

Academic Year/course: 2022/23

## 66366 - Energy efficiency in industry

### Syllabus Information

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**Academic Year:** 2022/23

**Subject:** 66366 - Energy efficiency in industry

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 636 - Master's in Renewable Energies and Energy Efficiency

**ECTS:** 6.0

**Year:** 1

**Semester:** Second semester

**Subject Type:** Optional

**Module:**

## 1. General information

### 1.1. Aims of the course

This course aims to provide the students with scientific and technical knowledge about process and technologies in the area of industrial energy efficiency. Current situation and future trends will be explored within the course in the framework of circular economy.

These overall objectives are aligned with Sustainable Development Goals , SDG, from 2030 Agenda ( <https://www.un.org/sustainabledevelopment/es/>) and specific challenges such as:

SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all.

Target 7.1 By 2030, ensure universal access to affordable, reliable, and modern energy services

Target 7.2 Increase substantially the share of renewable energy in the global energy mix by 2030

SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Target 9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, particularly developing countries, including by 2030 encouraging innovation and increasing the number of R&D workers per one million people by x% and public and private R&D spending

SDG 13: Take urgent action to combat climate change and its impacts

Target 13.3 Improve education, awareness raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning.

## 2. Learning goals

## 3. Assessment (1st and 2nd call)

## 4. Methodology, learning tasks, syllabus and resources

### 4.1. Methodological overview

The methodology applied in this course is oriented toward achieving the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

- Lectures. Explanation of the topic theoretical principles and solving of some model problems.
- Practice sessions. Sessions with problem-solving, case studies and laboratory practice are the lectures' support since they enable the learning of the contents through the development of a more applied knowledge.
- Assignments will complement the work done in lectures and practice sessions.

## 4.2. Learning tasks

The course includes the following learning tasks:

- Lectures (12 hours)
- Practice sessions (30 hours). Problems and case studies.
- Laboratory sessions (15 hours)
- Guided tasks (30 hours). The student will give a talk summarizing the main aspects of his/her work in a public defence.
- Lecturer-student tutorship sessions (6 hours)
- Autonomous work and study (52 hours)
- Assessment (5 hours)

The number of hours represents an estimation and they will be tuned according to the academic timetable of the course.

At the beginning of the course, the lab session schedule will be provided. This schedule will depend on the evolution of the course and the availability of labs and computer rooms.

## 4.3. Syllabus

The contents of the course include:

### PART I.- ENERGY INTENSIVE INDUSTRIES

- 1.1. Energy audits in the industry. EVO protocol, ISO 50001...
- 1.2. Sector analysis of the energy-intensive industries. Reference documents in the industrial sectors (BREF).
- 1.3. Best available practices and technologies in the industrial sectors (BAT).

### PART II.- INDUSTRIAL ECOLOGY AND THERMOECONOMY

- 2.1. Industrial ecology. Industrial symbiosis case studies: Energy, material and water district networks applied to the industrial sectors, solar energy as the supplier of process heat, industrial cogeneration and poligeneration.
- 2.2. Application of Thermoecconomy to the energy-intensive industry. Real case studies of the use of thermoecconomy in complex industrial systems.

## 4.4. Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class please refer to the EINA website, the Master?s and the course?s <https://moodle.unizar.es/>