction: energy and energy efficiency	2	3	J. V. Marín
2-5	Lecture Problems resolution	BLOCK I. Chapter 2. Control and audits	12	18	J. V. Marín
6-8	Lecture Problems resolution	BLOCK I. Chapter 3. Analysis of building energy data	12	18	Marc Medrano
9		Evaluation. Written test.	2	3	Marc Medrano J. V. Marín
10-12	Lecture Problems resolution	BLOCK I. Chapter 3. . Analysis of building energy data	10	15	Marc Medrano

12-13	Lecture Problems resolution	BLOCK II. Chapter 1. Certifications	8	12	J. V. Marín
14-15	Lecture Problems resolution	BLOCK II. Chapter 2. Energetic Certifications in buildings	10	15	J. V. Marín
15	Lecture Problems resolution	BLOCK II. Chapter 3. Other certifications	2	3	J. V. Marín
16-19		Evaluation Written test Recovery			Marc Medrano J. V. Marín

Evaluation

Evaluation activities	%	Dates	C/V (1)	I/G (2)	Observations
PA1: Written report about visit	25	Week 9	C	G	
PA2: Oral presentation about visit	25	Week 9	C	I	
PA3: Written report of buiding energy analysis	20	Week 15	C	G	
PA4: Oral presentation of buiding energy analysis	20	Week 10	C	I	
PA5: Class exercises	10	Along the course	C	G	
PA5: Recovery exam		Week 19	C	I	

1. Compulsory/Voluntary
2. Individual/Groups

Bibliography

Basic bibliography

Energy audits

-“Procedimientos para la determinación del rendimiento energético de plantas enfriadoras de agua y equipos autónomos de tratamiento de aire”. Colección Guías Técnicas de Ahorro y Eficiencia Energética en Climatización, 2. Ed. IDAE, 2007. . (Versión pdf en la web del

IDAE).

-“Procedimientos de inspección periódica de eficiencia energética para calderas”.

Colección Guías Técnicas de Ahorro y Eficiencia Energética en Climatización, 5. Ed. IDAE, 2007. . (Versión pdf en la web del IDAE).

-“Contabilización de consumos”. Colección Guías Técnicas de Ahorro y Eficiencia Energética en Climatización, 6. Ed. IDAE, 2007. . (Versión pdf en la web del IDAE).

-“Estalvi i eficiència energètica en Edificis Públics. Guia de bones pràctiques” (Versión pdf en la web del ICAEN)

-“Eficiencia Energética en Edificios. Certificación i Auditorias Energéticas” Ed. Parainfo

-“Ahorro y Eficiencia Energética en Instalaciones Ganaderas”. Ed. IDAE, 2005 (Versión pdf en la web del IDAE).

-“Protocolo de Auditoría Energética de las Instalaciones de Alumbrado Público Exterior”.

Ed. IDAE, 2008 (Versión pdf en la web del IDAE).

-“Aislamiento en edificios: Guías Técnicas para la Rehabilitación de la Envoltura Térmica de los Edificios”. Ed. IDAE, 2007. . (Versión pdf en la web del IDAE).

-“Avaluació energètica d'edificis”. Edicions UPC

-Francisco Javier Rey Martínez, Eloy Velasco Gómez, "Eficiencia energética en edificios, Certificación y auditorías energéticas", Thomson, ISBN: 84-9732-419-6

Energy certifications

-IDAE

-ICAEN

-Directiva 2002/91/CE (Europa) i Directiva 2010/31/UE

—CTE, RITE, Real Decret RD47/2007, Projecte real decret RD2012

—Decret d'ecoeficiència RD 21/2006

—ISO 50001