Course guide

240IEN31 - 240IEN31 - Management and Energy Efficiency

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 724 - MMT - Department of Heat Engines.
Degree: MASTER’S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Optional subject).
Academic year: 2023  ECTS Credits: 4.5  Languages: Catalan

LECTURER

Coordinating lecturer: José Luis Martín Godoy
Others: Fernandez Francos, Xavier

REQUIREMENTS

thermodynamics, Thermal Engineering and Fluid Mechanics.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEEENE2. Manage the energetic chain (generation, transformation and use) to obtain the highest energetic efficiency in a process or product.

TEACHING METHODOLOGY

B. Students will not face different activities scheduled throughout the year chronologically
1. Study the documentation provided on each topic
2. It promotes continuous work throughout the year with the proposal and collection problems.
3. Resolution of the Digital Campus exercises on the subject you are trying to classe (weekly)

LEARNING OBJECTIVES OF THE SUBJECT

Understanding and interpreting energy as a vector consisting of several components: thermodynamic, economic, environmental, affecting some thermal energy transformation processes. Students will learn to analyze and determine opportunities for energy savings in different scenarios (industrial, residential and tertiary), propose solutions and study their technical and economic viability, taking into account the current regulatory framework. As a practical case, they will carry out an audit and energy certification of a residential or tertiary building.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>72,0</td>
<td>64.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>27,0</td>
<td>24.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>13,5</td>
<td>12.00</td>
</tr>
</tbody>
</table>

Total learning time: 112.5 h
## CONTENTS

### Introduction: Energy efficiency and energy management systems. ISO50001 standard

**Description:**

**Full-or-part-time:** 1h 30m  
Theory classes: 1h 30m

### Energy balances and Thermoeconomics

**Description:**

**Full-or-part-time:** 3h  
Theory classes: 3h

### Energy audit and certification

**Description:**

**Full-or-part-time:** 4h 30m  
Theory classes: 4h 30m

### Production, distribution and use of heat

**Description:**
Efficiency in heat production in boilers and ovens. Distribution, recovery and internal use of heat. Centralized heating and cooling production: District Heating and Cooling

**Full-or-part-time:** 6h  
Theory classes: 6h

### Cogeneration and Polygeneration systems

**Description:**

**Full-or-part-time:** 3h  
Theory classes: 3h
Heat pumps

**Description:**

**Full-or-part-time:** 3h
Theory classes: 3h

Energy storage systems

**Description:**
We describe some electrical energy storage systems such as compressed air tanks, liquid air, reversible hydroelectric power stations, hydrogen production and fuel cells, batteries, ...

**Full-or-part-time:** 1h 30m
Theory classes: 1h 30m

Project

**Description:**
In the development of the subject, active learning methodologies based on projects (PBL) and cooperative work will be employed. It will consist of an energy audit and certification of a tertiary or residential building.

**Full-or-part-time:** 12h
Theory classes: 12h

**GRADING SYSTEM**

The qualification of the student will be

\[ N_{\text{final}} = 0,50 N_{\text{ef}} + 0,15 N_{\text{prof}} + 0,35 N_{\text{proj}} \]

RETAKE: the retake exam replace the final exam + Nprof

Nfinal: Final note
Nef: Note final exam
Nproj: Note the project or course work
Nprof: Note teacher’s continuous assessment

**EXAMINATION RULES.**

The final exam, about 3h approximately consist of short questions and problems are.

During the short questions will not be allowed to consult any material, whereas the resolution of the problems must be take notes because occasionally conducting an exercise could be allowed to consult additional material which communicates the same
BIBLIOGRAPHY

Basic:

Complementary: