Universidad Zaragoza

Academic Year/course: 2024/25

69966 - Energy Audits, Certification and Energy Management in buildings (BEMS) in dual mention

Syllabus Information

Academic year: 2024/25
Subject: 69966 - Energy Audits, Certification and Energy Management in buildings (BEMS) in dual mention
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 657 - Master in Mechanical Engineering
ECTS: 3.0
Year: 1
Semester: Second semester
Subject type: Optional
Module:

1. General information

Objectives of the subject

This subject is part of the Air Conditioning Module of optional subjects of the Master's Degree. Its objective is specialized training in the evaluation and improvement of the energy efficiency of buildings, applying the tools of certification, auditing and energy management in order to analyze and reduce their energy consumption and associated environmental impacts.

The Dual Mention takes advantage of the knowledge and human and material resources available to the company to strengthen the integration of the learning of technologies with their practical application in a company.

Recommendations for taking the subject

It is advisable to have prior knowledge of heat transmission and air conditioning systems. To pass the subject, continuous work and study is required from the first day of its delivery. Attendance at theory and problem classes and practice sessions is highly recommended. Likewise, the continued use and use of tutorials to resolve doubts is recommended.

2. Learning results

1. Identify the regulatory context and understand the usual methodology and terminology used in energy certifications and audits.
2. Understand the main energy efficiency measures, analysing what they consist of, advantages and disadvantages.
3. Carry out an energy audit of any building for residential or tertiary use and present its results orally and in a written report.
4. Identify, size and verify electrical installations within the professional tasks of the mechanical engineer.
5. Describe the basic fundamentals for monitoring and remote management of energy installations in buildings.

3. Syllabus

In each Individual Training Plan, the specific objectives and milestones of the subject in the company are specified. There is a tutor in the company, who ensures the learning of technologies and work methodologies and their application to the company's production processes and products.

Syllabus

1. - THERMAL ENVELOPE.
2. - REGULATIONS AND TECHNICAL CONDITIONS FOR ENERGY INSTALLATIONS IN BUILDINGS.

   Thermal and electrical energy consumption systems: air conditioning, DHW, lighting, etc. Renewable energy generation systems and infrastructures for electric vehicles. Conditions of operation and occupation.

2. - ENERGY EFFICIENCY MEASURES (MAEs).
3. - ENERGY EFFICIENCY INDICATORS IN BUILDINGS.
4. - ENERGY CERTIFICATION OF BUILDINGS.
5. - ENERGY AUDITS IN BUILDINGS. Regulations. Energy billing. Evaluation of improvements.
6. - INTRODUCTION TO ENERGY MEASUREMENT AND MANAGEMENT SYSTEMS. Automation data collection and measurement equipment.

Laboratory practices

1. - Obtaining energy efficiency indicators in a building.
2. - Identification and energy assessment of improvement measures in a building.
3. 3-Economic evaluation of improvement measures in a building.

4. Academic activities

- Master class and problem and case solving (20 hours).
- Computer practice (6 hours).
- Special practices: Visits to buildings with remotely managed energy installations (4 hours).
- Study and personal and team work. (42 hours)
- Evaluation tests. (3 hours)

In addition to the above activities, there is personalized teacher-student tutoring in the tutorial schedule published by the teacher. The hours indicated are indicative and will be adjusted depending on the academic calendar of the course. At the beginning of the academic year, the detailed calendar of practical sessions will be informed, which will be set according to the progress of the programme.

The alternating contract includes the schedule that the student must remain at the university centre to attend training activities. During the working day in the company, a programme of activities is also agreed to achieve the objectives and milestones specified in the Individual Training Plan.

5. Assessment system

The subject is preferably planned with continuous **evaluation** through the following activities:

1. Work nº1: Evaluation of energy efficiency indicators in a building. Delivery of written report. (40%, minimum score 4/10)
2. Work nº2: Energy audit of a building. Delivery of the written report and oral presentation of the work to the whole class. (60%, minimum grade 4/10)

The subject work is developed on technical cases of the company. The adjustment of its scope and the assessment criteria are established between the professor responsible for the subject and the company tutor. The delivery of the reports corresponding to the work and the oral presentation of work nº2 must be made on the dates indicated by the professor at the beginning of the subject.

In the event of not exceeding the minimum marks, there is the possibility of recovery on the same date established for the global exam.

The student also has the possibility of passing the subject through the **global evaluation** in the official calls. The evaluation will be carried out by means of a theoretical-practical test on the dates established by the center.

The following aspects will be assessed in the evaluation activities:

- Correct approach to the resolution procedures and/or the work methodology.
- Accuracy and critical analysis of results: consistency with units and orders of magnitude.
- Correctness and clarity in communication.
- Delivery within the stipulated time.

6. Sustainable Development Goals

7 - Affordable and Clean Energy
9 - Industry, Innovation and Infrastructure
13 - Climate Action