Course guide
820769 - EEI - Industrial Energy Efficiency

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering.

Degree:
MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Optional subject).
MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Optional subject).
MASTER'S DEGREE IN ELECTRIC POWER SYSTEMS AND DRIVES (Syllabus 2021). (Optional subject).
MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2022). (Optional subject).

Academic year: 2022  ECTS Credits: 5.0  Languages: English

LECTURER

Coordinating lecturer: ANDREAS SUMPER
Others: Sumper, Andreas
         Cadafalch Rabasa, Jordi
         Konuray, Ali Osman

PRIOR SKILLS

Basics of Electrical and Thermal Equipment

REQUIREMENTS

Bachelor

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEMT-4. Efficiently collect data on renewable energy resources and their statistical treatment and apply knowledge and endpoint criteria in the design and evaluation of technology solutions for using renewable energy resources, for both isolated systems and those connected to networks. They will also be able to recognise and evaluate the newest technological applications in the use of renewable energy resources.
CEMT-3. Assess the economic, social and environmental impact of the production, use and management of energy, with a holistic view of the life cycle of the different systems, and recognise and value the most remarkable developments in the fields of energy efficiency and the rational use of energy.
CEMT-5. Employ technical and economic criteria to select the most appropriate thermal equipment for a given application, dimension thermal equipment and facilities, and recognise and evaluate the newest technological applications in the production, transportation, distribution, storage and use of thermal energy.
TEACHING METHODOLOGY

During the development of the course will be used the following teaching methods:

- Lecture or conference (EXP): exhibition of knowledge by teachers through lectures by guest speakers.
- Participatory classes (PART): collective resolution of exercises, conducting debates and group dynamics with the teacher and other students in the classroom; presentation of a classroom activity performed individually or in small groups.
- Work conducted theoretical and practical (TD): completion of a classroom activity or exercise theoretical or practical, individually or in small groups, with the advice of the teacher.
- Project, with reduced work scope (PR): learning based on the conducting individual or group to work reduced complexity or length, applying knowledge and presenting results.
- Project with large work scope (PA): based learning design, planning and implementation of a project or group work full complexity or length, applying and expanding knowledge and writing a report. This approach and the results and conclusions.
- Evaluation Activities (EV).

LEARNING OBJECTIVES OF THE SUBJECT

To know the most important technologies and methodologies for Energy Efficiency in Industrial Energy Systems
- Understand the most important energy technologies both electrical and thermal
- Understand the energy efficiency methodologies
- Acquire knowledge on optimization for efficiency problems
- Understand and solve specific problems in engineering

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>80,0</td>
<td>66.67</td>
</tr>
<tr>
<td>Hours small group</td>
<td>30,0</td>
<td>25.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>10,0</td>
<td>8.33</td>
</tr>
</tbody>
</table>

Total learning time: 120 h

CONTENTS

Introduction

Description:
Introduction to energy efficiency.

Specific objectives:
Understand the most important energy technologies, both electrical and thermal.

Full-or-part-time: 16h
- Theory classes: 2h
- Practical classes: 2h
- Guided activities: 2h
- Self study: 10h
### Lighting

**Description:**
Lighting technology for industrial applications.

**Full-or-part-time:** 25h
- Theory classes: 4h
- Practical classes: 2h
- Guided activities: 4h
- Self study: 15h

### Industrial heating

**Description:**
Industrial heating techniques

**Full-or-part-time:** 25h
- Theory classes: 4h
- Practical classes: 2h
- Guided activities: 4h
- Self study: 15h

### Motors, drives and power electronics

**Description:**
Motors, drives and power electronics

**Full-or-part-time:** 25h
- Theory classes: 5h
- Practical classes: 1h
- Guided activities: 4h
- Self study: 15h

### Thermal efficiency

**Description:**
- Introduction
- Exergy balance
- Cycles and machines

**Full-or-part-time:** 34h
- Theory classes: 10h
- Laboratory classes: 6h
- Guided activities: 3h
- Self study: 15h
GRADING SYSTEM

In order to be able to have an evaluation of the subject, it is a necessary condition to have attended, carried out and delivered the reports of all the laboratory sessions and of the study case. In case this necessary condition is not met, the grade will be NP (Not Presented). If the necessary condition is met, then the calculation will be as follows:

The final grade is calculated by the weighted sum of the following parts:
- Report Thermic 10%
- Report Thermic Problem 10%
- Calculation problem Electric 10%
- Study Case Report and Presentation: 20%
- Final Exam Electric: 35%
- Final Exam Thermic: 15%

EXAMINATION RULES.

Individual evaluation of the theory content by tests, problem-based learning, production of reports, presentations

BIBLIOGRAPHY

Basic: